中国心血管病报告 2007

REPORT ON CARDIOVASCULAR DISEASES IN CHINA (2007)

卫生部心血管病防治研究中心
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编写说明

《中国心血管病报告2007》编撰过程及特点如下。

1．组织了中青年专家组成的编撰小组，多次召开会议讨论编撰方法和内容。编撰了心血管病危险因素（高血压、吸烟、血脂异常、代谢综合征、身体活动不足、超重/肥胖、膳食与营养)和心血管病流行状况部分。

2．临床专家编撰了冠心病、脑卒中、慢性肾脏病、心血管外科、心律失常。社区防治专家编撰了高血压社区防治范例。卫生部卫生经济研究所专家编撰了卫生经济学部分。

3．召开全体专家组会议3次，制定编撰原则和审改初稿。核心小组审改稿件3次，集体定稿。

4．参考美国心脏病和脑卒中统计报告的方法。

5．2007年报告内容包括了2007年12月31日前发表的数据。但由于种种原因，很可能有遗漏的。希望读者提供有关数据，使年报内容更加全面翔实。

6．常用缩写。

心血管病：CVD
缺血性心脏病：IHD
心力衰竭：HF
血清总胆固醇：TC
血清甘油三酯：TG
血清低密度脂蛋白-胆固醇：LDL-C
血清高密度脂蛋白-胆固醇：HDL-C
急性心肌梗死：AMI
慢性肾脏病：CKD
终末期肾病：ESRD
肾小球滤过率：GFR
血压：BP
心率：HR
体重指数：BMI
相对危险：RR
人群归因危险：PARP
95%可信区间：95%CI
血管紧张素转换酶抑制剂：ACEI
冠状动脉旁路移植术：CABG
经皮冠状动脉干预：PCI
国际标准化比值(抗凝)：INR

《中国心血管病报告2007》概要

《中国心血管病报告2007》是中国第三部心血管病流行状况和防治研究重要进展的权威报告。报告为国家卫生政策制定、防治研究提供了重要参考和依据。报告内容涵盖了中国心血管病流行趋势、死亡率及重要危险因素，也包括了临床研究重要进展和社区防治范例。

《中国心血管病报告2007》概要如下：

1．心血管病是我国重大公共卫生问题

改革开放30年来，我国经济快速发展，人民健康总体上有很大改善。但心血管病的发病持续增加，且有年轻化趋势。心血管病的高发病率，高致残率和高死亡率成为我国重大公共卫生问题。

估计我国心血管病现患人数至少2.3亿，每10个成年人中有2人是心血管病。估计每年新发脑卒中至少200万人，现患脑卒中至少700万人；新发心肌梗死至少50万人，现患心肌梗死至少200万人。

估计我国每年心血管病死亡300万人，每死亡3人中就有1人是心血管病。我国每天心血管病死亡8 400人，每10.5秒就有1人死于心血管病。

2．心血管病危险因素水平持续升高

我国心血管病的主要危险因素是高血压、吸烟、高胆固醇血症、超重/肥胖、糖尿病等。我国心血管病危险因素水平持续升高。

（1）高血压

据卫生部2002年全国居民营养调查和健康状况的调查，我国成人高血压患病率为18.8%，比1991年增加31%；估算高血压现患至少2亿人。我国高血压流行趋势呈以下特点：

- 城市成人高血压患病率高于农村，但此差距正在缩小。
- 45岁以前，男性高血压患病率高于女性，45岁以后则女性高于男性。
- 北方人群高血压患病率高于南方人群。
- 藏族人群高血压患病率最高，苗族则最低。

● 人群中正常高值血压(120～139mmHg/80～89mmHg)检出率达34%,正常高值血压是高血压的后备军。

● 我国单纯收缩期高血压患病率6.0%,估计全国有5 000万人。

● 我国人群高血压知晓率、治疗率、控制率及治疗控制率分别为30%,25%,6%和25%,虽较1991年有较大改善，但仍处于较低水平。

● 儿童高血压：教育部中学生体质与健康调查，测量了7～18岁学龄儿童血压，1995年与1991年比较,城市男女儿童收缩压偏高检出率上升了42.5%和45.5%;农村男女儿童上升了23.7%和31.0%;华北区汉族儿童收缩压偏高检出率最高(2.1%～3.4%),西南区最低(0.2%～0.6%)。首都“七五”儿童高血压队列研究18年随访发现，基线血压高的儿童中,42.9%个体发展为成年高血压。

（2）吸烟

据2002年全国调查,我国15岁以上人群吸烟率35.8%(男66.0%，女3.1%），推算全国吸烟人数3.5亿，(其中13～18岁青少年吸烟1 500万人），被动吸烟5.4亿人。值得警惕的是，我国15～24岁青少年人群中吸烟率呈上升趋势。吸烟是我国人群心血管病发病和死亡的重要危险因素，也是肿瘤、呼吸系统疾病的主要危险因素。

多省市队列研究表明，与不吸烟比，吸烟者急性冠心病的发病危险是1.75倍，急性缺血性卒中发病危险是1.37倍。中美队列也表明吸烟者缺血性心血管病发病危险增加了59%～100%。

（3）血脂异常

● 据2002年全国营养和健康状况调查，我国成年人血脂异常患病率为18.6%，估算现患人数近2亿；其中高胆固醇血症为2.9%，高甘油三酯血症为11.9%，低HDL-C血症为3.9%。高胆固醇血症患病率城市高于农村，45岁以前男性高于女性，45岁以上女性高于男性。

● 中美队列和多省市队列研究表明，随血总胆固醇水平升高，缺血性心血管病发病危险增加。

● 2007年《中国成人血脂异常防治指南》发布，提出适合国人的“血脂水平分层标准”、“血脂异常危险分层方案”，为我国血脂异常防治提供了参考和指导。

● 据2000～2001年我国10省市人群抽样调查，高胆固醇血症的知晓率、治疗率和控制率在男女中分别为21.3%和14.0%，11.3%和18.1%，11.6%和9.5%。

● 2007北京儿童调查显示，肥胖儿童血脂异常（血总胆固醇水平≥5.20mmol/L或TG≥1.70mmol/L）达30%。

（4）超重/肥胖

● 近三十年来，我国居民超重/肥胖率呈持续上升趋势。据2002年全国居民营养与健康状况调查，我国居民超重率为17.6%，肥胖率5.6%；与1992年调查比，分别增加了38.6%和80.6%。估计两者现患人数达2.4亿。

● 我国9省市研究及其他研究表明，随着体重指数的增加或腰围增加，高血压患病率增加。

（5）体力活动不足

体力活动不足与超重/肥胖、高血压、糖尿病的发生风险密切相关，与总死亡及心血管病死亡风险也有关。

我国大城市居民体力活动充分率占34%，提示大部分大城市居民体力活动不足。

（6）膳食与营养

● 2002年全国调查城市居民脂肪摄入量为86克，农村为73克；城市居民脂肪供能比达到35%(膳食指南推荐为少于30%)。

● 2002年膳食盐摄入量每天15.9克，超过世界卫生组织推荐的5克/日。

● 国内研究提示低盐、补钾或代替盐干预，均可轻度降低受试者血压水平。补充大量蛋白也可轻度降低血压水平。

（7）代谢综合征

● 2002年调查，我国15岁以上人群代谢综合征（中国糖尿病分会标准）患病粗率为6.6%，城市高于农村。

● 代谢综合征增加了冠心病、脑卒中的发病危险。

3．人群防治和临床研究取得进展

（1）冠心病

● 2006年冠心病死亡粗率城市为57.1/10万人，农村为33.7/10万人。

● 冠心病主要危险因素是高血压、吸烟、高胆固醇血症、超重/肥胖、糖尿病等。

● 冠脉介入治疗注册：大陆地区2006年注册112 580例，比2005年增加16 000余例。

● CCSPS研究亚组分析表明，血脂康对老年心肌梗死的治疗是安全有效的；可明显减少Ⅱ型糖尿病和冠心病患者的心血管事件。

（2）脑卒中

● 1991～2000年间，北京、上海和长沙三个城市社区进行健康教育和健康促进活动的干预结果表明：干预组全部脑卒中、缺血性卒中、出血性卒中的发病风险分别下降了11.4%，13.2%和7.2%。

● 脑卒中的危险因素有高血压、血脂异常、房颤、糖尿病等。

脑卒中二级预防

● 我国一组6年降压治疗的随机对照临床研究结果表明，降低脑血管病患者血压水平，可明显减少脑卒中再发危险2/5。

● 我国房颤抗栓协作组报道，华法令（INR2.0～3.0）与阿司匹林比较可有效降低房颤患者的缺血性卒中事件及死亡危险。

（3）慢性肾脏病（CKD）

● 冠心病人群中CKD患病率为24.8%。

● CKD是糖尿病患者发生心血管事件的高危因素。

● 40岁以上人群，与正常血压比较，血压正常高值、I期、II期高血压发生终末期肾病的相对危险是1.3，1.5和2.6。

（4）心血管外科

● 近四年来，大陆地区心外科手术量平均每年以14%的速率递增。2007年手术达136 015例，比2006年有所增加。

● 2007年心脏移植130例。

● GABG手术死亡率女性高于男性，体重指数＜20或＞35kg/m^2者死亡率均增高。

● 心脏瓣膜手术早期死亡率2.8%～8.6%；术后5,10,15年生存率分别为89%，84%和65%。

（5）外周血管病

下肢动脉硬化症患病率2.1%～22.5%，吸烟、糖尿病、血脂异常、高血压是其危险因素。

（6）心律失常

● 2007年起博器置入量估计为35 000台，用于病窦综合征的占50%。

● 2007年射频消融约20 000例，用于治疗室上性心动过速的占88%。

● 我国30岁以上人群房颤患病率为0.77%；射频消融治疗房颤的例数增长迅速。

● 我国人群心脏性猝死发生率为41.8/10万人（男44.6/10万，女39.0/10万），估计我国每年发生心脏性猝死54.4万人。

（7）心血管病社区防治范例

● 首钢经验：1969年开始，在阜外医院专家指导下，首钢地区开展心血管病人群防治工作，建立了三级医院、首钢心血管病防治所和保健站组成的心血管病防治网络，对高血压患者分级管理，取得显著效果。

1974～1995年，2 736例高血压综合管理，使男性血压水平由145/92mmHg降至137/84mmHg。

1974～2001年，首钢社区28年疾病监测结果显示：脑卒中发病率由138/10万人降至64/10万，脑卒中死亡率由52/10万下降至18/10万。

● 三城市社区人群脑卒中综合干预

1991年～2000年，国家“八五”、“九五”科技攻关课题，北京、上海、长沙开展社区人群脑血管病综合干预研究，通过健康教育和健康促进活动，干预高血压等重点人群。干预9年，与对照社区比较，干预社区脑卒中发病风险减少11.4%。

第一部分　心血管病

1.1 心血管病患病人数

估计我国心血管病(冠心病、脑卒中、心衰、高血压等)现患人数2.3亿，每10个成年人中有2人患有心血管病。其中高血压2亿，脑卒中700万，心肌梗死200万，心衰420万，肺心病500万，风心病250万，先心病200万。

1.2 心血管病死亡状况

估计我国每年死于心血管病的人约300万，每3个人死亡至少有1人是死于心血管疾病，每天心血管病死亡8 400人，约10.5秒钟就有1人因心血管病死亡。

1.3 心血管病死亡率及死因构成比

(1)中国心血管病死亡率居高不下，2006年与1990，1995，2000和2005年一样，心血管病死亡率仍居首位，高于肿瘤及其他疾病(见图1-3(1),图1-3(2))。[1]

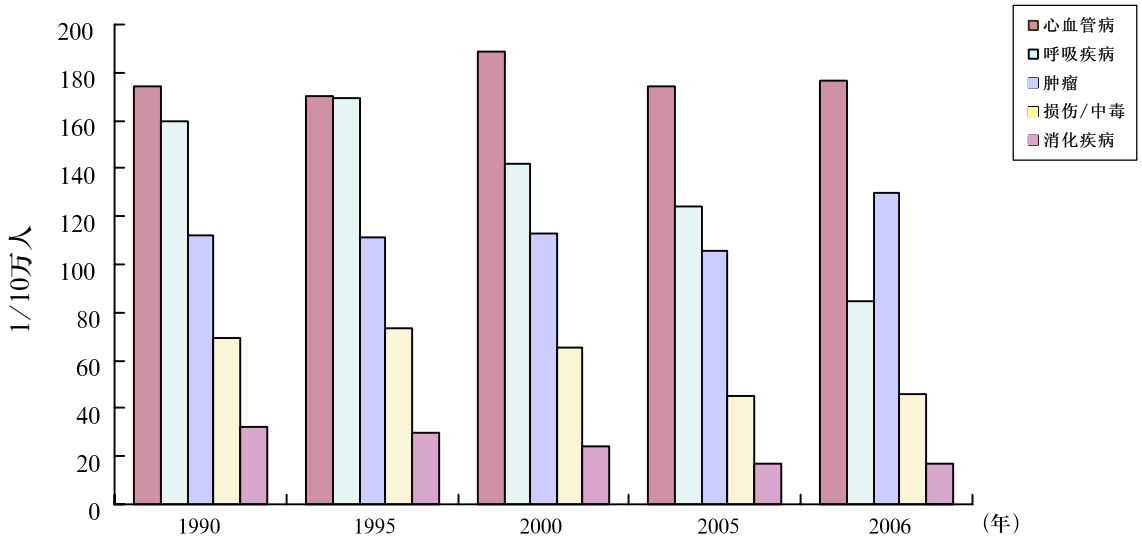

图1-3（1）　近16年我国农村居民主要疾病死亡率变化

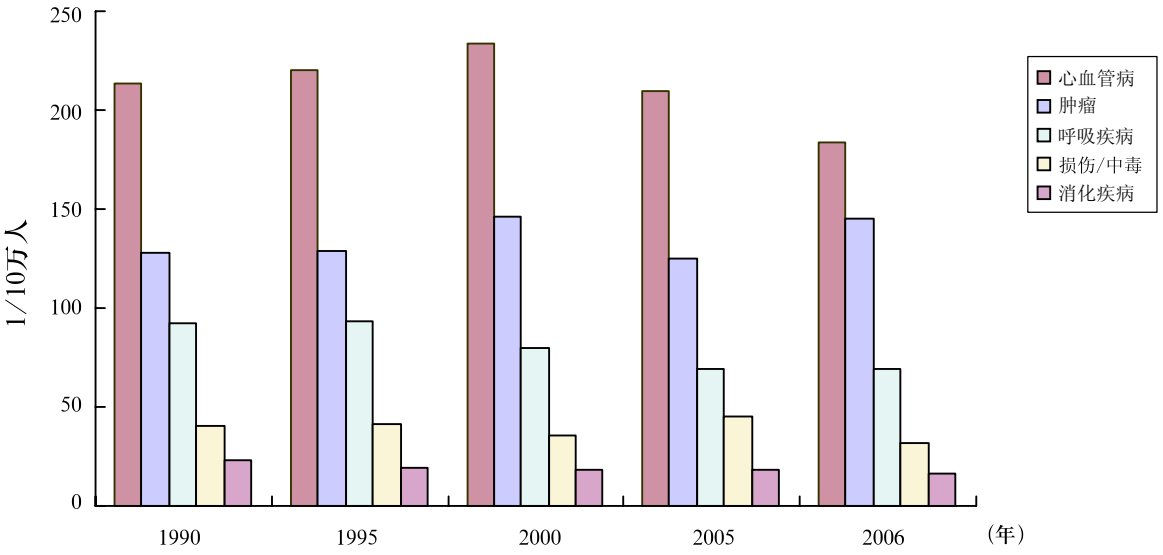

图1-3（2） 近16年我国城市居民主要疾病死亡率变化

(2)中国城乡居民主要疾病死亡构成比中,心血管病占首位(图1-3(3),1-3(4))

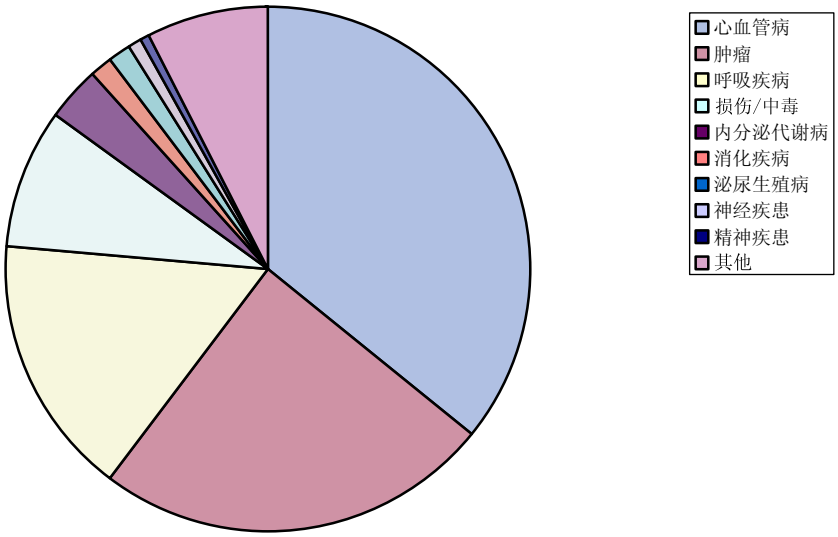

图1-3（3） 2006年我国农村居民主要疾病死因构成比（%）

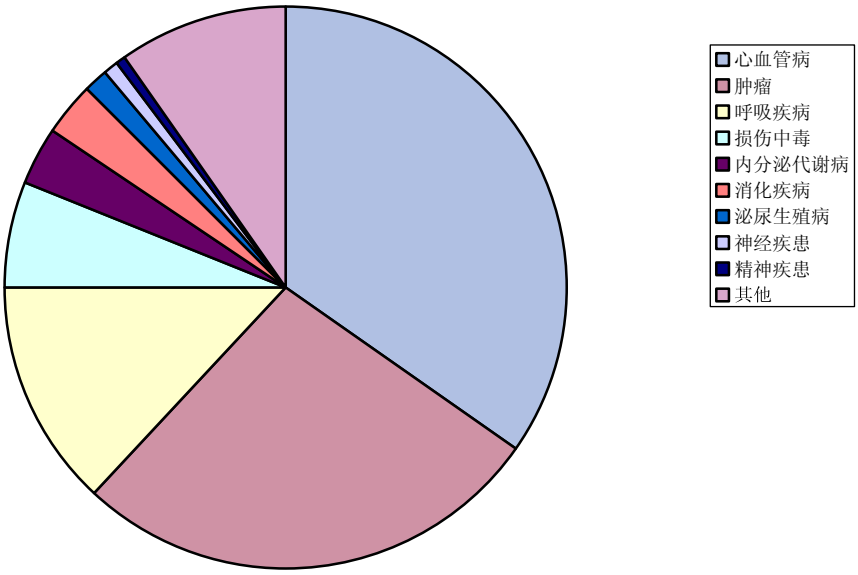

图1-3（4）　2006年我国城市居民主要疾病死因构成比（%）

1.4 首钢男工随访21年死亡原因

按MONICA方案[2]，对首钢地区5 137名平均45岁的男工平均随访20.8年，死亡760例。全因死亡率733/10万人年，年龄标化死亡率643/10万人年。前三位死亡原因分别是肿瘤，脑卒中和心脏病，死亡率分别为231，139和96.4/10万人年。按国际惯例，脑卒中和心脏病统称为心血管病，心血管病死亡位列首位。前三位死亡的主要危险因素是高血压、吸烟和高胆固醇血症，总死亡相对危险分别是1.62[95%CI(1.37～1.90)]，1.44[95%CI(1.17～1.77)]和1.27[95%CI(1.06～1.54)]。

1.5 西安退伍军人死因监测[3]

1987年入选1 268名男性退休军人，年龄为55岁及以上，每两年进行一次查体和标准问卷调查，截至2005年，共随访18年。随访人群中，491人死亡，748人存活，29人失访。调整死亡率为2 616/10万人年。三大主要死因是癌症、心脑血管病和慢性阻塞性肺病，其比例死亡率分别为39.71%，28.10%和16.90%。

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[2]段秀芳，吴锡桂，于学海等.首钢公司男工主要死亡原因的前瞻性研究.中华心血管病杂志，2006，34(7)：651～654.

[3] Sai XY, He Y, Men K, et al. *All-cause Mortality and Risk Factors in a Cohort of Retired Military Male Veterans,* Xi'an, China: *An 18-year Follow Up Study. BMC Public Health.* 2007 *Oct* 12;7:290.

第二部分　心血管病危险因素

2.1 高血压

2.1.1 原发性高血压

2.1.1.1 中国人群血压水平

根据2002年中国居民营养与健康状况调查的结果[1]，我国人群的平均血压水平随年龄的增加而增加。在45岁前，男性的收缩压高于女性，而在之后，则女性的收缩压高于男性。尽管女性的舒张压水平在各年龄段均低于男性，但45岁以后这种差距在缩小(表2-1-1(1))。

表2-1-1(1)中国15～74岁人群平均血压水平

年龄组	收缩压（mmHg）		舒张压（mmHg）	
	男	女	男	女
15~24	112.4	107.6	71.9	69.8
25~34	115.7	109.4	75.6	71.5
35~44	118.4	114.8	78.1	74.9
45~54	122.9	123.1	80.0	78.3
55~64	129.3	130.4	80.7	79.1
65~74	135.2	136.8	79.8	78.7

2002年中国居民营养与健康状况调查有关不同民族的高血压分析数据[2]显示，在可用于分析的l5岁以上人群152 683份资料中，满族男性、女性的平均收缩压水平最高，分别为126.2mmHg和125.7mmHg；而藏族男性、女性的平均舒张压水平最高，分别为85.7mmHg和81.6mmHg(表2-1-1(2))。

表2-1-1(2)中国不同民族15岁及以上人群平均血压水平

民族	收缩压（mmHg）		舒张压（mmHg）	
	男	女	男	女
汉族	123.3	120.3	78.6	75.9
蒙古族	123.3	123.3	78.2	77.1
回族	120.4	118.3	78.2	75.3
藏族	124.8	117.0	85.7	81.6

续表

民族	收缩压（mmHg）		舒张压（mmHg）	
	男	女	男	女
苗族	116.2	111.0	73.0	69.7
壮族	123.8	116.7	77.4	72.7
布依族	119.7	117.3	77.1	73.5
满族	126.2	125.7	79.4	77.7
土家族	122.6	121.0	74.4	73.1
其他民族	118.2	114.3	76.9	74.6
合计	123.1	120.0	78.5	75.7

2.1.1.2 高血压患病率

我国建国以来进行过4次大规模的高血压患病率调查，从历次调查的结果可以看出高血压的患病率呈明显的上升趋势(图2-1-1(1))。

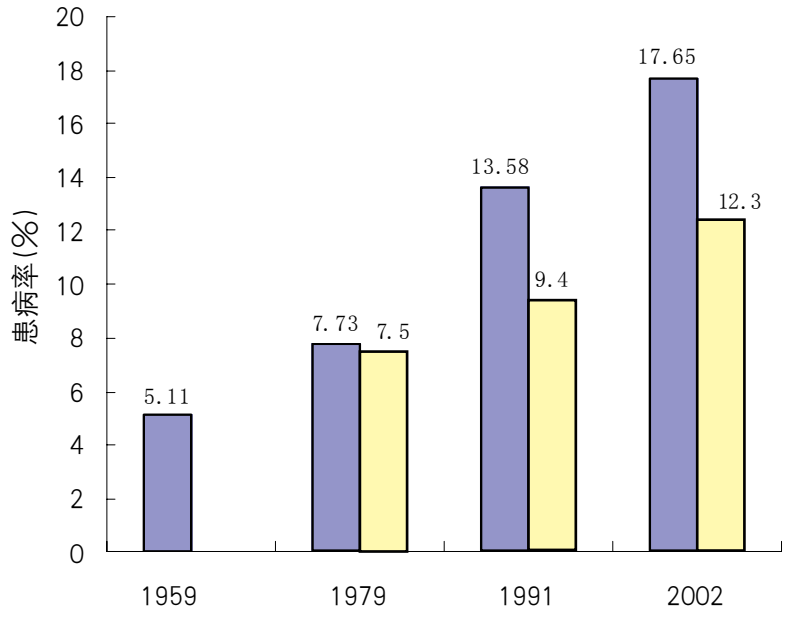

图2-1-1(1) 四次全国高血压调查15岁以上人群高血压患病率的比较

注：■为调查当年全国估计患病率。各次调查高血压诊断标准不尽相同：1959年为DBP＞90和/或39岁以下SBP＞140，40岁以后SBP年龄+10；1979～1980年为SBP≥141和/或DBP≥91，且未考虑2周内服药情况；1991年为SBP≥140和/或DBP≥90，或近两周内服用降压药；2002年同1991年。

□为年龄标化患病率。诊断标准统一采用1979～1980年标准，标准人口统一采用1964年全国人口，对象均为15岁以上年龄。血压单位均为毫米汞柱（mmHg）。

2002年中国居民营养与健康状况调查显示[3]，我国成人高血压患病率为18.8%，男性患病率高于女性，患病率随年龄的增加而呈上升趋势(表2-1-1(3))。按照这一患病率估算，2006年高血压患者人数约为2亿人。

表2-1-1(3)　2002年中国居民营养与健康状况调查高血压患病率的性别年龄分布(%)

性别与年龄	合计	城市	农村
合计	18.8	19.3	18.6
男性	20.2	21.8	19.6
女性	18.0	17.9	18.0
青年（18～44 岁）			
小计	9.1	9.4	9.0
男性	12.7	14.5	12.0
女性	6.7	6.1	6.9
中年（45～59 岁）			
小计	29.3	32.8	28.0
男性	28.6	33.1	26.9
女性	30.0	32.6	29.1
老年（≥60 岁）			
小计	49.1	54.4	47.2
男性	48.1	54.0	46.0
女性	50.2	54.9	48.4

按5岁1个年龄组分类，不同年龄段的患病率见图2-1-1(2)。无论男性、女性，随年龄增加高血压患病率增加明显。40岁以前，男性增加较女性明显；45岁以后，女性的高血压患病率要高于男性[4]。

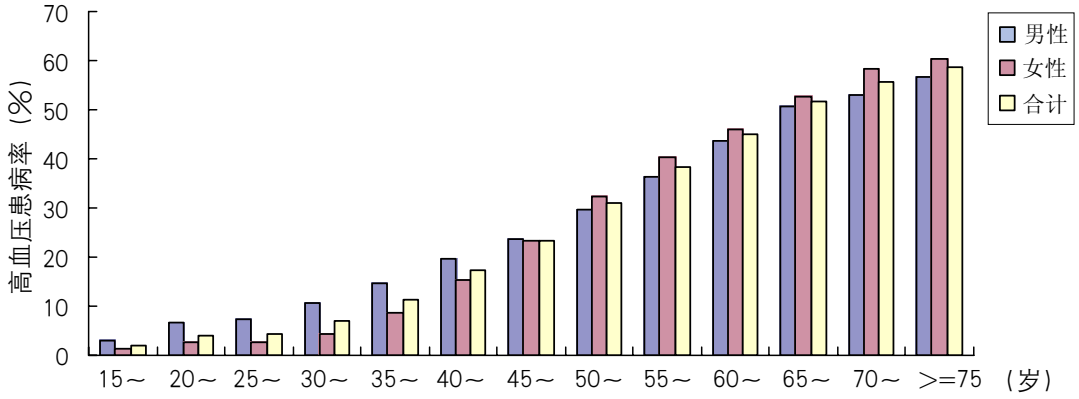

图2-1-1（2）　2002年中国人群不同年龄高血压患病率

引自：中国居民营养与健康状况调查报告之四2002高血压．北京：人民卫生出版社，23～36.

注：高血压的诊断标准为：收缩压≥140mmHg或舒张压≥90mmHg或近2周服用降压药。

从1979年到2002年的演变趋势看，不同性别都呈上升趋势(图2-1-1(3))。同样无论男性、女性，40岁以上年龄组增速加快、不同时期差异增大[5]。

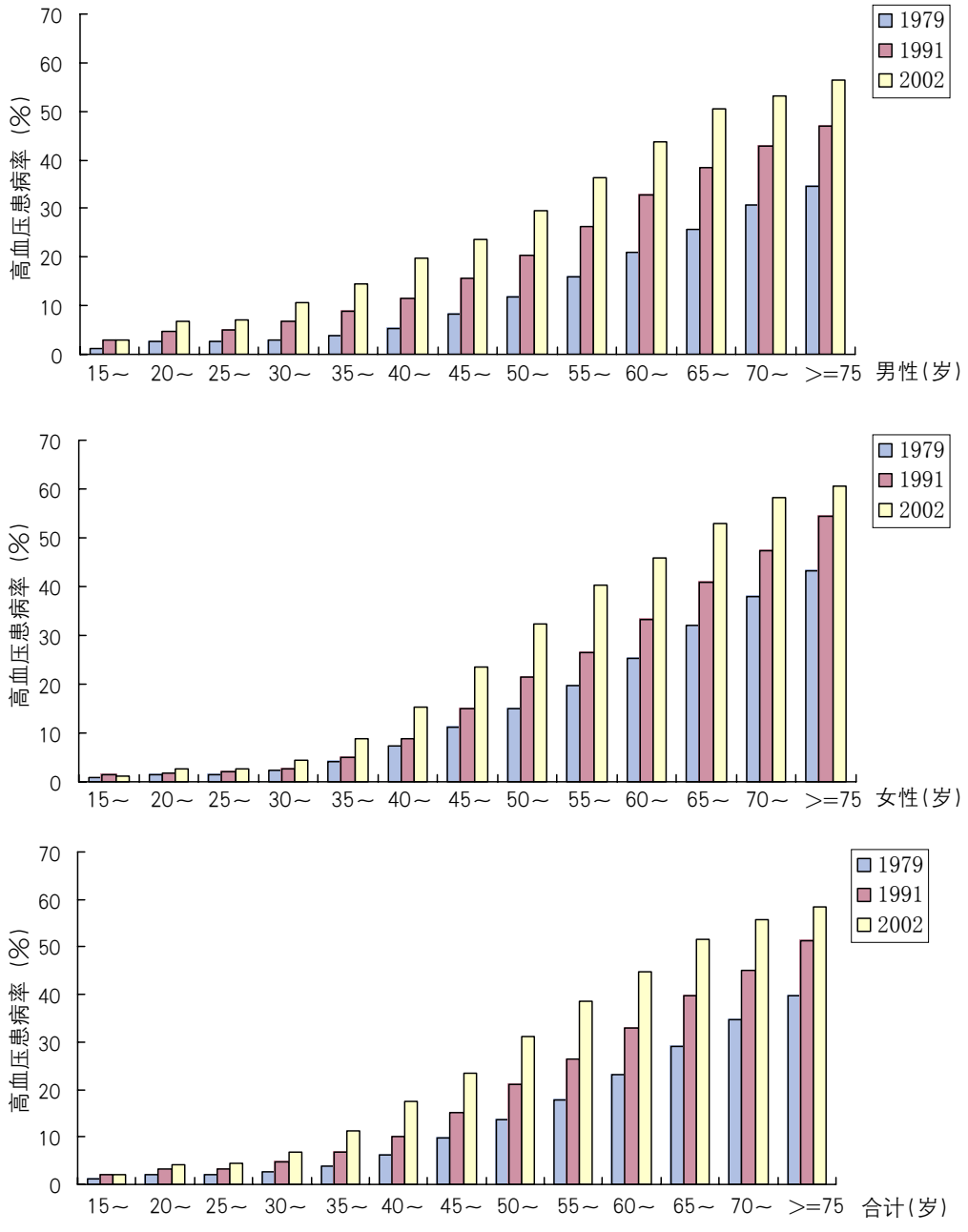

图2-1-1(3) 1979～2002不同年龄高血压患病率的变化趋势

引自：中国居民营养与健康状况调查报告之四2002高血压．北京：人民卫生出版社，23～36.
注：1979年高血压的诊断标准为：收缩压＞140mmHg或舒张压＞90mmHg；1991年和2002年高血压的诊断标准为：收缩压≥140mmHg或舒张压≥90mmHg，或近2周服用降压药。

2002年调查资料提示，我国高血压患病率城乡差别依然存在，而且除三、四类地区外南北方差异明显(图2-1-1(4))。

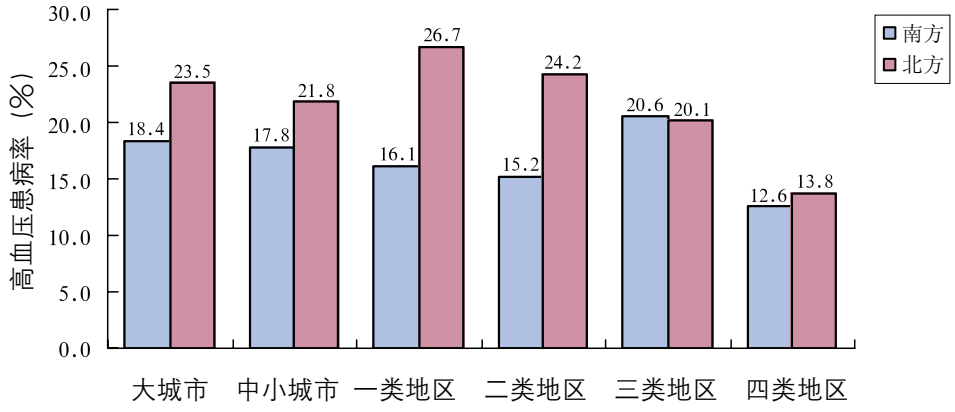

图2-1-1(4) 中国人群2002年不同地区的高血压患病率

引自：中国居民营养与健康状况调查报告之四2002高血压．北京：人民卫生出版社，23～36．

注：高血压的诊断标准为：收缩压≥140mmHg或舒张压≥90mmHg或近2周服用降压药。

不同时期有关高血压患病率的调查均显示城乡差别、地区差别都非常明显。2002年城市的标化患病率达到19.3%，农村为18.6%。但从变化趋势来看，城乡差距在缩小(图2-1-1(5))。

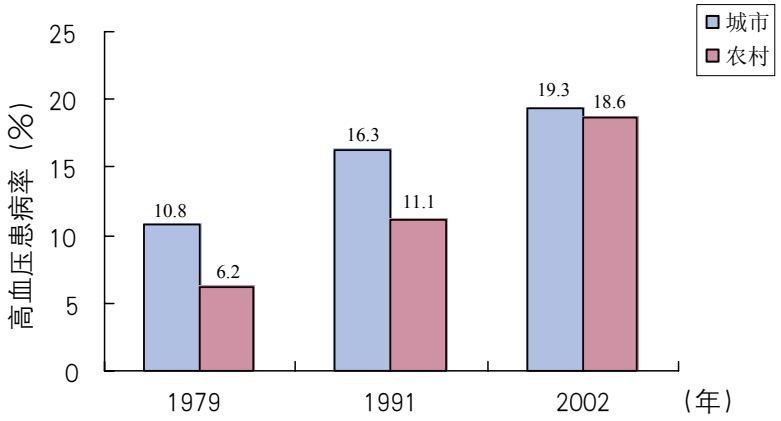

图2-1-1(5) 不同时期高血压患病率的变化趋势

引自：中国居民营养与健康状况调查报告之四 2002 高血压．北京：人民卫生出版社，23～36.

注：1979年高血压的诊断标准为：收缩压＞140mmHg或舒张压＞90mmHg；1991年和2002年高血压的诊断标准为：收缩压≥140mmHg或舒张压≥90mmHg，或近2周服用降压药。除2002年外，余均为未标化率。

2002年一项针对我国14省市的高血压患病率调查[6]，调查对象年龄在35～85岁，共调查29 076名。结果显示，不同的省市的标化患病率为18.68%～42.61%(表2-1-1(4))。

表2-1-1(4)2002年14省市调查35-85岁高血压患病率的地区分布

地区	检查人数	患病率（%）	标化患病率（%）
天津	1 988	40.69	30.8
内蒙古	2 029	33.86	42.61
河北	2 006	48.75	41.05
山西	2 031	28.61	28.94
河南	2 696	41.43	41.59
山东	1 992	16.87	18.6
浙江	2 107	36.4	31.45
湖北	2 163	24.13	21.16
湖南	1 741	34.06	24.91
四川	2 083	27.36	18.68
广东	2 005	27.36	24.91
江西	2 125	34.12	27.71
云南	2 278	40.34	30.8
陕西	1 832	38.1	31.47

关于不同民族的高血压分析数据[7]显示，在可用于分析的15岁以上人群152 683份资料中，藏族患病率最高为24.7%，苗族最低为7.7%。与1991年相比，增长幅度最大的为满族，而蒙古族有所下降(表2-1-1(5))。

表2-1-1(5)不同时期不同民族高血压标化患病率的变化(%)

民族	男性		女性		合计	
	1991	2002	1991	2002	1991	2002
汉族	11.6	17.7	10.3	15.3	11.3	16.2
蒙古族	21.1	18.8	15.6	17.2	18.2	17.6
回族	10.4	16.2	9.3	16.2	9.8	16.0
藏族	19.5	25.6	16.4	24	17.8	24.7
苗族	8.3	9.2	7.0	6.1	7.7	7.7
壮族	9.4	16.1	7.5	8.3	8.8	11.8
布依族	11.6	13.9	7.8	10.7	9.5	12.4
满族	13.4	23.1	11.1	18.7	12.3	20.5

2.1.1.3 血压正常高值的检出率

2002年营养调查资料显示，按照2005年《中国高血压防治指南》的定义，将18岁及以上147 472人的资料按血压水平分类，正常高值的比例占34%。男性正常血压的比例低于女性，而正常高值则相反(图2-1-1(6))。

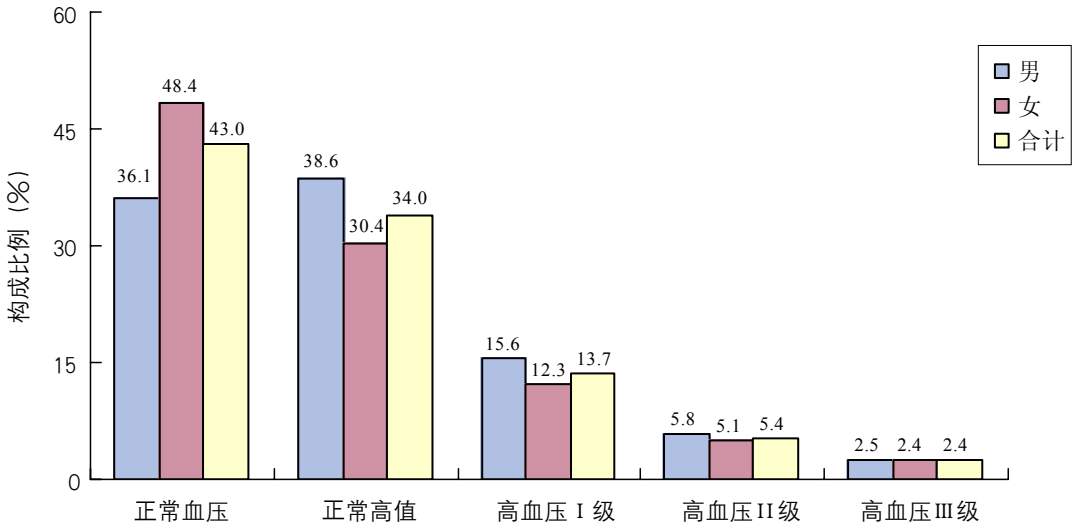

图2-1-1(6) 2002年中国成年人群血压分类构成

引自：中国居民营养与健康状况调查报告之四 2002高血压. 北京：人民卫生出版社, 23～36.

注：血压水平分类按照《中国高血压防治指南 2005》的定义。

表2-1-1(6)中国不同时期成年人血压正常高值检出率(%)

年龄组	男性		女性		合计	
	2002 年	1991 年	2002 年	1991 年	2002 年	1991 年
18～	37.0	34.8	23.4	16.8	28.5	25.4
25～	40.3	36.0	25.1	17.4	30.9	26.0
35～	41.7	36.5	32.8	24.7	36.7	30.2
45～	40.3	35.9	36.1	30.2	38.0	32.9
55～	36.7	33.8	33.2	31.7	34.9	32.7
65～	31.6	32.3	28.9	30.1	30.3	31.2
75～	29.3	30.5	27.0	27.4	28.1	28.7
合计	38.6	35.2	30.4	23.5	34.0	29.0

研究报道[8]，正常高值血压增加脑卒中发病危险56%、冠心病危险44%、总的心血

管病危险52%；冠心病事件、脑卒中事件、总的心血管病事件中正常高值血压的归因危险度分别为12.4%、15.2%和14.4%。

2.1.1.4 单纯收缩期高血压

根据2002年的调查资料[9]，我国成年人单纯收缩期高血压(ISH)标化患病率为6.0%，男性为5.4%，女性为6.9%。据此估计我国成年人群中ISH的患病人数约为5 000万。整体上ISH患病率随年龄增加而增加，尤其是40岁以后更为明显。在40岁前，男性高于女性；40岁之后，女性高于男性(图2-1-1(7))。

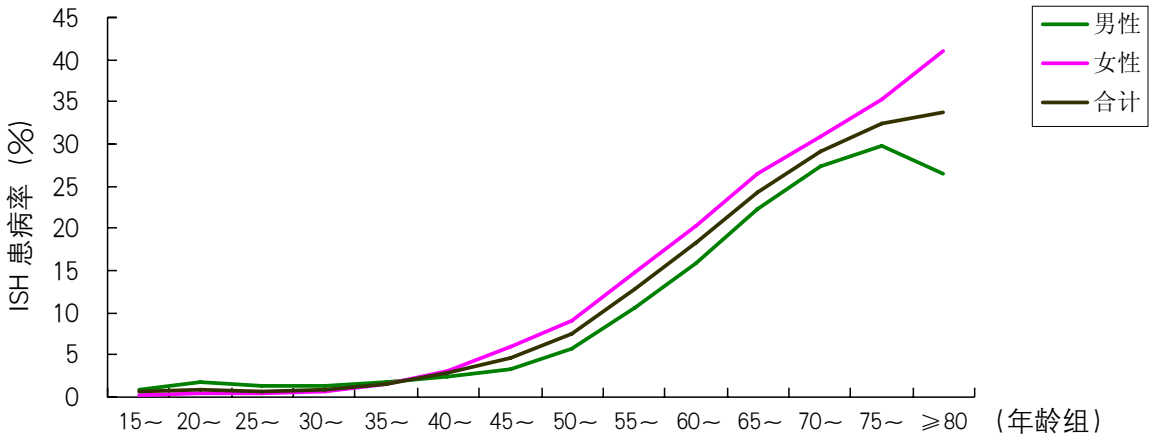

图2-1-1（7） 中国人群不同年龄组ISH标化患病率

引自：中国居民营养与健康状况调查报告之四 2002 高血压. 北京：人民卫生出版社，37～48.
注：各年龄组患病率均调整地区构成。

ISH的患病率也表现为北高南低。但与高血压患病率不同的是，无论南方、北方，女性均高于男性，农村高于城市(表2-1-1(7)、表2-1-1(8))。

表2-1-1(7)2002年不同城市农村成年人群ISH标化患病率

性别	合计	城市小计	农村小计	大城市	中小城市	一类地区	二类地区	三类地区	四类地区
男性	5.4	4.9	5.6	5.4	4.8	6.5	5.8	5.2	3.9
女性	6.9	6.7	6.9	7.0	6.5	8.2	6.9	77.5	5.0
合计	6.1	5.8	6.2	6.2	5.6	7.3	6.2	6.3	4.4

表2-1-1(8)　2002年南北方成年人群ISH标化患病率

性别	城市		农村	
	南方	北方	南方	北方
男性	4.5	5.4	5.1	5.9
女性	6.6	6.8	6.5	7.5
合计	5.6	6.0	5.7	6.7

对于60岁及以上人群，ISH的患病率25.1%。且表现为城市高于乡村、女性高于男性。在农村，一类地区最高，依次为二、三、四类地区(表2-1-1(9))。尽管仍表现为北方高于南方，但差异相对较小(表2-1-1(10))。

表2-1-1(9)　2002年不同城市农村≥60岁人群ISH标化患病率

性别	合计	城市小计	农村小计	大城市	中小城市	一类地区	二类地区	三类地区	四类地区
男性	22.2	22.4	22.1	23.6	21.8	26.1	22.8	20.0	16.1
女性	28.3	29.5	27.8	31.2	28.8	32.6	27.7	29.5	20.4
合计	25.1	26.0	24.8	27.7	25.3	29.3	24.9	24.6	18.3

表2-1-1(10)　2002年南北方≥60岁人群ISH标化患病率

性别	城市		农村	
	南方	北方	南方	北方
男性	22.5	22.3	21.1	22.5
女性	29.1	29.7	26.8	29.1
合计	25.8	26.1	24.0	25.6

而对于成年高血压患者而言，不同年龄段女性的ISH患病率要高于男性(图2-1-(8))、农村高于城市(表2-1-1(11))、南方高于北方(图2-1-1(9))，这与我国成年人群高血压患病率的特点不完全一致。

表2-1-1(11)2002年不同城市农村成年高血压人群ISH标化患病率

性别	合计	城市小计	农村小计	大城市	中小城市	一类地区	二类地区	三类地区	四类地区
男性	19.5	14.3	21.6	15.5	13.8	23.2	21.0	19.8	22.7
女性	25.3	21.8	26.7	22.6	21.4	2.8	26.2	25.0	27.1
合计	22.3	17.8	24.2	18.9	17.4	26.0	23.5	22.6	25.0

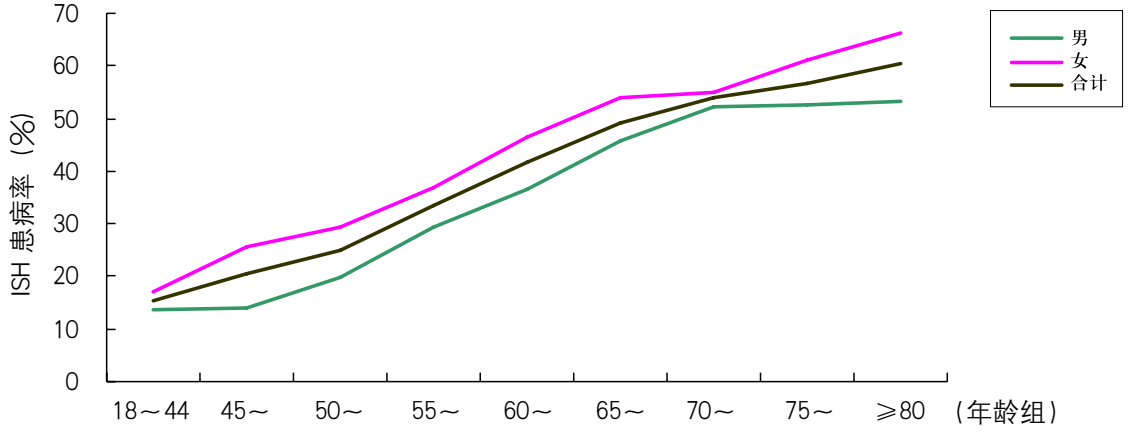

图2-1-1（8） 不同年龄组成年高血压患者ISH标化患病率

引自：中国居民营养与健康状况调查报告之四 2002 高血压. 北京：人民卫生出版社，37～48.
注：各年龄组患病率均调整地区构成。

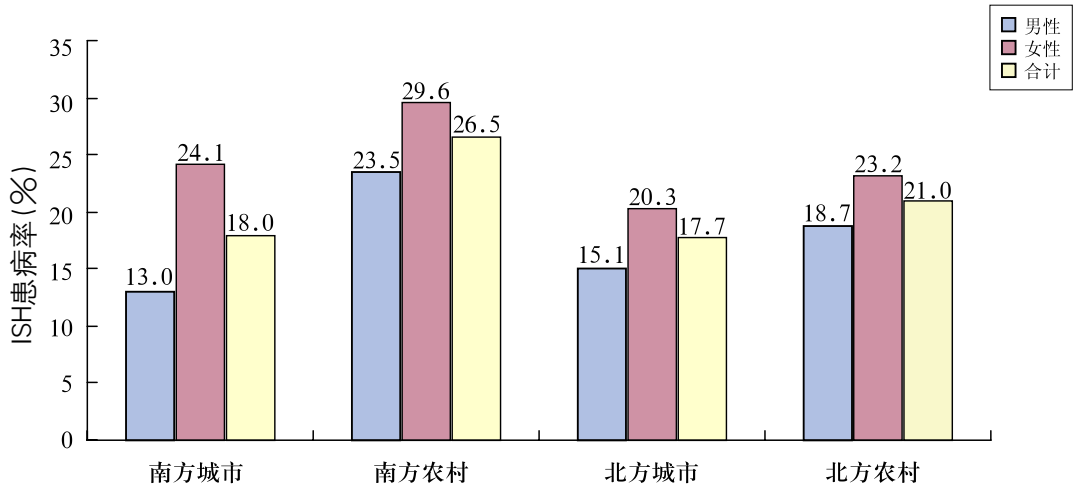

图2-1-1（9） 南方北方成年高血压患者ISH标化患病率

引自：中国居民营养与健康状况调查报告之四 2002 高血压. 北京：人民卫生出版社，37～48.
注：各年龄组患病率均调整地区构成。

2.1.1.5 高血压知晓率、治疗率、控制率

2002年调查[10]，我国人群高血压知晓率为30.6%，治疗率为24.7%，控制率为6.1%；对于接受治疗的患者，控制率达到25%。随着年龄的增加，知晓率、治疗率和控制率都在升高，而且城市高于农村(表2-1-1(12))。

表2−1−1(12) 我国高血压患者知晓率、治疗率和控制率(%)

	年龄组	城市	乡村	合计
知晓率	18~	17.8	11.6	13.6
	45~	40.8	25.1	31.0
	60~	48.5	26.8	37.6
	合计	41.1	22.5	30.2
治疗率	18~	11.8	7.9	9.1
	45~	34.1	19.4	25.0
	60~	43.1	21.3	32.2
	合计	35.1	17.4	24.7
控制率	18~	4.2	2.1	2.7
	45~	10.0	3.8	6.2
	60~	11.3	3.9	7.6
	合计	9.7	3.5	6.1
治疗控制率	18~	36.3	26.8	30.7
	45~	29.7	20.2	25.2
	60~	26.6	19.1	24.1
	合计	28.2	20.4	25.0

有研究[11]观察了26 655例医院门诊高血压患者的控制状况。经药物治疗4周、12周后，血压达标率分别为50.2%及56.7%。不同高血压类型患者治疗达标率不同。不同危险分层患者治疗达标率也有差异，随危险分层增高，达标率依次下降。糖尿病、肾病患者达标率显著低于平均达标水平(表2-1-1(13))。

表2−1−1(13) 不同时期不同特征高血压患者的达标率(%)

治疗周数	ISH	IDH	SDH	低危	中危	高危	很高危	糖尿病	肾病	合计
4	56.0	69.1	48.1	84.6	69.6	43.7	40.9	18.9	27.7	50.2
12	57.9	72.6	55.6	93.9	79.5	54.1	49.9	30.3	45.5	56.7

ISH：单纯收缩期高血压，IDH：单纯舒张期高血压，SDH：混合型高血压。

2.1.1.6 高血压患病率的影响因素

年龄是高血压不可改变的危险因素，无论男性、女性，随着年龄的增高，高血压患病率的风险成倍上升。如与男性15～24岁年龄组的风险相比，65～74岁组的风险要达到22倍。对于女性而言，相同年龄组比较，风险高达57倍(表2-1-1(14))。

表2-1-1(14) 中国人群不同年龄高血压患病相对风险

年龄组	男性		女性	
	患病率	OR（95%CI）	患病率	OR（95%CI）
15~24	4.76	1	2.13	1
25~34	9.45	2.09（1.85,2.36）	3.82	1.82（1.56,2.13）
35~44	17.27	4.18（3.72,4.68）	11.88	6.19（5.37,7.14）
45~54	27.24	7.49（6.69,8.39）	28.42	18.25（15.89,20.95）
55~64	40.79	13.78（12.30,15.43）	43.66	35.61（30.97,40.95）
65~74	52.46	22.07（19.64,24.79）	55.7	57.77（50.09,66.63）

就不同年龄段性别间的相对风险看，45岁前男性风险高于女性；45岁之后，女性高于男性(表2-1-1(15))。

表2-1-1(15)中国人群不同性别高血压的患病风险

年龄组	性别	患病率（%）	OR（95%CI）
15~24	男	4.76	1
	女	2.13	0.44（0.37,0.52）
25~34	男	9.45	1
	女	3.82	0.38（0.35,0.42）
35~44	男	17.27	1
	女	11.88	0.65（0.61,0.69）
45~54	男	27.24	1
	女	28.42	1.06（1.01,1.11）
55~64	男	40.79	1
	女	43.66	1.13（1.07,1.190
65~74	男	52.46	1
	女	55.7	1.14（1.07,1.22）

有高血压病家族史的患病风险是没有家族史者的2倍，饮酒精量越高风险越高。相对于正常体重者来说，超重、肥胖者患病风险增高。无论甘油三酯、胆固醇、还是高密度脂蛋白胆固醇，只要异常其患病风险就高于正常者(表2-1-1(16))。

表2-1-1(16) 中国人群不同危险因素高血压的患病风险

危险因素	危险因素水平	患病率（%）	OR（95%CI）
高血压家族史	无	18.22	1
	有	30.38	1.96（1.90,2.20）
酒精摄入量（g/d）	<4.8	24.04	1
	≥4.80,<10.51	23.65	0.98（0.86,1.12）
	≥10.51,<19.94	26.25	1.13（0.99,1.28）
	≥19.94,<40.03	30.2	1.37（1.2,1.55）
	≥40.03	35.22	1.72（1.52,1.94）
超重肥胖	消瘦	13.7	0.8（0.8,0.9）
	正常	16.5	1.0
	超重	33.3	2.5（2.5,2.6）
	肥胖	51.2	5.3（5.1,5.5）
甘油三酯	正常	20.69	1
	偏高	37.2	2,27（2.15,2.4）
胆固醇	正常	21.29	1
	偏高	43.26	2.82（2.56,3.11）
高密度脂蛋白	正常	22.68	1
	偏低	25.47	1.17（1.08,1.260）

2.1.2 继发性高血压

继发性高血压的患病率缺乏大样本资料，有研究报道[12]在所有住院的高血压患者中，继发性高血压占14%，亚类的具体构成情况见图2-1-2。

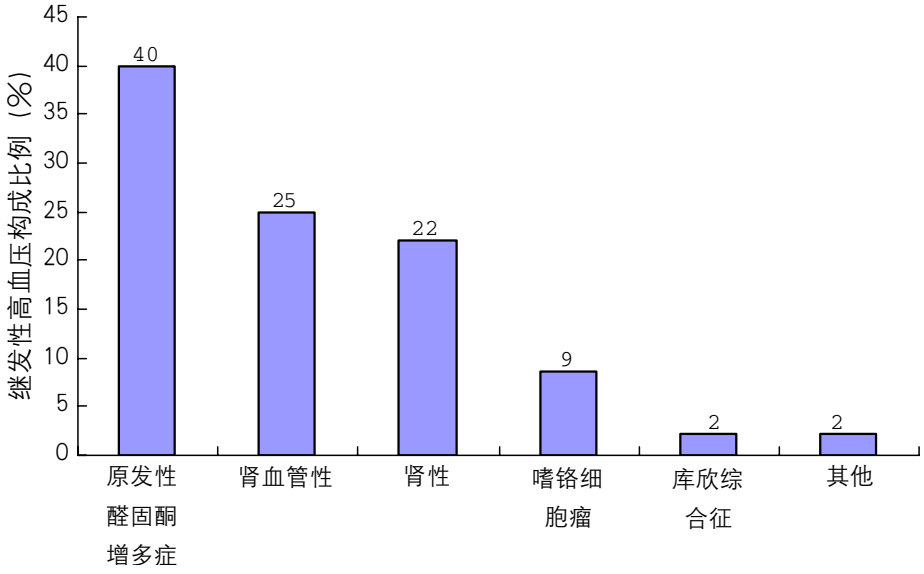

图2-1-2 住院患者继发性高血压的亚型分布(%)

2.1.3 儿童高血压

一项针对6 278名年龄在6～13岁的儿童进行的调查[13]显示，采用1996年美国心肺血中心公布的“参考身高，3～16岁儿童第95百分位的血压”为高血压诊断标准，儿童的高血压患病率达到3.04%；城市儿童高血压患病率3.16%，高于农村的2.76%(表2-1-3(1))。如果采用WHO推荐的身高标准体重法，体重超过身高标准体重的20%为肥胖，超过身高标准体重的10%～20%为超重，那么肥胖组的高血压患病率明显高于其他组，达36.88%，高于超重组(2.18%)，更高于正常体重组(0.28%)，高血压患病率与儿童肥胖呈正相关(表2-1-3(2))。

表2-1-3(1)济南市城乡儿童高血压患病率

性别	城市	乡村	合计
男性	2.72	1.56	2.36
女性	4.20	5.57	4.62
合计	3.16	2.76	3.04

表2-1-3(2)济南市城乡儿童不同体质状况的高血压患病率

组别	人数	患病人数	患病率（%）
肥胖组	141	50	36.88
超重组	336	7	2.18
正常体重组	971	3	0.28

2.1.3.1 中国学龄儿童血压偏高检出率及变化趋势

1985～2005年，由教育部、国家体育总局、卫生部、国家民委、科技部共同实施的每五年一次的中国学生体质与健康调查，提供了我国学生体质与健康状况的大样本、动态性的基础数据。该调查采用分层整群抽样原则，样本覆盖全国约30个省、自治区、直辖市(不含西藏)约14万～40余万7～18岁学龄儿童。5次调查均进行了血压测量，但只公开发布了1991年和1995年两次调查的血压偏高检出率[14][15]。两次调查时点对舒张压的记录方法不统一，即1991年记录Korot Koff第IV音(K4，变音)，而1995年记录Korot Koff第V音(K5，消音)，导致两次调查时点舒张压水平缺乏可比性。因此，本文仅报告两次调查收缩压(SBP)偏高检出率。

两次调查SBP偏高检出率均采用1991年全国调查年龄、性别SBP第95百分位值进行诊断(表1)。1995年城乡男女儿童SBP偏高检出率均呈显著上升趋势，其中城市男、女儿童SBP偏高检出率分别上升了42.5%和45.5%，分别高于同期农村男、女儿童SBP偏高检出率的上升幅度(乡村男：23.7%；乡村女：31.0%)。

表2-1-3(3)中国7～18岁男女青少年偏高血压的P95筛选标准(SBP/DBP，mmHg)*

年龄（岁）	收缩压		舒张压	
	男	女	男	女
7	110	110	75	75
8	112	112	76	76
9	114	114	78	78
10	118	120	80	80
11	120	120	80	80
12	122	121	80	80
13	124	121	80	80
14	126	122	81	80
15	130	122	83	80
16	132	124	85	82
17	134	124	86	82
18	134	124	86	82

* 根据 1991 年全国汉族男、女城乡合并的各年龄收缩压和舒张压第 95 百分位值

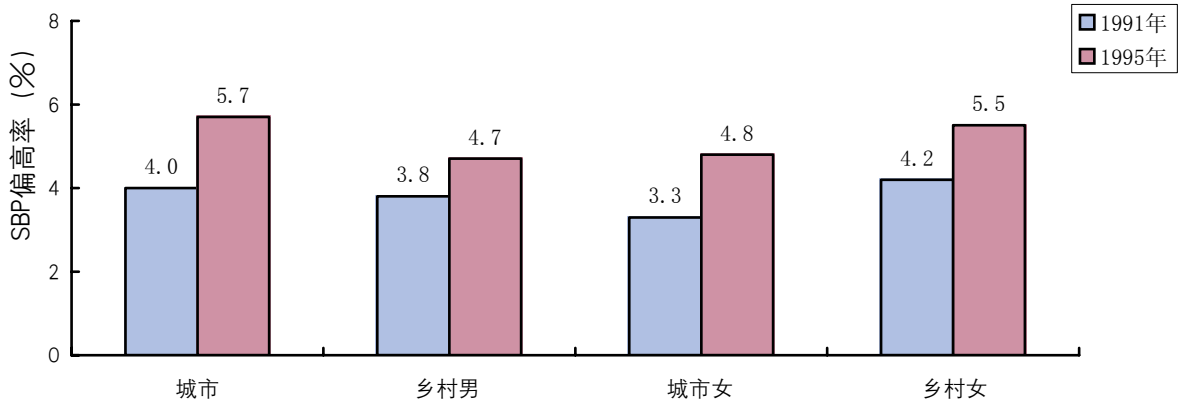

图2-1-3(1) 1991年、1995年全国城乡男女学龄儿童SBP偏高的检出率(%)

2.1.3.2 中国学龄儿童血压偏高率的地区分布特征

依据表2-1-3(3)的筛选标准，图2-1-3(2)显示1995年中国汉族学龄儿童SBP与DBP同时偏高检出率的地区分布特点：无论城乡男女，华北地区血压偏高检出率均居最高水平(2.1%～3.4%)，东北次之(1.4%～2.3%)，西南地区最低(0.2%～0.6%)；其中，华北、华东两地区的乡村儿童血压偏高率均高于城市儿童。

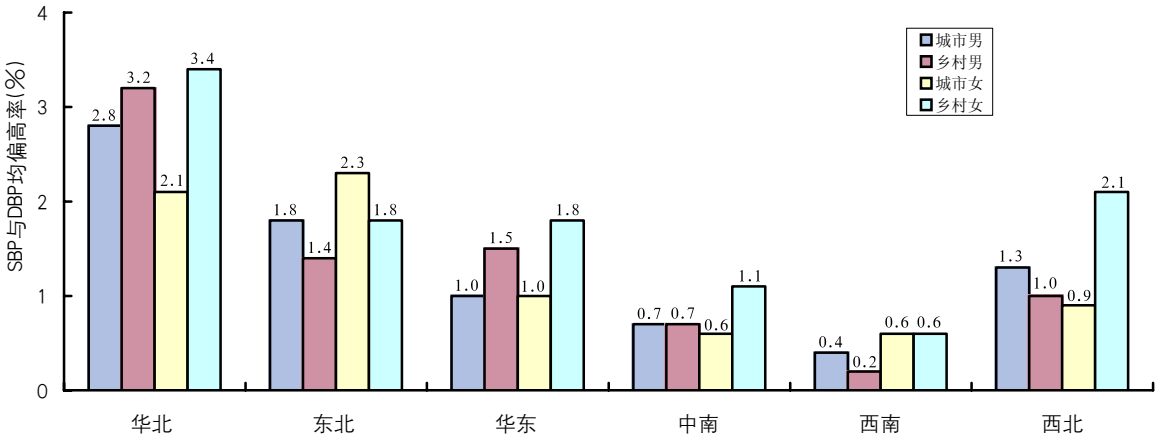

图2-1-3(2) 1995年中国不同地区学龄儿童SBP与DBP同时偏高检出率(%)

2.1.3.3 儿童高血压的长期队列研究

2004年，首都儿科研究所对“七五”儿童血压研究队列人群(1987年)进行18年后的追访研究发现：基线处于高血压状态的儿童中，42.9%的个体最终发展为成年高血压病人(图2-1-3(3))[16]，证明儿童期血压偏高儿童是成年罹患高血压的高危人群。

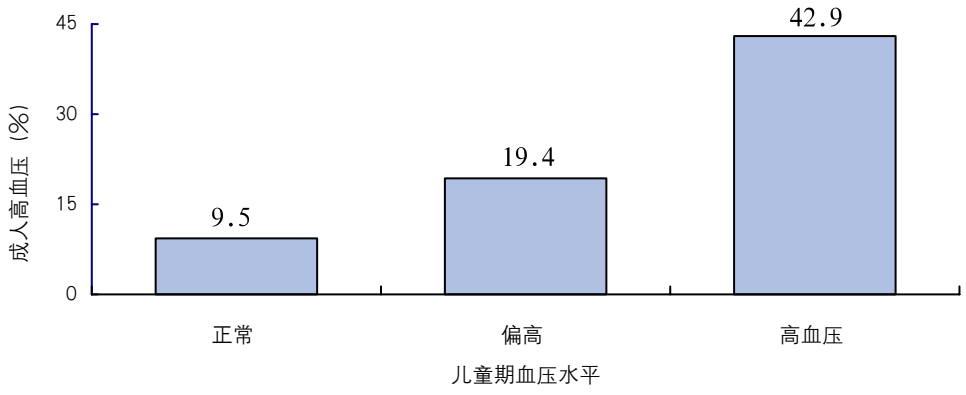

图2-1-3(3) 基线(1987年)血压状态与成年期(2004年)高血压患病率（%）

2.2 吸烟

2.2.1 吸烟流行状况

2.2.1.1 吸烟流行现状

2002年全国调查结果显示，中国15岁以上人群的吸烟率为35.8%，其中男性为66.0%，女性为3.1%。据此推算，我国15岁以上吸烟人口高达3.5亿。此外，还有5.4亿被动吸烟者。农村居民吸烟率高于城市居民。确凿证据表明吸烟与被动吸烟可引发癌症、心血管病等多种疾病，每年死于吸烟相关疾病的人数超过100万。预计到2030年，吸烟所致的死亡约占中国中年男性死亡的33%[17]。

调查显示，2002年我国15岁以上人群吸烟率比1996年下降了1.8%，男女分别下降了3.1%和1.0%(将两次调查结果用2000年人口普查数据标化后进行比较)；城市人群的吸烟率下降比农村人群更为明显，致使城乡人群吸烟率差距增大。但由于人口的增长及老龄化，吸烟人口较1996年增加了3 000万。同期戒烟率增加，从1996年的9.42%上升到2002年的11.5%[18]。中国男性人群的吸烟率持续在较高水平。尤其是男性医生和教师的吸烟率达50%以上，我国是男性医生吸烟率最高的国家之一，高达57%[19]；与此同时，我国医生的总戒烟率仅为10.8 %，接近90%的现吸烟医生没有戒烟意愿[20]。

表2−2−1(1)全国15岁以上人群三次吸烟率调查结果的比较

调查时间	调查人数	男性吸烟率	女性吸烟率	男女合计
1984	519 000	61.0%	7.0%	33.9%
1996	122 000	66.9%	4.2%	37.6%
2002	167 000	66.0%	3.08%	35.8%

注：三次调查，吸烟的定义有所差异：

- 1984 全国吸烟抽样调查，“吸烟者”定义为：现在吸烟，平均每天吸烟 1 支以上，且连续 1 年以上。
- 1996 年全国吸烟行为流行病学调查，“吸烟者”的定义：现在吸烟，连续或累计吸烟 6 个月及以上者。
- 2002 年全国行为危险因素监测，“吸烟者”的定义：现在吸烟，连续或累积吸烟达到 100 支及以上者。

值得关注的是，我国目前存在吸烟低龄化的倾向，尽管大多数人群的年龄别吸烟率都低于1996年人群的年龄别吸烟率，但15～24岁人群吸烟率上升。据专家估计，目前我国1.3亿13～18岁的青少年中，吸烟者约1 500万，尝试吸烟者不下4 000万人。青少年开

始吸烟呈现低龄化趋势，并且女学生尝试吸烟率和现在吸烟率均有上升趋势。2005年的调查数据显示，我国青少年吸烟率为11.5%，男女生分别为18.4%和3.6%。男生中，现在吸烟率随年龄增长而迅速升高[21]。

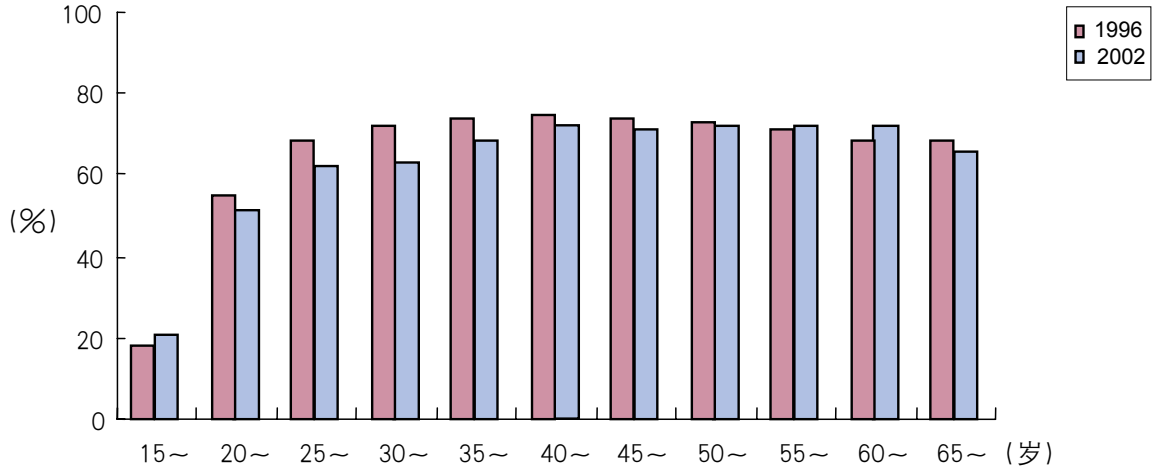

图2-2-1（1） 全国15岁以上男性人群2002年与1996年吸烟率调查结果比较

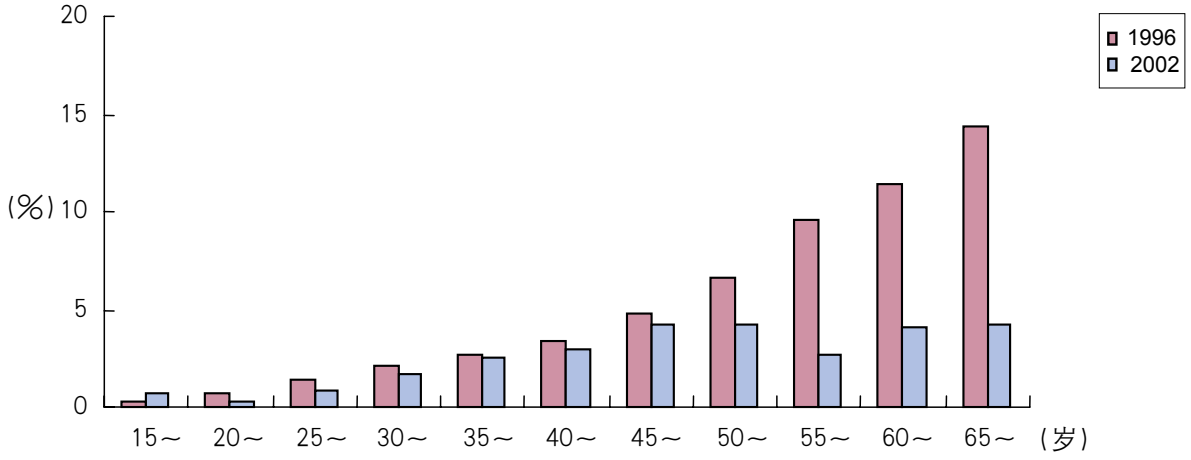

图2-2-1（2） 全国15岁以上女性人群2002年与1996年吸烟率调查结果比较

2.2.2 被动吸烟状况

2002年调查数据显示我国非吸烟者被动吸烟的比例高达51.9%(图2-2-2)。比较1984年、1996年、2002年全国吸烟行为流行病学调查数据显示，被动吸烟状况没有任

何改善。目前我国约半数的青少年遭受被动吸烟的危害，估计的遭受二手烟雾危害的15岁以下儿童有1.8亿，13～18岁的青少年达6 500万。43.9%的青少年在家中遭受危害，55.8%在公共场所遭受此危害[22]。

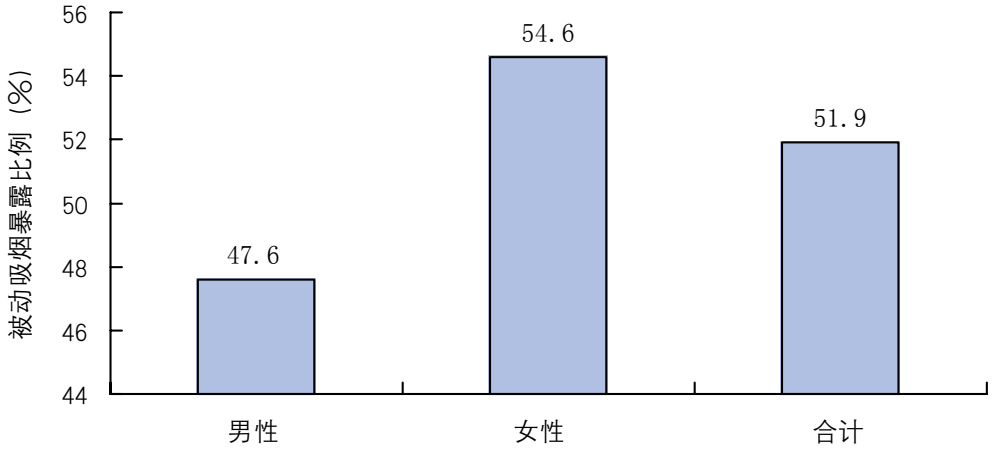

图2-2-2我国非吸烟者遭受被动吸烟暴露比例*

* 被动吸烟暴露定义：不吸烟者每周至少一天内有15分钟暴露于吸烟者呼出的烟雾中。

2.2.3　吸烟与被动吸烟的危害

吸烟与被动吸烟是中国成年人死亡的主要可预防的危险因素之一，中国人群的吸烟相对死亡危险(RR)及人群归因死亡风险(PAR)分别是1.23(95%CI 1.18～1.27)和7.9%；男性RR1.18(1.13～1.23)，PAR为10.0%；女性RR1.27(1.19～1.34)，PAR为3.5%[23]。

2.2.3.1　吸烟对CVD发病和死亡的影响

吸烟是心血管病的独立危险因素之一

中国多省市心血管病危险因素队列研究3万35～64岁人的10年随访研究结果：高血压、吸烟、糖尿病、高胆固醇/低高密度脂蛋白血症是急性冠心病事件的独立危险因素；高血压、糖尿病、高胆固醇/低高密度脂蛋白、吸烟、肥胖是急性缺血性卒中的独立危险因素。35～64岁人群中19.9%的急性冠心病事件和11%的急性缺血性脑卒中事件归因于吸烟。多因素分析显示，吸烟者的急性冠心病事件、急性缺血性脑卒中事件

和急性缺血性脑卒中事件的发病危险分别是不吸烟者的1.75倍、1.37倍和1.21倍[24]。中美队列对近1万人长达15年的随访研究也取得了相似的结果：中国35～59岁人群中31.9%的缺血性心血管病（冠心病+缺血性脑卒中）归因于吸烟；与不吸烟者相比，男性吸烟者的缺血性心血管病的发病危险增加了100%[RR＝2.04，95%CI(1.43～2.92)]，女性增加了59%[RR＝1.59，95%CI(1.10～2.30)] [25]。

吸烟与深静脉血栓（DVT）[26]

天津医院对2003年11月至2004年10月期间14岁以上的547名创伤住院患者进行了下肢骨关节创伤后深静脉血栓(DVT)的随访调查。平均年龄39.6岁，吸烟者占26.7%。结果显示：在控制混杂因素后，吸烟者形成深静脉血栓的可能性是不吸烟者的2.34倍[95% CI(1.04～1.47)]。

吸烟和饮酒对死亡的联合效应[27]

1996年～2000年，上海66 743名30～89岁男性队列人群进行297 396人年的随访研究，结果发现：死亡2 514人，其中776人死于CVD，另982人死于癌症。每周饮酒1～7单位与死亡危险下降，尤其是CVD死亡危险降低[HR=0.7，95%CI(0.5，1.0)]有关。同不吸烟者相互比，目前吸烟者和曾吸烟者的各种原因死亡率均显著升高，且死亡风险随吸烟量增加而增加。适量饮酒者中，总死亡风险比，不吸烟者为0.8 95%CI(0.6，1.0)，中度吸烟者为1.0(0.9，1.2)，重度吸烟者增加为1.4[95%CI(1.2，1.7)]。重度饮酒、且重度吸烟者的死亡风险最高[HR=1.9，95% CI(1.6，2.4)]。研究得出的结论是：尽管适量饮酒能降低CVD死亡危险，但此益处被吸烟抵消。

2.2.3.2 被动吸烟对CVD发病和死亡的影响

被动吸烟对CVD发病的影响

吸烟者CVD发病危险增加，被动吸烟者CVD发病危险也增加。10年前已有研究明确证实被动吸烟对心血管系统的危害。此后的研究进一步量化分析了被动吸烟对CVD的危害程度。对18项流行病学研究的汇萃(Meta)分析结果显示，被动吸烟者冠心病的发病危险增加25%[RR=1.25，(95%CI 1.17～1.32)]；其中队列研究显示：被动吸烟者的发病危险增加21%[RR=1.21，(95%CI 1.14～1.30)]；病例对照研究显示：被动吸烟者的发病危险增加51%[(RR=1.51，(95%CI 1.26～1.81)]。[28]

中国上海丈夫吸烟的非吸烟女性人群被动吸烟与脑卒中患病率的关系研究[29]

我国学者于1997～2000年对60 377名40～70岁妇女的调查显示，在家中被动吸烟的妇女，患脑卒中的危险性随丈夫每天吸烟量加大而增高，丈夫每天吸烟量为1～9支，10～19支和20支，则妻子脑卒中患病危险分别为28%，32%和62%。另有香港研究证

实，长期在家里吸入二手烟的女性，患冠心病的风险比其他人高1.6倍，且接触二手烟的时间越长，患病机会也越高。

表2-2-3(1)根据丈夫吸烟情况确定的不吸烟女性脑卒中比值比
—中国上海妇女健康研究(1997～2000年)

丈夫吸烟情况	研究人数	患病例数（人）	年龄调整 OR	95%CI	多因素 OR*	95%CI
从不吸烟（对照）	22,982	213	1.00		1.00	
既往吸烟	5,108	74	1.03	0.79,1.35	0.94	0.71,1.24
现在吸烟	32,287	239	1.47	1.22,1.78	1.41	1.16,1.72

* 经年龄、教育水平、职业、家庭收入、饮酒、运动、BMI、绝经情况、激素治疗、口服避孕药、高血压和糖尿病病史、服用降压药和阿斯匹林调整。

被动吸烟对发病和死亡的影响

我国学者运用统计学方法估算2002年人群中因被动吸烟死亡人数超过10万，其中31 300人死于被动吸烟所致的冠心病[30]。上海前瞻性队列研究表明：中国非吸烟女性接触丈夫吸烟时的环境香烟烟雾使全病因死亡风险增加15%[HR1.15，(95%CI 1.01～1.31)]，其中因心血管疾病死亡的风险增加37%[HR1.37，(95%CI 1.06～1.78)]；幼年接触二手烟可使心血管病死亡危险增加26% [RR1.26，(95%CI 0.94～1.69)]。[31]

西安军队离休干部死因随访研究[32]

中国西安1 268名55岁以上男性军队离休干部的11年随访研究发现：血管性疾病的死亡率为28.10%。目前吸烟者的总死亡率、CHD死亡率分别是从不吸烟者的1.37倍[HR 1.369 95%CI(1.083～1.731)]和2.94倍[HR 2.939 95%CI(1.311～6.585)]。年龄、每天吸烟[HR 1.026 95%CI(1.013～1.039)]、SBP、TG、家族史、现患病者、BMI、开始吸烟年龄[HR 0.988 95%CI(0.978～0.999)]与全病因死亡有关。既往吸烟者总死亡率、CHD死亡率分别是从不吸烟者的1.34倍(95%CI 1.02～1.76)和冠心病1.60倍(95%CI 0.81～3.19)，且死亡风险同既往吸烟量和吸烟年限存在明确的剂量反应关系。与持续吸烟相比，戒烟者总死亡和冠心病死亡的危险分别下降56%和93%。该研究得出吸烟是中国男性老年人的主要死因之一，而戒烟可以降低总死亡和心血管病死亡的结论。

表2-2-3(2) 全因死亡危险因素中吸烟的风险比

吸烟状况	粗 HR[1]	95% CI	调整 HR[2]	95% CI	P
日吸烟量(支)	1.023	1.015～1.032	1.026	1.013～1.039	<0.001
吸烟年限(年)	1.012	1.006～1.017	1.005	0.997～1.013	0.218
开始吸烟年龄(岁)	1.003	0.996～1.011	0.988	0.978～0.999	0.028

1：粗风险比； 2：调整的风险比（经年龄、收缩压（SBP）、甘油三酯 （TG）、 日吸烟量、吸烟年限、开始吸烟年龄、运动、BMI、负性事件、高血压、脑卒中、癌症和基线所有现患疾病的家族史）

表2-2-3(3)吸烟相关连续性变量的全病因死亡风险比及95% CI

	死亡人数	HR	95% CI	P	趋势检验 *P* 值
吸烟状况*	491				
从不吸烟	126	1.000			
曾经吸烟	193	1.089	0.865～1.372	0.467	
现在吸烟	172	1.369	1.083～1.731	0.009	
吸烟指数	172				<0.001
<350	34	1.000			
350～569	29	1.163	0.901～1.501	0.2457	
570～749	48	1.531	1.188～1.974	0.001	
≥750	61	2.069	1.642～2.606	<0.001	
开始吸烟年龄(岁)	365				0.038
<19	101	1.000			
19～22	109	0.823	0.627～1.078	0.157	
23～27	74	0.763	0.565～1.029	0.077	
>27	81	0.720	0.537～0.966	0.028	
日吸烟量(支)	365				<0.001
1～9	49	1.000			
10～14	32	1.093	0.700～1.707	0.694	
15～19	130	1.316	0.947～1.828	0.101	
≥20	154	1.831	1.327～2.527	0.001	

* 经年龄、收缩压（SBP）、总胆固醇（TC）、甘油三酯 （TG）、常规饮酒、运动、基线现病史调整。

BMI 按照中国诊断标准分组。

● 56 000香港老年人吸烟、戒烟与死亡的队列研究[33][34]

香港学者对56 167(男性18 749人，女性37 416人)名65岁以上老年人群随访4.1年的前瞻性死因队列研究结果显示：经调整的全因死亡的相对危险，男性曾吸烟者和现吸烟者分别是不吸烟者的1.39倍[95% CI (1.23～1.56)]和1.75倍[95% CI (1.53～2.00)]。在目前吸烟者中，全因死亡相对危险随日吸烟量的增加明显增加(趋势检验P<0.001)。曾吸烟者和现吸烟者的因心血管病死亡的风险分别是不吸烟者的1.24倍[95% CI (1.04～1.47)]和1.57倍[95% CI (1.28～1.94)]；因癌症死亡危险分别是不吸烟者的1.49倍(1.30～1.72)和2.20倍(1.88～2.57))。而戒烟者的死亡危险性明显降低。故得出结论：在老年人群吸烟仍然是一个主要死因，戒烟有益。

2.3 血脂异常

2.3.1 我国成人血脂异常患病率

据2002年中国居民营养与健康状况调查，我国18岁以上人群血脂异常的患病率为18.6%，患病人数按2006年我国人口估算达到2.0亿。高胆固醇血症(TC≥5.72mmol/L)患病率2.9%，胆固醇边缘升高(TC 5.20～5.71 mmol/L)患病率3.9%，高甘油三酯血症(TG≥1.70 mmol/L)患病率11.9%，低高密度脂蛋白胆固醇(HDL-C<1.04mmol/L)患病率7.4%。

高胆固醇血症和胆固醇边缘升高患病率随年龄逐渐增高，青年组男性明显高于女性，中老年组女性明显高于男性；城市人群患病率明显高于农村(图2-3-1(1)，图2-3-1(2))[35]。

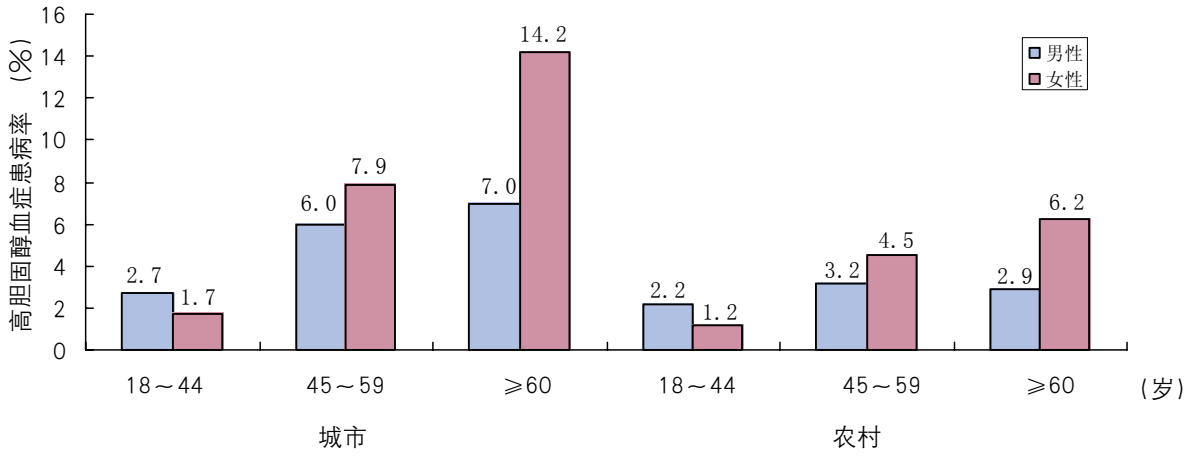

图2-3-1(1) 我国成人高胆固醇血症(TC≥5.72mmol/L)患病率(%,按年龄和地区加权调整)年龄、性别和城乡分布

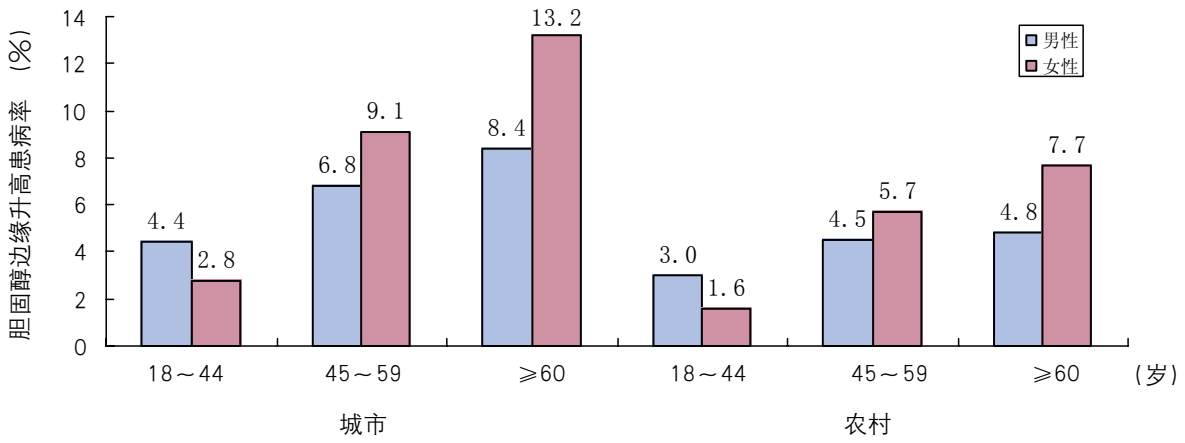

图2-3-1（2）我国成人胆固醇边缘升高（TC 5.20 mmol/L -5.71mmol/L）患病率（%,按年龄和地区加权调整）年龄、性别和城乡分布

2005年6～9月北京市、上海市等7城市52家医院心内科开展了一项旨在探讨冠心病患者血脂水平以及血脂代谢异常的流行情况的调查。共收集有效病例3 513例，研究对象的血脂代谢异常总发生率为79.7%。<50岁组、50～59岁组、60～69岁组和≥70岁组分别为90.6%，86.9%，80.0%和72.5%。随着年龄的增加总胆固醇异常、低密度脂蛋白异常、高密度脂蛋白异常以及三酰甘油异常的发生率降低。总的血脂代谢异常发生率亦呈现同样趋势[36]。

2.3.2 血脂水平与缺血性心血管病

中国医学科学院阜外心血管病医院和首都医科大学附属北京市心肺血研究所合作采用统一方法对“中美心肺疾病流行病学合作研究”和“中国多省市心血管病队列研究”资料进行的血脂水平与缺血性心血管病(冠心病和缺血性脑卒中)发病关系的分析(表2-3-2)，为制订《中国成人血脂异常防治指南》，设定适合我国人群特点的血脂异常诊断界值和危险分层方案提供重要依据。据此提出的我国人群血脂异常诊断标准与国际相关标准一致[37]。

表2-3-2 两组队列人群血脂水平与缺血性心血管病发病率、相对危险

血脂水平(mmol/L)	中美队列				11省市队列			
	人数	发病率/10万人年	RR	95%CI	人数	发病率/10万人年	RR	95%CI
TC								
<5.18	7 850	200	1.0		21 800	229	1.0	
5.18~5.67	1 163	342	1.2	0.9～1.6	4 353	326	1.3	1.0～1.6
5.70~6.19	635	435	1.7	1.2～2.3	2 530	355	1.3	1.0～1.8
≥6.22	574	502	1.7	1.2～2.3	3 016	475	1.6	1.2～2.1
LDL-C								
<3.37	7 898	214	1.0		22 774	233	1.0	
3.37~4.12	1 206	352	1.4	1.1～1.8	4 509	369	1.3	1.0～1.6
4.14~4.90	355	460	1.5	0.9～2.3	1 686	421	1.4	1.0～2.0
≥4.92	166	466	1.5	0.8～2.8	1 055	608	2.0	1.4～2.9
HDL-C								
≥1.55	2 687	255	1.0		11 268	191	1.0	
1.04~1.53	6 161	240	1.1	0.8～1.4	16 200	281	1.2	1.0～1.5
<1.04	1 374	262	1.1	0.8～1.6	4 232	425	1.5	1.2～2.0
TG								
<1.70	8 346	226	1.0		23 979	255	1.0	
1.70~2.25	755	348	1.0	0.7～1.4	3 467	303	0.9	0.7～1.2
≥2.26	666	425	1.1	0.7～1.5	2 926	352	1.0	0.7～1.3

注：相对危险（RR）的计算均采用多因素分析。对不同TC和LDL-C分组，调整变量包括年龄、性别、吸烟、糖尿病、肥胖、低HDL-C和高血压；对不同HDL-C分组，调整变量包括年龄、性别、吸烟、糖尿病以及收缩压、体重指数和TC；对不同TG分组，调整变量包括年龄、性别、吸烟、糖尿病以及收缩压、体重指数和HDL-C。

2.3.3 血脂异常防治

2.3.3.1 血脂水平分层标准和血脂异常危险分层方案

2007年发表了由中华医学会心血管病、糖尿病、内分泌和检验专业学会与卫生部心血管病防治研究中心共同制订的《中国成人血脂异常防治指南》[38]。该指南参考国际相关指南的制定方法，并结合我国人群的循证医学证据，提出了适合我国人群的“血脂水平分层标准”(表2-3-3(1))和“血脂异常危险分层方案”(表2-3-3(2))。

表2-3-3(1)血脂水平分层标准

分层	血脂项目 mmol/L（mg/dl）			
	TC	LDL-C	HDL-C	TG
合适范围	<5.18（200）	<3.37（130）	≥1.04（40）	<1.70（150）
边缘升高	5.18～6.19（200～239）	3.37～4.12（130～159）		1.76～2.25（150～199）
升高	≥6.22（240）	≥4.14（160）	≥1.55（60）	≥2.26（200）
降低			<1.04（40）	

表2-3-3(2)血脂异常危险分层方案

危险因素	危险分层	
	TC 5.18～6.19mmol/L（200～239mg/dl）或 LDL-C 3.37～4.12mmol/L（130～159 mg/dl）	TC≥6.22mmol/L（240mg/dl）或 LDL-C≥4.14mmol/L（160mg/dl）
无高血压且其他危险因素数<3	低危	低危
高血压，或其他危险因素数≥3	低危	中危
高血压且其他危险因素数≥1	中危	高危
冠心病及其等危症	高危	高危

其他危险因素包括:年龄（男≥45 岁，女≥55 岁）、吸烟、低 HDL-C、肥胖和早发缺血性心血管病家族史。

2.3.3.2 临床血脂异常控制状况

2000～2001年我国10省市35～74岁自然人群抽样调查显示，血脂异常知晓率、治疗率和控制率在血清TC≥6.22mmol/L或服用降脂药者中，男女分别为 21.3%、14.0%、11.3%和18.1%，11.6%、9.5%；在血清TC≥5.18mmol/L或服用降脂药者中，男性分别为8.8%、3.5%、1.9%，女性7.5%，3.4%、1.5%[39]。

2006年第二次中国临床血脂控制状况调查，在全国有选择代表性的12个城市（北京、上海、广州、武汉、杭州、南京、长沙、沈阳、厦门、珠海、成都、乌鲁木齐）和1个县(山西盂县)，共21家省部级医院和6家地县级医院，调查2 237名患者。结果显示，按照2004年美国ATPⅢ标准和2007年《中国成人血脂异常防治指南》标准判断，接受调脂治疗者总达标率分别为34%和50%，且随患者危险分层水平增高，治疗达标率逐渐降低(P<0.001)(图2-3-3-2(1)、图2-3-3-2(2))[40]。与2000年第一次临床血脂控制状况调查比较(选择入选标准一致者)，不同危险分层组2006年调脂治疗达标率均明显增高(表2-3-3-2(1))[41]。

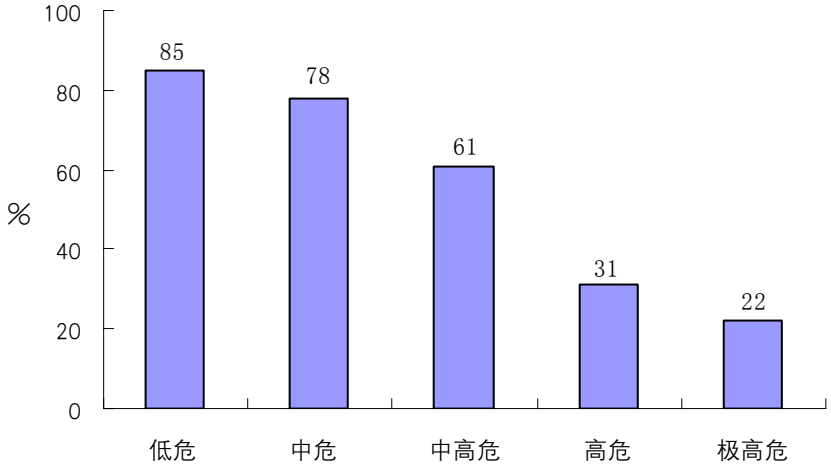

图2-3-3-2（1）　不同危险分层组达标率 (按照2004美国ATPⅢ LDL-C目标值)

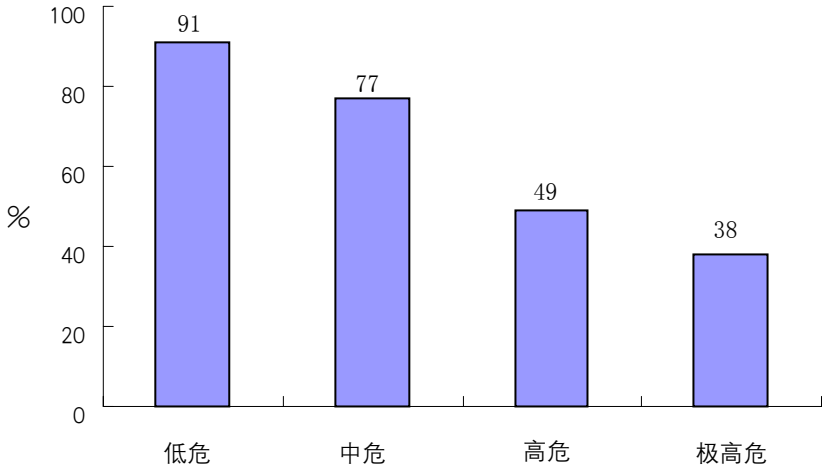

图2-3-3-2（2）不同危险分层组达标率 (按照《中国成人血脂异常防治指南》LDL-C目标值)

表2-3-3-2(1) 2000年与2006年高胆固醇患者治疗达标率比较

危险分层	2000 年		2006 年	
	例数	%	例数	%
无 RF, 无 ASD	49	44.9	4	50.0
有 RF, 无 ASD	1 308	31.7	370	45.9*
有 ASD	779	16.6	165	26.7*

*P<0.01

RF:危险因素；ASD：动脉粥样硬化性疾病

2.3.4 儿童血脂异常患病率

目前我国尚无统一的儿童血脂异常诊断标准，且未见报告全国性调查结果。现将1987年以来发表的几项大样本人群调查结果汇总如下(表2-3-4)。

表2-3-4 国内不同时期大样本研究儿童血脂异常患病率（%）

地区	年代	年龄段（岁）	样本量	TC 增高	TG 增高	HDL-C 降低
北京市[42]	1987	7~19	1201	1.3	4.2	0.4*
广东省#[43]	2005	3~14	6188	2.1	2.2	8.0*
北京市#[44]	2007	6~18	19593	1.2	8.8	-

TC 增高：TC≥200mg/dl(5.17mmol/L)

TG 增高:TG≥150mg/dl(1.70mmol/L)

HDL-C 降低:HDL-C<40mg/dl(1.04mmol/L)

* HDL-C<35mg/dl(0.9mmol/L

采用空腹末梢血

上述北京市2007年调查结果还显示，无论有无家族史(心血管病、糖尿病、血脂异常和肥胖等家族史)，肥胖儿童血脂异常(TC≥5.20mmol/L或TG≥1.70mmol/L)患病率均较高，约为30%(图2-3-3)[45]。

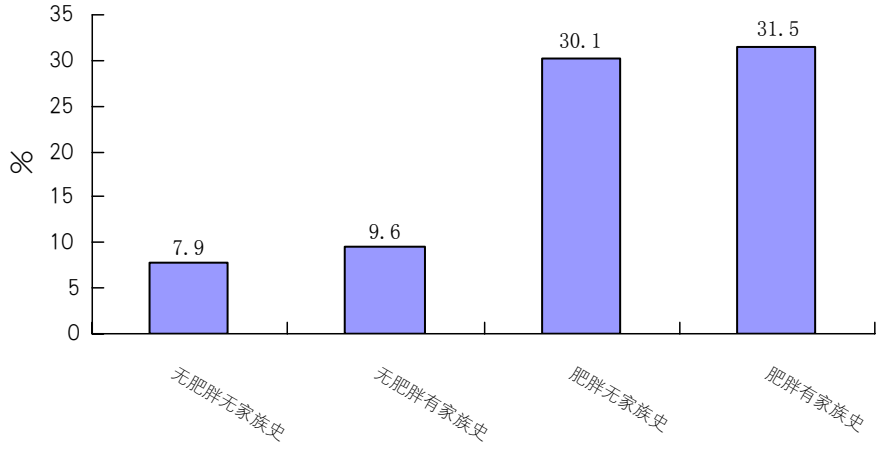

图2-3-3 有无家族史和是否肥胖儿童血脂异常患病率比较

2.4 超重与肥胖

近二三十年来，我国居民超重和肥胖率呈明显上升趋势。根据2002年中国营养与健康状况调查结果估计，我国居民中超重者(体重指数：24～27.9kg/m^2)约2.0亿人，肥胖者(体重指数≥28kg/m^2)约6 000万，如按2006年我国人口估计，超重者和肥胖者分别达到2.4亿和7 000万。

一项在我国9个省市进行的重复横断面调查结果显示，在20～65岁的人群中，自1993年至2004年，男女性中心性肥胖率(男性腰围≥85cm，女性腰围≥80cm)均明显增加(图2-4(1))[46]，男性平均每年增长2.1%，女性平均每年增长1.6%。

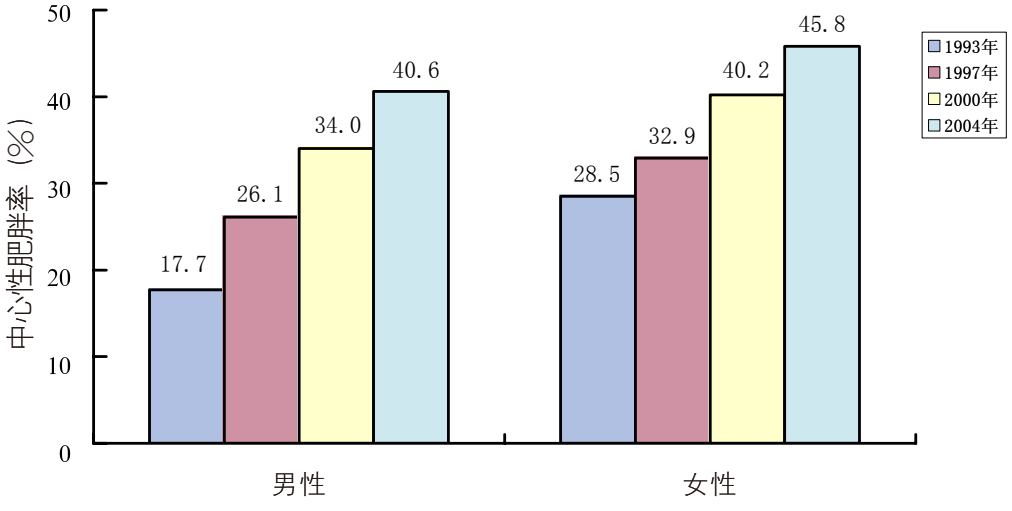

图2-4（1） 1993～2004年我国9省市中心性肥胖变化

一项在60岁以上老年人群中开展的现况调查显示[47]，老年人群超重的患病率(BMI≥25kg/m^2)为56.3%(男性53.9%，女性57.9%)。

有1万余人参加的InterASIA前瞻性研究结果表明，随着基线体重指数的增加，高血压发病率明显升高(图2-4(2))[48]。在我国9个省市的研究中，对参加2000年调查的4 552人的4年随访资料进行分析，体重指数和腰围均与高血压的发病率明显正相关，且伴有中心性肥胖者高血压发病危险更大(表2-4(1))[49]。而来自InterASIA的研究结果也表明，反映中心性肥胖指标的腰围和腰臀比值与糖尿病及糖耐量递减关系更为密切(表2-4(2))[50]。

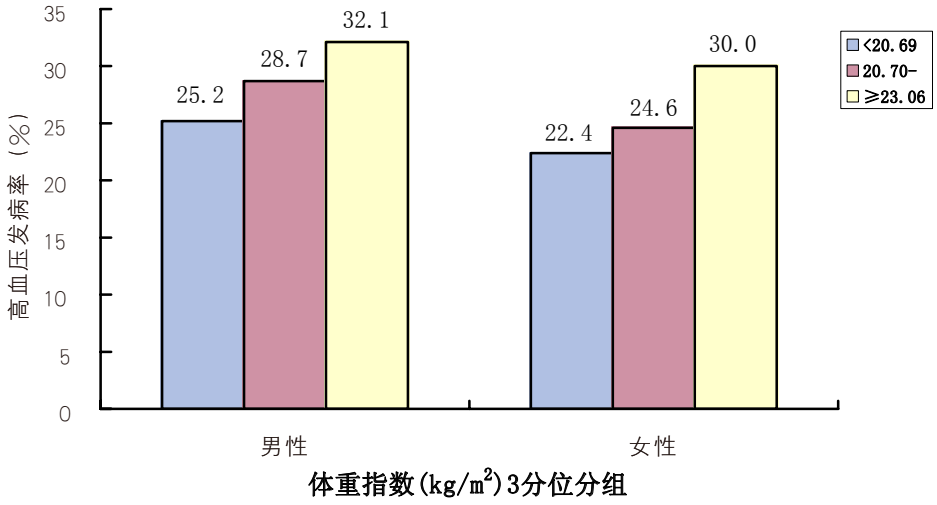

图2-4(2)　基线体重指数水平(kg/m^2)与8年后累计高血压发病率(调整年龄)关系

表2–4(1)不同体重指数和腰围人群随访4年高血压发病危险

组别	男性		女性	
	RR	95%CI	RR	95%CI
正常组	1.00	-	1.00	-
单纯全身性超重/肥胖组	1.74	1.15～2.62	2.05	1.33～3.15
单纯腹部肥胖组	2.00	1.39～2.89	1.60	1.08～2.36
全身性超重/肥胖组且腹部肥胖组	2.84	2.14～3.77	2.73	2.05～3.65

注：logistic 回归分析时调整了年龄、教育程度、体力活动、饮酒

表2-4(2)　不同肥胖测量指标与糖尿病的关系(受试者工作特征曲线下面积比较)

	受试者工作特征曲线下面积	
	糖尿病	空腹血糖受损
	[面积 (95% CI)]	[面积(95% CI)]
腰臀比	0.666 (0.647～0.685)	0.638 (0.619～0.655)
腰围 (cm)	0.661 (0.643～0.682)	0.637 (0.615～0.654)
BMI (kg/m^2)	0.622(0.601～0.642)	0.607(0.589～ 0.627)

注：不同测量指标间检出糖尿病比较:腰臀比 vs.BMI：χ^2=21.74,p<0.0001；腰围vs.BMI：χ^2=47.86,p<0.0001；腰臀比vs.腰围：χ^2=0.47,p>0.05．不同测量指标间检出空腹血糖受损比较:腰臀比vs.BMI：χ^2=11.50,p<0.001；腰围vs.BMI：χ^2=29.85,p<0.0001;腰臀比vs.腰围：χ^2=0.05,p>0.05.

2.5　身体活动不足

身体活动(即体力活动)不足是心血管病的重要危险因素。在2002年中国居民营养与健康状况调查中,对18～59岁的职业人群(近3万余人)体力活动资料分析表明，体力活动的充分率有明显的城乡差别(图2-5(1))[51],且职业的体力活动对体力活动充分率贡献最大,家务劳动次之,而体育锻炼较少。

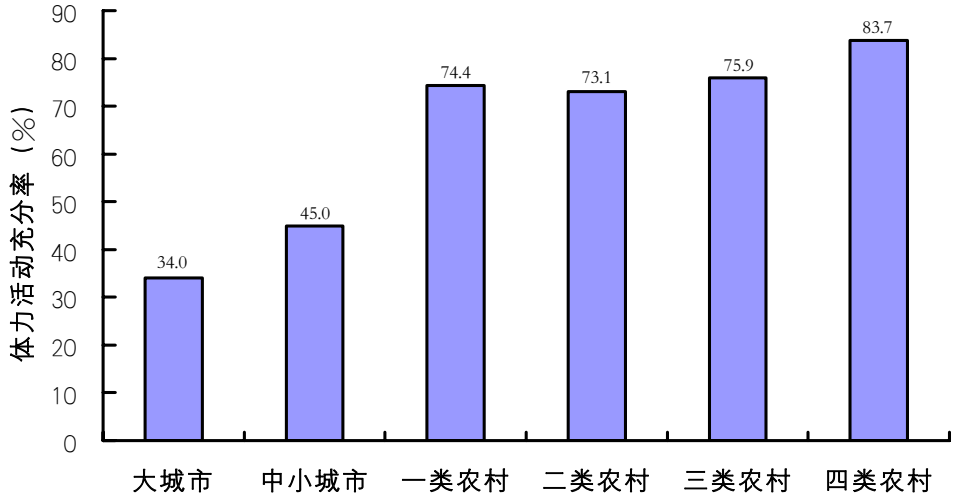

图2-5(1)　我国居民体力活动充分率

2002年中国居民营养与健康状况调查结果还表明，成年人体力活动水平与超重／肥胖(BMI≥24)(图2-5(2))[52]、其他心血管病危险因素及代谢综合征密切相关(图2-5(3))[53]。

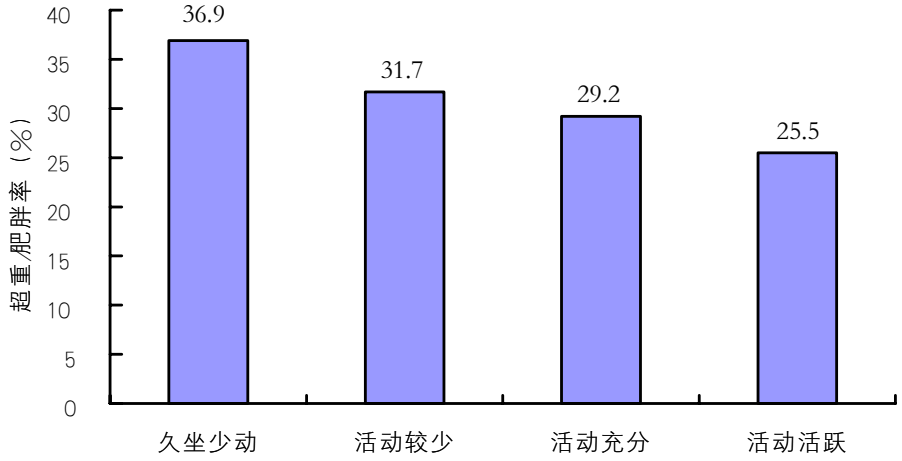

图2-5(2) 体力活动水平与超重肥胖率

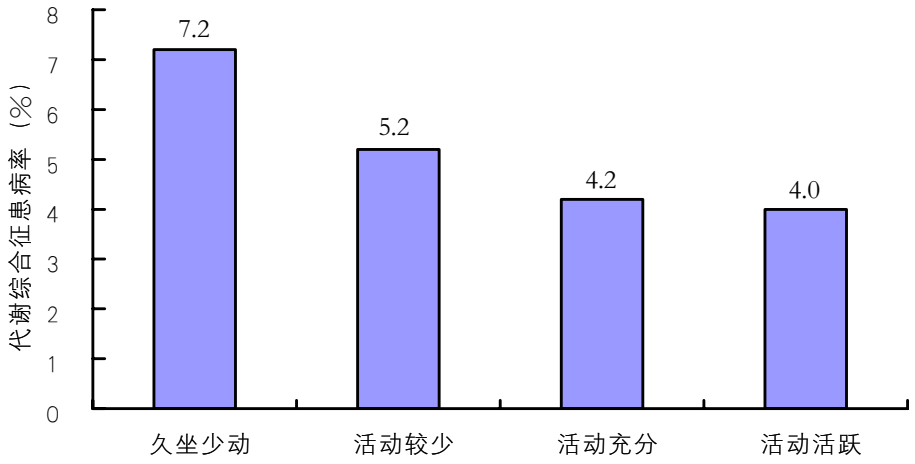

图2-5(3) 体力活动水平与代谢综合征患病率

在“上海女性健康研究”中，对年龄在40～70岁约7.5万名女性随访约5.7年，发现基线总体力活动量、身体锻炼活动量不仅与总死亡的风险呈显著负关联，而且与心血管病死亡密切相关(表2-5(1))[54]。

表2-5（1）　基线体力活动水平(MET-小时/天)与总死亡及心血管病死亡的相对危险

基线体力活动量	总死亡		心血管病死亡	
	RR 值	95%CI	RR 值	95%CI
总体力活动量				
≤9.9	1.00	-	1.00	-
10.0～13.6	0.81	0.69～0.96	0.94	0.66～1.33
13.7～18.0	0.67	0.57～0.80	0.75	0.52～1.08
≥18.1	0.61	0.51～0.73	0.66	0.46～0.95
趋势检验 P 值	0.000		0.012	
体育锻炼活动量				
0	1.00	-	1.00	-
0.1～3.4	0.84	0.69～0.96	0.91	0.70～1.19
3.5～7.0	0.77	0.57～0.80	0.68	0.39～1.18
≥7.1	0.64	0.51～0.73	0.23	0.02～1.64
趋势检验 P 值	0.008		0.038	

注：(1)　MET，代谢当量；(2) Cox 回归分析时，调整年龄、婚姻状况、教育水平、家庭收入、是否吸烟、是否饮酒、妊娠次数、是否服用口服避孕药、是否绝经、其他类型体力活动及是否患有其他慢性疾病（糖尿病、高血压、呼吸系统疾病、慢性肝炎）。

在对同一研究平均随访4.6年的资料进行分析，也发现日常体力活动及闲暇时体力活动与糖尿病Ⅱ型发病危险负相关(表2-5(2))[55]。

表2-5(2)　基线体力活动水平(MET-小时/天)与糖尿病Ⅱ型发病的相对危险(N=64130)

	RR 值	95%CI
日常体力活动量		
<7.85	1.00	
7.85～11.26	0.99	0.85～1.15
11.27~15.20	0.92	0.79～1.07
>15.20	0.86	0.73～0.99
趋势检验 P 值	0.02	
闲暇时体力活动量		
0	1.00	
<1.4	0.89	0.76～1.03
1.5～3.5	0.99	0.85～1.15
>3.5	0.83	0.70～0.97
趋势检验 P 值	0.05	

注：(1)　MET，代谢当量；(2) 研究对象基线时无糖尿病，并排除基线已罹患冠心病、脑卒中及恶性肿瘤者；　(3) Cox 回归分析时，调整基线年龄、总热量摄入、教育水平、收入水平、职业、是否吸烟、是否饮酒及是否患有高血压。

2.6 膳食与营养

随着我国社会经济的变革，近二十年来我国居民整体膳食状况有了明显的改善。但某些食物摄入的过量增加或减少，以及原有一些不合理的膳食特点依然存在，这些因素主要包括[56]：

1．谷类食物摄入量明显下降，2002年人均谷类摄入量城市居民为366克，农村居民为416克，与1982年和1992年全国营养调查相比，城市居民分别下降20%和10%，农村分别下降22%和14%。而谷类摄入量的下降，也使碳水化合物供能比例减少，其中城市居民2002年碳水化合物供能比为51.9%，已低于推荐摄入水平(55%～65%)的下限。

2．脂肪摄入量明显增加，2002年城市居民脂肪摄入量为86克，农村为73克，其中来源于食用油(城市44克，农村41克)的比例已超过50%。脂肪供能比也明显增加，其中城市居民总热量来源于脂肪的比例已达到35%，已明显超过膳食指南推荐的水平(<30%)。

3．蔬菜、水果摄入量明显偏低，且20年来并没有明显改善。2002年全国每日人均蔬菜摄入量为276克，水果摄入量约为45克。

4．高盐摄入情况依旧，与1992年相比，2002年膳食钠的摄入量虽然有所降低(下降11.9%)，但每日摄入量仍高达6 268毫克(折合成食盐为15.9克)。

在有1万余人参加的“青岛港健康研究”中，蔬菜、水果的摄入量与心血管病危险因素密切相关(图2-6(1))[57]。在上海约7.5万名女性(年龄在40～70岁)进行的前瞻性研究中，也发现富含水果膳食模型积分较高的女性总死亡和心血管病死亡的风险显著降低(表2-6)[58]。

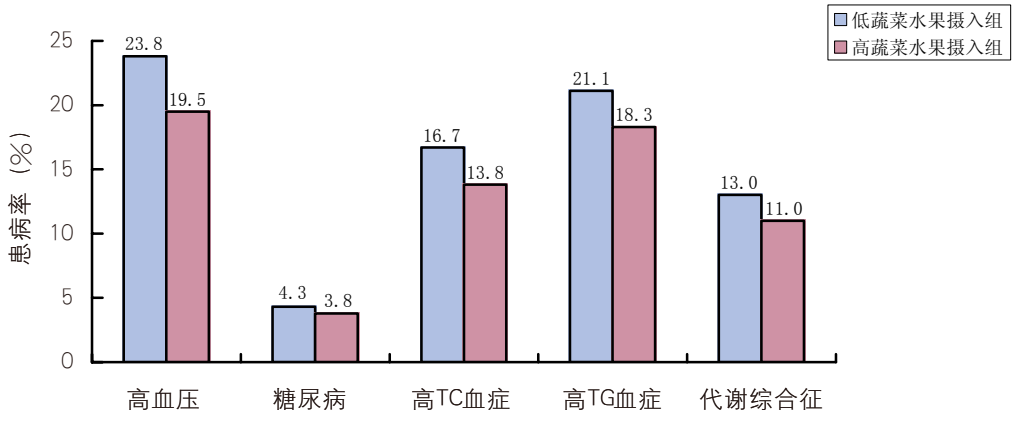

图2-6(1) 蔬菜水果摄入量与心血管病危险因素水平的关系

表2-6 基线水果摄入水平与总死亡及心血管病死亡的相对危险

富含水果膳食模型评分	总死亡		心血管病死亡	
	RR 值	95%CI	RR 值	95%CI
第 1 分位	1.00	-	1.00	-
第 2 分位	0.96	0.84～1.09	0.86	0.67～1.11
第 3 分位	0.91	0.79～1.04	0.79	0.60～1.05
第 4 分位	0.80	0.69～0.94	0.71	0.51～0.98
趋势检验 P 值	0.0090		0.0309	

注：Cox 回归分析时，调整年龄、BMI、婚姻状况、个人收入、吸烟、饮酒、饮茶、人参摄入量和体力活动能量消耗。

在GenSalt研究中[59]，对入选676名血压偏高(正常高限或1级高血压)的研究对象，进行减盐和补钾的干预研究。研究共分3个阶段，每个阶段为期7天，第一阶段盐的摄入量为3克，第二阶段盐的摄入量为18克，第三阶段盐的摄入量仍然为18克，并同时补充钾2.3克。与基线血压相比(图2-6(2))，低盐摄入血压明显降低，高盐摄入血压明显升高，而在高盐摄入同时补充钾，也可使血压水平降低，但程度要小于单纯低盐膳食。

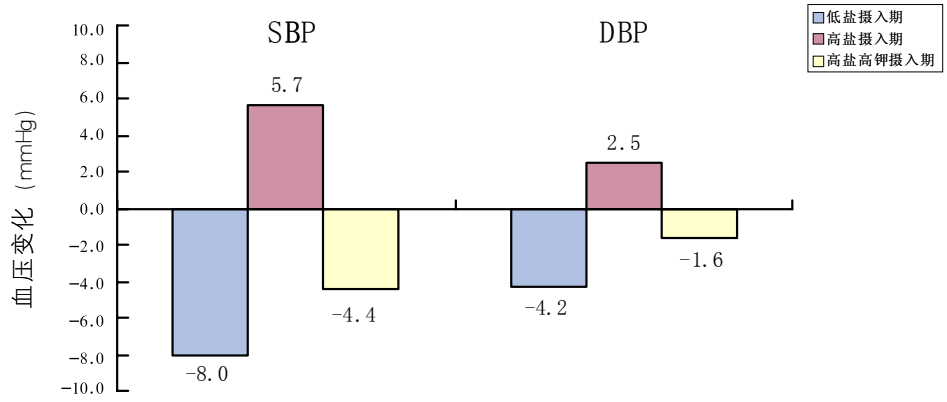

图2-6(2)　不同干预阶段血压变化

在中国代用盐研究中[60]，也证实钠钾对血压的影响。该研究为随机双盲干预研究，608名具有心血管病危险因素的研究对象分为2组，分别使用普通盐或低钠盐，干预为期1年，干预期间，盐的使用量没有限制。与对照组相比，使用低钠盐的研究对象收缩压平均下降3.7mmHg(P<0.001)，舒张压水平下降0.7mmHg，但未达到统计学显著性(P=0.2)。

一项随机双盲多中心植物蛋白干预研究[61]将302名年龄在35～64岁、血压为正常高值或I期高血压的对象随机分为干预组和对照组，干预组每天补充40克大豆蛋白，连续补充3个月。对照组给予安慰剂(复合碳水化合物)，结果显示增加大豆蛋白的摄入可使收缩压降低4～6mmHg，舒张压降低2～3mmHg。提示增加膳食大豆蛋白摄入对预防和治疗高血压有一定的作用(图2-6(3))。

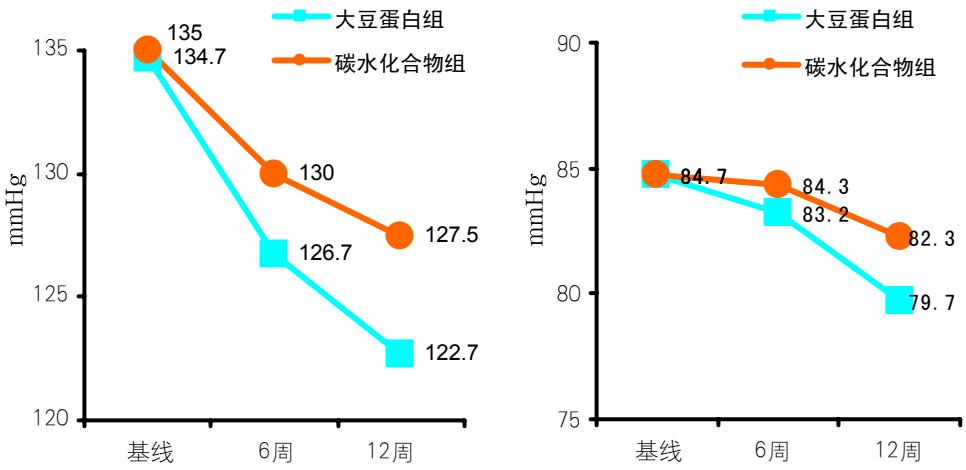

图2-6(3) 大豆蛋白预防高血压随机化临床试验

2.7 代谢综合征

2.7.1 我国代谢综合征的流行趋势

2.7.1.1 18岁以上人群代谢综合征患病率

2002年，采用多阶段分层整群抽样，对全国31个省、直辖市、自治区15岁以上人口进行营养与健康状况调查[62]。代谢综合征流行现状分析人群48 556人。依据我国中华医学会糖尿病分会2004年代谢综合征诊断标准(CDS)，18岁以上代谢综合征患病粗率为6.6%。依据美国国家胆固醇教育项目成年人高胆固醇血症的监测、评估和治疗方案(ATPⅢ)标准，代谢综合征患病粗率为13.8%。

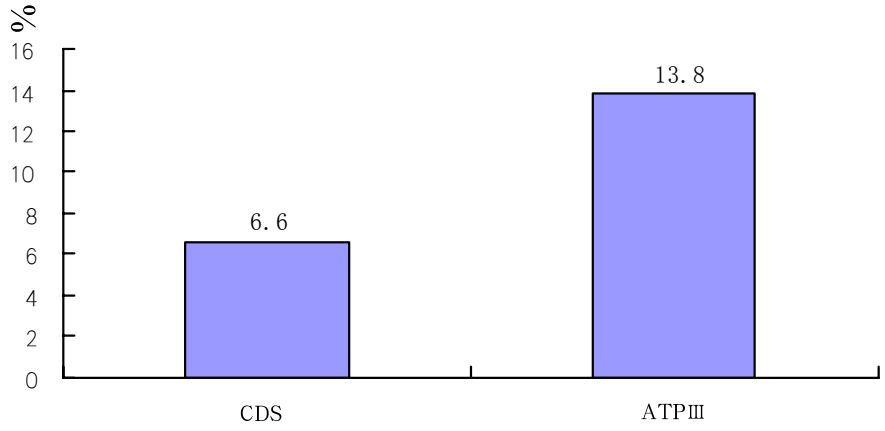

图2-7-1（1）不同标准代谢综合征患病率

2.7.1.2 不同性别代谢综合征患病率[63]

依据CDS代谢综合征诊断标准男性和女性代谢综合征患病率接近(6.4%vs6.8%)，没有统计学显著差异。依据ATPIII代谢综合征诊断标准，女性代谢综合征患病率高于男性(10.9% vs17.1%)(P<0.001值)。

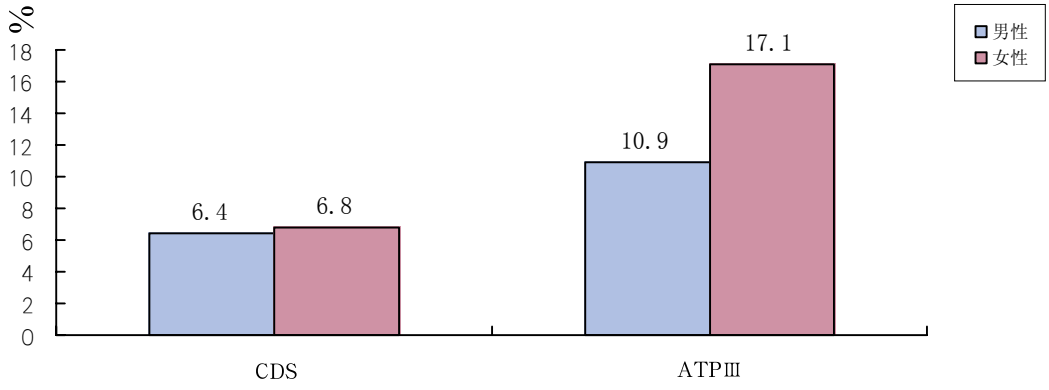

图2-7-1（2）不同性别代谢综合征患病率

2.7.1.3 不同年龄代谢综合征患病率

（1）成人不同年龄代谢综合征患病率[64]：依据CDS代谢综合征诊断标准，代谢综合征的患病率总体趋势是随着年龄的增加而增加，65岁组患病率达高峰，超过65岁代谢综合征患病率呈下降趋势。男性和女性代谢综合征患病率呈现相同趋势，但在50岁以

前男性代谢综合征患病率高于女性，而50岁后则低于女性。

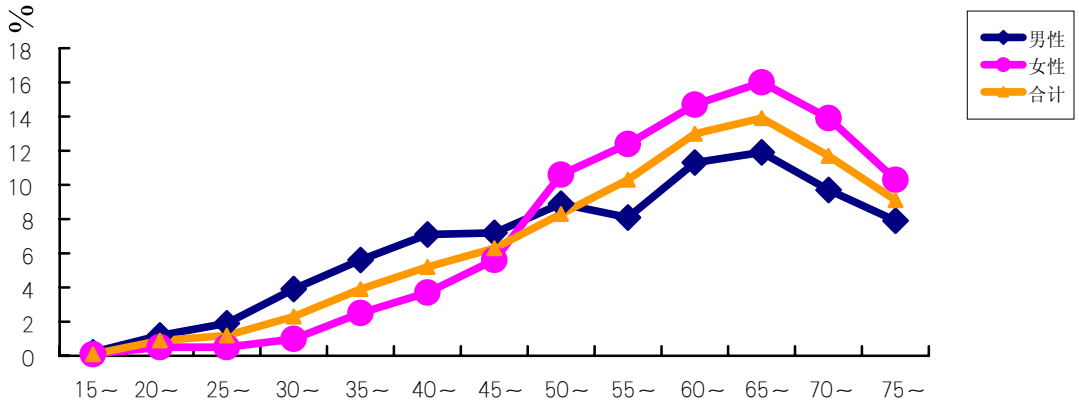

图2-7-1（3）成人不同年龄代谢综合征患病率

(2)儿童代谢综合征患病率[65]:2004年北京市7个区县3 471例6～18岁青少年。依据美国国家胆固醇教育计划III(NCEPIII)定义的美国青少年MS诊断标准和国际糖尿病联盟2004年诊断标准(IDF)。超重和肥胖儿童代谢综合征患病率显著高于体重正常的儿童(P<0.001)

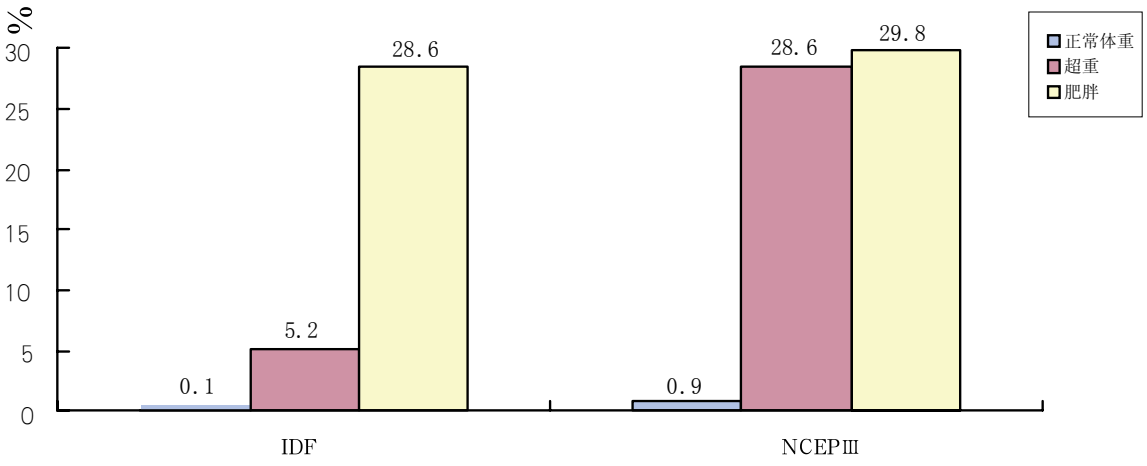

图2-7-1（4）儿童代谢综合征患病率

2.7.1.4 不同地区代谢综合征患病率[66]

依据CDS代谢综合征诊断标准，城市15岁以上代谢综合征患病粗率为9.7%，农村为4.6%。其中大城市代谢综合征患病率最高，达11.4%。农村中三类农村代谢综合征患病率最高，达6.1%。

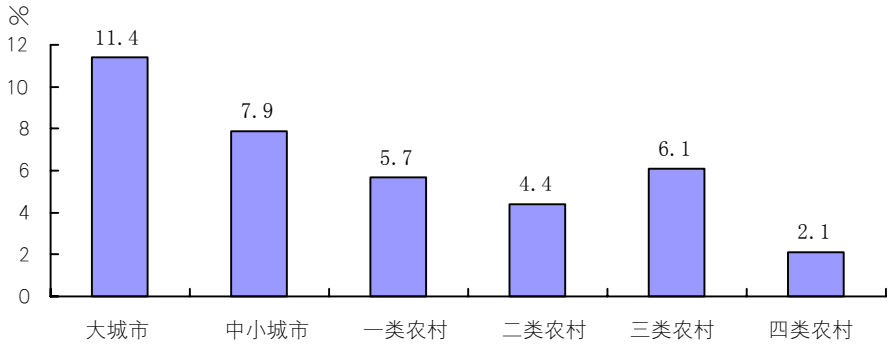

图2-7-1（5）不同地区代谢综合征患病率

2.7.1.5 不同类型代谢综合征构成比[67]

依据CDS代谢综合征诊断标准，不同类型代谢综合征以超重或肥胖+高血压+血脂异常的比例最高，达53.7%，为我国代谢综合征的主要类型。

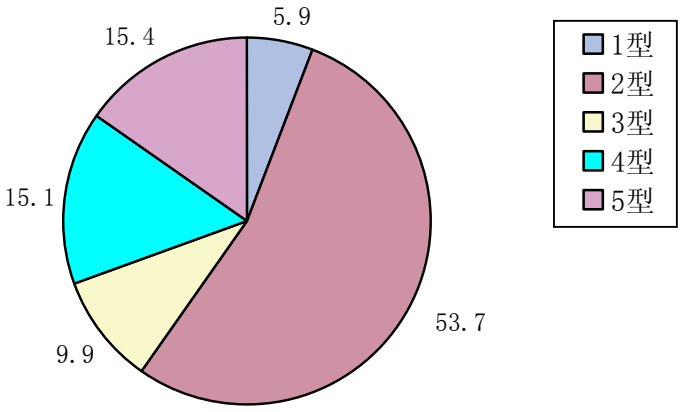

图2-7-1（6）不同类型代谢综合征构成比

注：1型：糖代谢异常+高血压+血脂异常；
2型：超重或肥胖+高血压+血脂异常
3型：超重或肥胖+糖代谢异常+血脂异常；
4型：超重或肥胖+糖代谢异常+高血压
5型：超重或肥胖+糖代谢异常+高血压+血脂异常

2.7.1.6 代谢综合征的患病率变化趋势（青岛港健康研究）[68]

2000年和2004年分别对青岛港18～54岁职工进行调查，依据ATPIII代谢综合征诊断标准，2000年(11 364人)代谢综合征患病率为10.0%，2004年(10 834人)增加到12.5%。其中女性代谢综合征患病率由6.0%增加到8.9%升高了48.3%，男性由13.9%增加到16.1%，升高了15.8%。

2.7.2 代谢综合征与心血管疾病

我国11省市35～64岁30 378队列研究[69](1992年开始)，基线代谢综合征患者5 534例，非代谢综合征患者24 844例。10年冠心病发病率分别为207.9/10万和101.1/10万；缺血性脑卒中发病率分别为450.5/10万和159.7/10万；出血性卒中的发病率分别为130.6/10万和67.2/10万。

表2-7-2 代谢综合征患者10年发病率及发病危险(1/10万)

心血管疾病	非代谢综合征	代谢综合征
冠心病		
发病率	101.1	207.9
发病危险　OR(95%CI)	1	1.80 (1.36～2.37)
缺血性脑卒中		
发病率	159.7	450.5
发病危险　OR(95%CI)	1	2.41 (1.98～2.37)
出血性脑卒中		
发病率	67.2	130.6
发病危险　OR(95%CI)	1	1.63 (1.16～2.30)

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第三部分　心血管病防治研究

3.1 冠心病、急性冠状动脉综合征和心绞痛

3.1.1 冠心病流行病学

3.1.1.1 中国人群冠心病的死亡率和变化趋势[1]

2006年冠心病的死亡粗率

根据《2007年中国卫生统计年鉴》提供的数据，2006年中国城市居民冠心病死亡粗率为57.1/10万，占所有心脏病死亡的60.9%。农村居民冠心病死亡粗率为33.74/10万，占心脏病总死亡的47%。总体上看城市地区冠心病死亡粗率高于农村地区，男性高于女性(图3-1-1(1))。详见表3-1-1(1)。

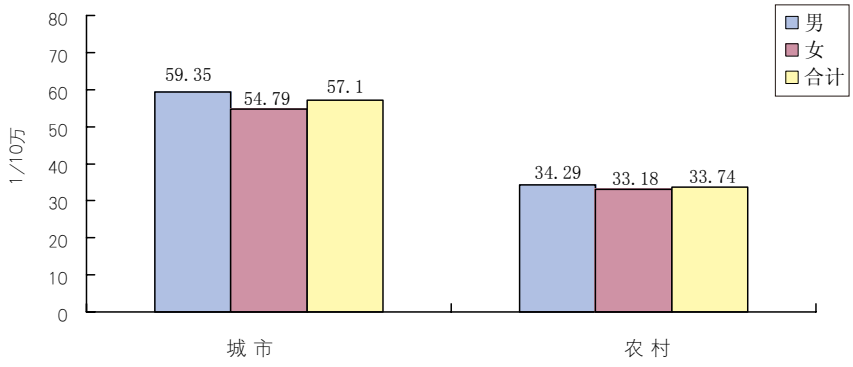

图3-1-1（1）2006年中国城乡不同性别人群冠心病死亡粗率比较

表3-1-1(1) 2006年冠心病死亡粗率(1/10万)

	城市合计			大城市		
	合计	男性	女性	合计	男性	女性
急性心梗	25.53	28.47	22.51	30.96	34.56	27.31
其他冠心病	31.57	30.88	32.28	43.16	41.87	44.46
冠心病合计	57.1	59.35	54.79	74.12	76.43	71.77
心脏病合计	93.69	95.95	91.36	107.87	110.24	105.46
冠心病死亡比例%	60.9	61.9	60.0	68.7	69.3	68.1

续 表

	中小城市			农村		
	合计	男性	女性	合计	男性	女性
急性心梗	18.61	20.82	16.3	18.4	20.24	16.49
其他冠心病	16.81	17.07	16.53	15.34	14.05	16.69
冠心病合计	35.42	37.89	32.83	33.74	34.29	33.18
心脏病合计	75.61	77.99	73.13	71.84	71.79	71.9
冠心病死亡比例%	46.8	48.6	44.9	47.0	47.8	46.1

(1)中国城市人群2006年冠心病年龄别死亡专率(1/10万)

城市地区冠心病死亡率随年龄的增加而增加，各年龄组中男性均高于女性。其递增趋势近似于指数关系(图3-1-1(2))，详见表3-1-1(2)。

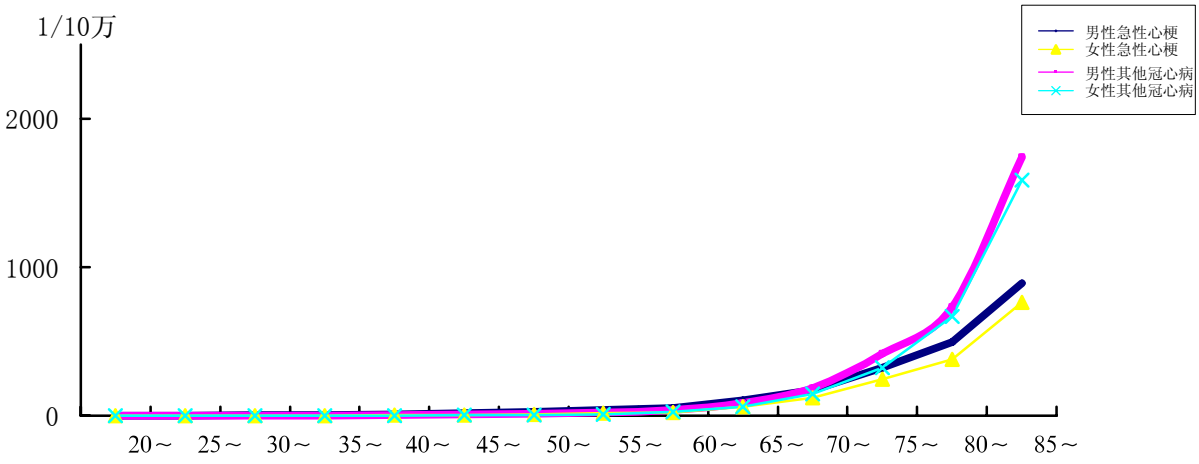

图 3-1-1（2） 城市地区不同性别、年龄组人群冠心病死亡专率比较

表 3−1−1（2）中国城市人群2006年冠心病年龄别死亡专率(1/10万)

		20~	25~	30~	35~	40~	45~	50~
男	急性心梗	0.66	0.90	2.60	3.99	9.79	15.60	25.73
性	其他冠心病	0.27	0.28	0.61	1.31	4.02	6.63	14.19
女	急性心梗	0.42	0.24	0.63	1.95	2.91	3.97	9.31
性	其他冠心病	0.06	0.12	0.29	0.41	1.39	2.22	4.81
合	急性心梗	0.54	0.58	1.64	2.99	6.44	9.88	17.57
计	其他冠心病	0.17	0.20	0.45	0.87	2.74	4.46	9.52

续 表

		55~	60~	65~	70~	75~	80~	85~
男	急性心梗	38.99	49.60	102.19	173.16	325.43	496.76	894.12
性	其他冠心病	20.55	39.63	85.76	183.51	418.99	734.85	1743.46
女	急性心梗	15.84	23.24	60.65	119.78	244.07	379.28	764.97
性	其他冠心病	10.66	24.55	62.47	146.79	321.28	666.96	1585.22
合	急性心梗	27.49	36.30	81.05	145.48	281.91	429.30	811.99
计	其他冠心病	15.64	32.02	73.91	164.47	366.73	695.86	1642.83

(2) 中国农村人群2006年冠心病年龄死亡专率(1/10万)

农村地区冠心病死亡粗率亦随年龄呈指数型递增(图3-1-1(3))，但总体水平低于城市，详见表3-1-1(3)。

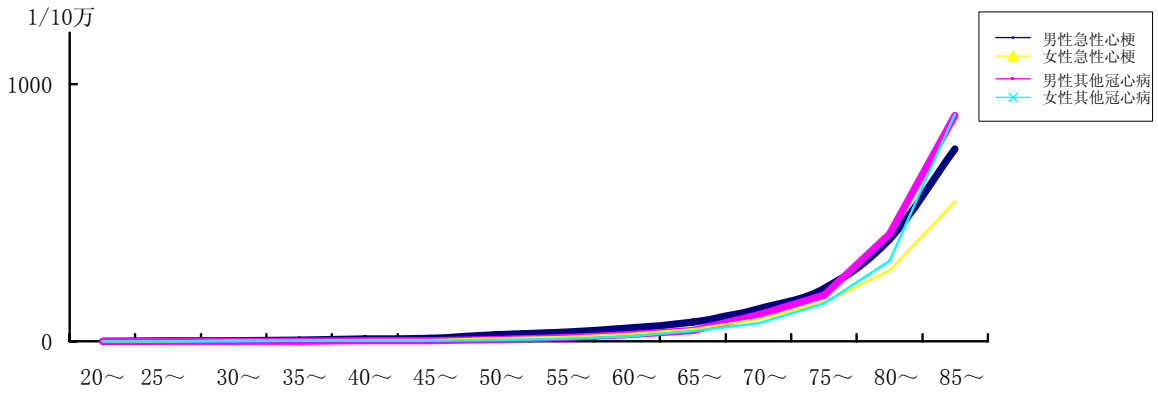

图3-1-1（3） 农村地区不同性别、年龄组人群冠心病死亡专率比较

图3−1−1(3) 农村地区不同性别、年龄组人群冠心病死亡专率比较

性别	冠心病类型	20~	25~	30~	35~	40~	45~	50~
男	急性心梗	0.75	1.20	2.33	5.63	10.36	11.08	25.15
性	其他冠心病	0.08	0.13	0.49	0.87	2.17	2.92	7.57
女	急性心梗	0.25	0.41	1.31	2.27	5.23	5.06	11.63
性	其他冠心病	0.17	0.20	0.37	1.17	1.40	3.10	5.02
合	急性心梗	0.50	0.81	1.82	3.97	7.85	8.12	18.58
计	其他冠心病	0.13	0.17	0.43	1.02	1.79	3.01	6.33

续 表

性别	冠心病类型	55~	60~	65~	70~	75~	80~	85~
男	急性心梗	34.38	50.83	74.08	126.28	204.20	396.40	749.12
性	其他冠心病	12.96	26.12	41.77	102.62	179.14	416.62	877.37
女	急性心梗	17.46	27.86	46.02	86.80	152.35	274.95	542.55
性	其他冠心病	10.31	19.60	39.36	69.06	147.39	311.23	883.91
合	急性心梗	26.22	39.89	60.30	105.85	175.29	322.57	608.45
计	其他冠心病	11.68	23.02	40.58	85.25	161.43	352.55	881.82

3.1.1.2 冠心病危险因素

高血压

中国多省市队列研究对1992年建立的11省市35～64岁队列人群共30 378人的基线血压水平和1992～2003年期间发生的CVD(冠心病和脑卒中)事件的关系进行分析。结果显示：1)我国35～64岁人群中正常高值血压者占32.1%,与高血压的比例为1.2:1。2)多因素分析显示:以正常血压为对照,正常高值血压增加冠心病发病危险44%(RR=1.441； 95% CI：0.996,2.086)。增加总的CVD发病危险52%(RR=1.522,95%CI1.206,1.919)。3)在总的CVD事件中,14.4%归因于正常高值血压;其中12.4%的CHD事件归因于正常高值血压[2]。

另一项队列研究探讨了老年人血压水平与冠心病的关系。该研究对1993年抽样调查的60岁及以上老人3 440例进行了11年的随访。结果显示该人群基线高血压组新发冠心病16.9%,脑卒中15.4%,发病率明显高于血压正常组(发病率分别为13.2%,10.1%);且冠心病的发病率随基线收缩压或舒张压水平的升高而升高;在相同血压水平女性老年人的冠心病发病率高于男性；低龄老人较高龄老人心、脑血管疾病发病率高[3]。

多危险因素聚集

一项以选择性冠状动脉造影为金标准,对2 993例临床诊断冠心病患者的调查显示：冠脉造影阳性率随着伴发危险因素(高龄、男性、糖尿病、高脂血症、高血压以及吸烟)数目的增加而明显上升,冠脉多支病变比例显著增加,重度和闭塞病变所占比例呈上升趋势[4]。

中国心脏研究的一项横断面调查结果显示：在3 513名已知患有冠心病的住院病人中,慢性肾病的患病率为24.8%。与未患慢性肾病的冠心病患者比较,前者更容易患有高血压(49.5%vs.42.8%;P=0.001)和糖尿病(43.1%vs.29.5;P<0.001)，高密度脂蛋白水平也相对较低。提示对于此类患者应采取更加积极的危险因素控制措施[5]。

3.1.2 冠状动脉介入治疗登记注册研究

3.1.2.1 2002年～2006年中国大陆PCI逐年完成例数(图3-1-2-(1))

3.1.2.2 亚洲冠心病患者的Multi-link Vision及 MiniVision支架登记注册研究：前瞻性多中心研究

(Multi-link Vision and MiniVision Stent Registry in Asian Patients with Coronary Artery Disease：A Prospective,Multi-center Study)

亚洲14个临床中心参加的观察性、前瞻性、多中心、非随机的市场后注册登记研究,入选429例冠心病患者(平均年龄61.7±7.4岁,77.2%男性,449处病变,平均靶病变参

考血管直径3.0±0.5mm，平均长度15.7±5.0mm)置入裸金属支架Multi-link Vision及Mini Vision支架，观察住院期间及随访6个月时的效果，结果见表3-1-2。

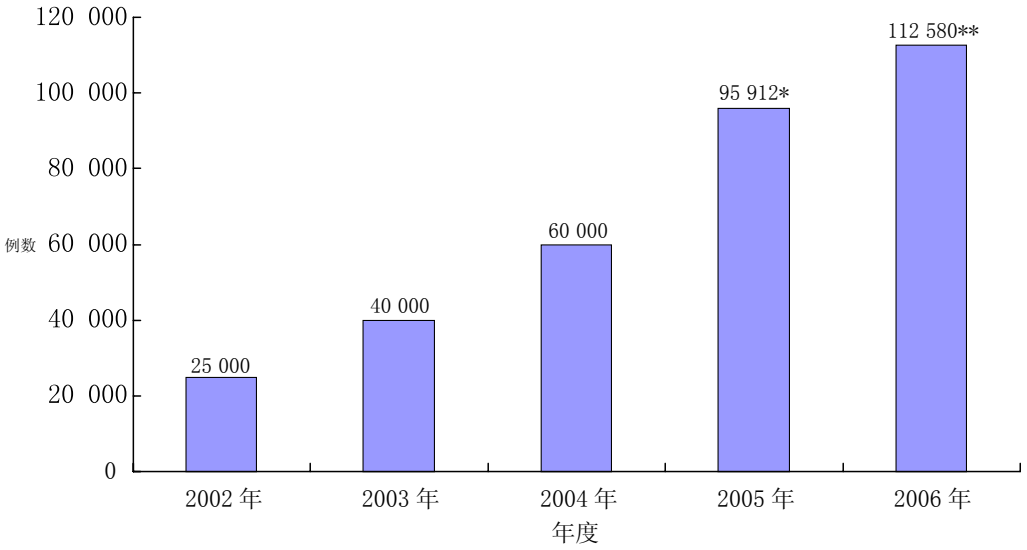

图3-1-2-1(1) 2002年~2006年中国大陆PCI逐年完成例数(其中2002~2004年为估计值)

资料来源：*吕树铮等 中华心血管病杂志 2006；34（11）：966～970.

**吕树铮等 中华心血管病杂志 2007；35（9）：871～872.

表3-1-2 住院期间及随访结果

事件	病例数	百分比（%）
支架置入成功	426	99.3
住院期间主要心脏事件	2	0.5
出院后到 6 个月时主要心脏事件	27	6.3
6 个月时总心脏事件	29	6.8
死亡	2	0.5
Q 波心肌梗死	0	0
非 Q 波心肌梗死	1	0.2
反复心绞痛发作	20	4.7
靶病变血管血运重建	6	

资料来源：Xu Ya-wei, Wei Yi-dong, Tang Kai, et al. Chin Med J 2007;120(12):1093～1096.

该研究提示：裸金属支架Multi-link Vision 及 Mini Vision 支架对亚洲冠心病患者效果好。

3.1.3 急性心肌梗死溶栓治疗

重组葡激酶与重组组织型纤溶酶原激活剂治疗急性心肌梗死的随机多中心临床试验

2002年1月至2003年10月在国内12家医院进行多中心、随机、平行对照临床试验，入选发病12小时内、年龄≤70岁、sT段抬高的急性心肌梗死(AMI)患者210例，随机分为重组葡激酶(r-Sak)组104例(年龄56.3±9.2岁，男性77.9%)，给予r-Sak3mg静注，12mg于30分钟内静脉输注，总量15mg；重组组织型纤溶酶原激活剂(rt-PA)组106例(年龄58.4±9.0岁，男性84.0%)，8mg静注，42mg在90分钟内输注，总量50mg。全部患者给予阿司匹林和静脉输注肝素。于用药90分钟行冠状动脉造影，对TIMI血流0～2级者行补救性PCI。观察重组葡激酶(r-Sak)治疗急性心肌梗死(AMI)的冠状动脉通畅率、临床疗效及安全性，结果见表3-1-3。无其他药物相关的严重不良反应及过敏反应发生。

表3-1-3　主要终点及次要终点结果

终点	r-Sak(%) (n=104)	Rt-PA组(%) (n=106)	P
主要终点			
用药90分钟冠状动脉通畅率			
TIMI血流2级或3级	77.8	63.6	0.0277
TIMI 3级	57.6	48.5	0.1929
1个月内死亡	8.7	5.7	0.3997
非致死性再梗死	2.9	3.8	1.0000
心肌缺血复发	8.7	16.0	0.1043
复合临床终点	18.3	21.7	0.5345
次要终点			
出血	28.8	27.4	0.8105
严重或威胁生命的出血	1.9	3.8	
脑出血	1.0	3.9	

资料来源：急性心肌梗死再灌注治疗研究协作组　基金项目：国家“十五”攻关项目资助课题(2001BA703B10)
中华心血管病杂志 2007；35（8）：691～696.

该研究提示：r-Sak是一种安全、有效的治疗AMI的溶栓药物，其疗效及安全性至少与rt-PA50mg相似。

3.1.4 冠心病二级预防

3.1.4.1 血脂康对老年有心肌梗死史患者的心血管事件与死亡率的影响：中国冠心病二级预防研究的老年患者的亚组分析

1996年11月1到2000年12月31日全国66家医院参加的随机、双盲、安慰剂对照的

临床试验(中国冠心病二级预防研究),入选有心肌梗死史的患者4 780例,本亚组分析选取其中年龄65岁～75岁的1 445例患者,随机分入血脂康组(735例,血脂康0.6克每日两次)与安慰剂组(710例),两组基线情况匹配,平均随访4年(0.5～7年),观察冠状动脉事件、全因死亡率及其他临床事件。结果见表3-1-4(1)。

表3-1-4(1)临床事件

临床事件	血脂康组 (n=735) n(%)	对照组 (n=710) n(%)	组间差	P 值
全部冠心病事件	69(9.4)	106(14.9)	-36.9	0.001
非致死性心肌梗死	18(2.4)	35(4.9)	-51.0	0.01
致死性心肌梗死	13(1.38)	11(1.55)	12.3	0.74
猝死	24(3.3)	31(4.4)	-25.0	0.27
其他冠心病死亡	14(1.9)	29(4.1)	-53.6	0.02
全部冠心病死亡	51(6.9)	71(10.0)	-31.0	0.04
全因死亡	68(9.2)	96(13.5)	-31.9	0.01
卒中	24(3.3)	42(5.9)	-44.1	0.04
卒中存活	17(2.3)	39(5.5)	-58.2	0.006
卒中死亡	7(0.9)	3(0.4)	125.0	0.22
PCI/CABG	14(1.9)	26(3.7)	-48.6	0.07
癌症	13(1.8)	26(3.7)	-51.4	0.03
癌症存活	7(0.9)	9(1.2)	-25.0	0.57
癌症死亡	6(0.8)	17(2.4)	-66.7	0.02

资料来源：Ping Ye, Zong-Liang Lu, Bao-Min Du, et al. J Am Geriatr Soc 55:1015～1022,2007.

该研究提示：血脂康对中国老年冠心病患者二级预防安全有效。

3.1.4.2 血脂康(一种Cholestin的提取物)减少伴有Ⅱ型糖尿病的冠心病患者的心血管事件：中国冠心病二级预防研究的患有Ⅱ型糖尿病患者的亚组分析

1996年11月到2000年12月全国19个省市66家医院参加的随机、双盲、安慰剂对照的临床试验(中国冠心病二级预防研究),入选有心肌梗死史的患者4 780例,本亚组分析选取其中患Ⅱ型糖尿病的患者591例,随机分入血脂康组(306例,血脂康0.6克每日两次)与安慰剂组(285例),两组基线情况匹配,平均随访4年,观察冠状动脉事件、全因死亡率及其他临床事件。结果见表3-1-4(2)。

表3-1-4(2)临床事件

临床事件	血脂康组（n=306）n(%)	安慰剂组(n=285) n(%)	组间差	P 值
非致死性急性心肌梗死	7(2.3)	18(6.3)	−63.8	0.015
致死性急性心肌梗死	4(1.3)	9(3.2)	−58.5	0.125
猝死	11(3.6)	14(4.9)	−26.9	0.426
其他冠心病死亡	6(1.9)	12(4.2)	−53.4	0.112
全部冠心病死亡	21(6.9)	35(12.3)	−44.1	0.025
全部冠心病事件	28(9.2)	53(18.6)	−50.8	0.001
卒中存活	11(3.6)	13(4.6)	−21.3	0.625
卒中死亡	3(0.9)	6(2.1)	−53.6	0.273
全部卒中	14(4.6)	19(6.7)	−31.3	0.335
PCI/CABG	14(4.6)	12(4.2)	8.8	0.836
总死亡	27(8.8)	45(15.8)	−44.1	0.009

资料来源：Shui-ping Zhao, Zong-liang Lu, Bao-min Du, et al. J Cardiovasc Pharmcol 2007;49:81-84.

该研究提示：血脂康治疗能有效减少合并糖尿病Ⅱ型的冠心病患者的心血管事件且安全可靠。

3.2 脑卒中

3.2.1 脑卒中流行趋势

三个中国城市以人群为基础的社区干预卒中发病率变化研究[6]

1991年，在北京、上海和长沙各入选两个匹配良好的城市社区，每个社区大约5万人口，分别作为干预组和对照组。在1991～2000年间，干预组接受常规的健康教育和健康促进活动，而对照社区没有特殊活动。干预10年后，与对照组相比，干预组的全部卒中、缺血性卒中和出血性卒中的发生风险分别下降了11.4%、13.2%和7.2%。

表3-2-1 1991～2000年间三个城市的干预社区和对照社区的全部、缺血性和出血性首次卒中的平均年改变率（%）

社区	所有卒中趋势	缺血性卒中趋势	出血性卒中趋势
		北京	
干预	–6.1	–3.6	- 9.1
对照	–0.8	4.0	- 11.7
		上海	
干预	- 5.6	- 0.6	- 9.0

续 表

社区	所有卒中趋势	缺血性卒中趋势	出血性卒中趋势
对照	0.2	7.7	-4.5
长沙			
干预	-11.1	-11.1	-10.1
对照	-6.5	-4.6	-7.7
三个城市（总计）			
干预	-7.9	-5.1	-9.6
对照	-2.9	2.2	-8.0

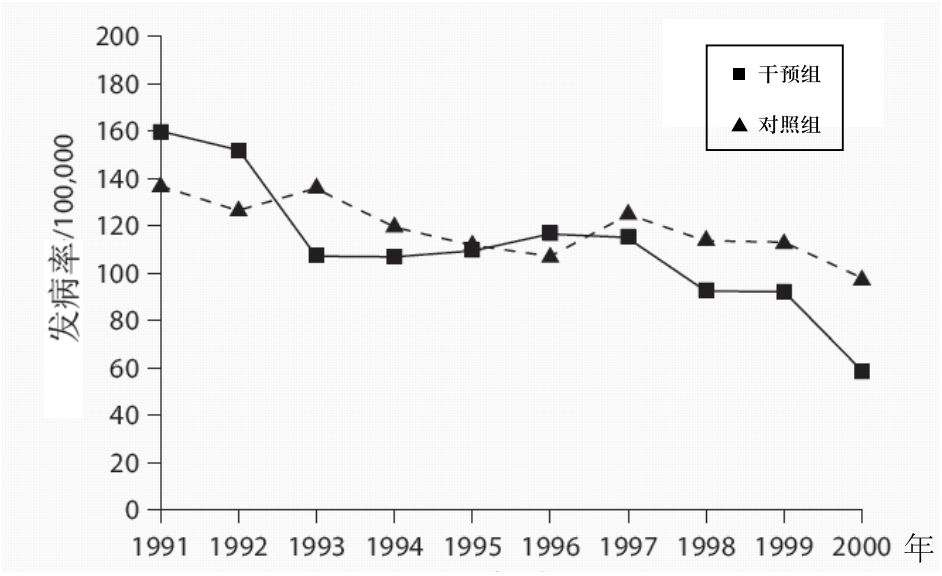

图3-2-1 在总的研究组中年龄调整的首次卒中发病率

1987～2001年城市和农村人群卒中死亡率的差异和变化趋势[7]

截止20世纪90年代末，年龄调整的卒中死亡率，城市高于农村。1987年，城市与农村比率，男性为1:16，女性为1:21。但到2001年，这一比率分别下降至0.77和0.79。因为城市的卒中死亡率显著下降（每年男性下降2.0%，女性下降2.5%），而这一时期内农村下降很少（女性下降0.7%）。下降主要发生于老年人群。而在35～54岁年龄段，除城市女性外，所有区域和性别组的卒中死亡率上升。

中国缺血性卒中患者复发率[8]

在登记患者中，第一年复发率是11.2%。高血压、房颤和吸烟与复发风险增高有关。得到控制的高血压和房颤使复发风险减半。戒烟超过一年使复发的危害比从1.71降至1.39。控制糖尿病患者的血糖水平不能使复发风险有显著改变。与一个西方人群报告的数据相比，中国缺血性卒中患者的复发风险更高。

3.2.2 脑卒中危险因素

家族史

一项关于我国人群中父母高血压史与子代心血管病发病(包括脑卒中)的关系的研究表明[9]，父母有高血压史者具有较高的发生心血管病的危险性，父母双方均有高血压史者心血管病发病危险的增加尤为显著。该研究对15 131人随访10.8年，发生冠心病事件82例，脑卒中事件370例。

表3-2-2(1)队列人群心血管事件发生率(1/10 000人•年)

父母高血压史		心血管事件					
		50岁以下人群		50岁及以上人群		全部人群	
		例数	发生率	例数	发生率	例数	发生率
男性	父母均无	61	17.7	124	61.0	181	33.5
	父母一方有	34	25.4	33	64.9	67	36.3
	父母均有	10	45.1#	10	121.1*	20	65.8#
女性	父母均无	28	6.7	87	37.2	115	17.7
	父母一方有	24	17.2#	28	48.7	52	26.4*
	父母均有	7	30.3#	6	52.9	13	37.8#

与父母均无高血压相比，* P<0.05; # P<0.01.

血脂异常

有研究表明，我国中年人群TC/HDL-C比值对缺血性脑卒中发病有独立的预测作用，且预测能力可能优于TC或LDL-C。研究采用前瞻性队列研究方法，在中美心血管病和心肺疾病流行病学合作研究4组队列人群(北京、广州两地工人和农民)中选择基线年龄35～59岁、无心肌梗死和脑卒中病史且资料完整者10 121名为研究对象(男性

4 921名，女性5 200名），平均随访15.9年[10]。随访期间共发生缺血性脑卒中277例，出血性脑卒中125例。将TC/HDL-C比值分为< 3.0、3.0～、3.5～、4.0～和≥4.5五组，缺血性脑卒中年龄调整发病率(1/10万人年)随比值增高而增高，比值≥4.0增高明显（表3-2-2(2)）；Cox回归分析显示，调整年龄、性别、地区以及舒张压、血糖、吸烟和饮酒等变量后，TC/HDL-C比值4.0～及≥4.5组，缺血性脑卒中发病相对危险性显著高于参照组(TC/HDL-C<3.0)（表3-2-5(2)）；TC/HDL-C比值、TC、LDL-C对缺血性脑卒中均有独立预测作用，TC/HDL-C比值五分位与缺血性脑卒中发病相对危险性关联曲线呈线性，与出血性脑卒中未见明显关联趋势。

表3-2-2(2) 血清TC/HDL-c比值与缺血性和出血性脑卒中年龄调整发病率及相对危险

TC/HDL-c Ratio	缺血性脑卒中					出血性脑卒中				
	发病例数	人年	发病率(1/10万)	RR*	P值	发病例数	人年	发病率(1/10万)	RR*	P值
<3.0	78	55 117.6	144.1	1.0		45	55 373.8	89.4	1.0	
3.0～	57	34 702.6	169.4	1.33	0.123	26	34 929.0	75.5	0.96	0.865
3.5～	43	25 885.2	166.7	1.37	0.117	24	26 45.2	91.7	1.21	0.472
4.0～	39	15 740.3	226.9	1.59	0.024	18	15 869.8	110.2	1.34	0.322
≥4.5	60	20 251.8	282.2	1.87	0.001	12	20 509.1	57.2	0.65	0.205

* 控制变量包括年龄、性别、地区、舒张压、血糖、吸烟、饮酒。

中国糖尿病患者卒中特征[11]

比较伴或不伴糖尿病的2 532名首次卒中的住院患者的人口学特点、危险因素、卒中亚型和结局。471名(18.6%)患者患糖尿病。有糖尿病者与无糖尿病者相比，患缺血性卒中的风险更高(92.1%vs71.3%)，尤其是腔隙性梗死(41.2%vs35.2%)。与无糖尿病者相比，糖尿病者患脑出血更少(4.2%vs18.1%)。两组的住院死亡率接近(糖尿病患者18.2%，无糖尿病者16.9%)。糖尿病患者住院死亡的预测因素包括意识障碍、充血性心脏衰竭和房颤。总之，糖尿病患者的卒中与无糖尿病者有所不同：糖尿病者的脑出血发生率较低，而腔隙性梗死综合征的发生率较高，但由缺血性卒中导致的住院死亡率并不升高。卒中起病时明确的临床因素对住院死亡率有明显影响，有助于医生更

准确地估计预后。

表3-2-2(3) 糖尿病和非糖尿病患者中的卒中病理分型

卒中亚型	糖尿病性 (n = 471)	非糖尿病性 (n = 2061)	*P* 值
脑出血	4.2%	18.1%	0.000
蛛网膜下腔出血	0.2%	1.6%	0.018
未分类	3.5%	9.0%	0.000
脑梗塞　(缺血性卒中)	92.1%	71.3%	0.000
缺血性卒中亚型	(n=434)	(n=1470)	
全前循环梗塞	23.3%	25.3%	NS
部分前循环梗塞	25.4%	30.2%	0.050
后循环梗塞	10.1%	9.2%	NS
腔隙性梗塞	41.2%	35.2%	0.026

3.2.3 脑卒中一级、二级预防

控制高血压

长期降压治疗是脑卒中二级预防的重要措施，可减少脑卒中再发的危险。2007年报道了一项关于长期降压治疗对脑血管病患者脑卒中再发事件影响的研究结果[12]：1 399例有脑血管病病史患者被随机分为血管紧张素转换酶抑制剂(ACEI)+吲哒帕胺治疗组(702例)和相匹配的安慰剂对照组(697例)，双盲治疗4年，开盲后开放治疗2年，共随访6年。双盲治疗4年治疗组较对照组血压净下降12.5/5.3mmHg　，开放治疗2年净下降9.2/4.7mmHg　，随访6年血压平均净下降10.5/5.0mmHg。双盲治疗4年治疗组脑卒中发生(9.5%)　较对照组(20.2%)　危险下降53%(P<0.01)；开放2年脑卒中危险下降25%(P=0.19)；随访6年脑卒中危险下降46%(P<0.01)。证实长期降压治疗对脑血管病患者是有益的，可减少脑卒中再发的危险。

抗血栓治疗

抗血栓治疗可以降低外周动脉疾病患者主要心血管事件包括脑卒中、心肌梗死等的发生率，但是关于口服抗凝剂联合或不联合抗血小板药物治疗的有效性和安全性的资料非常有限。2007年在*New England Journal of Medicine*发表的WAVE试验[13]为心血管疾病的二级预防提供依据。此项研究为随机、开放的临床试验，在加拿大、波兰、匈牙利、乌克兰、中国、荷兰和澳大利亚等80多个中心进行。将2 161例外周动脉疾病

患者(包括TIA和脑卒中)分为合并治疗组(一种抗血小板和一种口服抗凝剂)或单抗血小板制剂组。平均随访35个月。结果表明，合并治疗组和单用抗血小板制剂组发生心肌梗死、脑卒中或心血管死亡差异无统计学意义，脑卒中(3.5%比3.5%；RR1.01)。但与抗血小板治疗组相比，联合治疗组威胁生命的出血、中度出血的发生率都显著升高。两组威胁生命的出血：联合治疗组中有14例(1.3%)发生出血性卒中，而抗血小板治疗组中没有[RR=15.2；95%CI(2.0～115.6；P=0.001)]。总之，外周动脉病患者接受一种口服抗凝药和一种抗血小板制剂，在预防严重并发症方面并不比单服抗血小板制剂更有效，甚至危及生命出血的危险可能增多。

中国报道了一项前瞻性、随机、多中心研究，比较阿司匹林与调整剂量华法林预防非瓣膜性心房颤动(房颤)患者发生血栓栓塞的有效性和安全性的研究[14]。共704例患者分为阿司匹林组(369例)，华法林组(335例)。平均随访19个月(2～24个月)。与阿司匹林比较，调整剂量华法林使缺血性脑卒中的相对危险下降62%(表3-2-3)；华法林组轻微出血和严重出血发生率均高于阿司匹林组(P<0.05)。结果证实与阿司匹林比较，调整剂量的华法林抗凝使非瓣膜性房颤患者死亡和缺血性脑卒中的相对危险下降56.0%，缺血性脑卒中的相对危险下降62.0%，总血栓栓塞事件相对危险下降52.0%。调整剂量的华法林(INR2.0～3.0)与阿司匹林(150～160mg)比较能有效降低死亡和缺血性脑卒中的终点事件。

表3-2-3　阿司匹林组(369例)与华法林组(335例)疗效终点的比较

疗效终点	阿司匹林组例数(%)	华法林组例数(%)	P 值	OR(95%CIs)
主要终点事件	24(6.0)	10(2.7)	0.03	0.44(0.198～0.960)
缺血性脑卒中	17(4.6)	6(1.8)	0.04	0.38(0.147～0.977)
死亡	8(2.2)	4(1.2)	0.33	0.54(0.163～1.830)
次要终点事件	26(7.0)	19(5.7)	0.46	0.79(0.431～1.461)
血栓栓塞事件	39(10.6)	19(5.7)	0.01	0.48(0.269～0.858)
联合终点事件	48(13.0)	28(8.4)	0.047	0.61(0.373～0.997)

3.3 高血压

见《中国心血管病报告2007－心血管病危险因素2.1》（第11～24页）

3.4 慢性肾脏病（CKD）

3.4.1 慢性肾脏病的流行状况

3.4.1.1 慢性肾脏病患者的肾功能评估

根据对CKD进行早期监测与防治，临床医生需要随时准确评估患者的肾小球滤过率(GFR)。中国eGFR课题协作组开发了适合我国CKD患者的GFR评估方程，使得我国在估测CKD患者GFR的适用性上取得很大改善，但在GFR较高时仍然有过低估计真实值的倾向。基于此，该课题组进一步开发了结合血肌酐和Cystatin-C的eGFR公式：

eGFR=169×Pcr-0.608×cysC-0.63×Age-0.157(Female×0.83)

以基于99mTc-DTPA标准双血浆法的GFR为对照，经过验证发现该公式能更好的匹配各阶段CKD的肾功能评价，对肾功能正常者的评估较前一公式更好[15]。

3.4.1.2 慢性肾脏病高危人群中患病率的调查

老龄、高血压、糖尿病、高尿酸血症、高胆固醇血症、高甘油三脂血症、感染等是已知的CKD相关危险因素，因此具有上述危险因素的相应人群是CKD的高危人群。对上述高危人群中CKD的患病率有下列一些调查研究报告(见表3-4-1(1))。

表3－4－1(1)全国部分地区慢性肾脏病流行病学研究

地区	调查对象	调查对象来源	调查例数	CKD 评判标准	CKD 患病率
7 个城市[16]*	冠心病	多中心住院患者	3513	eGFR <60 ml/min/1.73 m^2 和/或蛋白尿和/或单纯血尿或非感染性白细胞尿	24.8%
香港[17]	HIV 感染患者	单中心随访患者	322	eGFR <60 ml/min/1.73 m^2 和/或 P/Cr> 0.3	16.8%

*7 个城市包括：北京，天津，上海，南京，杭州，广州，武汉

对15160名全国随机抽样的35～74岁人群的调查显示，按eGFR小于60ml/min/1.73m^2作为CKD的评判指标，合并代谢综合征者与未合并者相比，罹患CKD的比值比和95%可信区间为1.64(1.16，2.32)；如按血肌酐≥1.14mg/dl(男)或≥0.97mg/dl(女)为肌酐升高，肌酐升高的比值比和95%可信区间为1.36(1.07，1.73)。与不合并任意一项代谢综合征指标的患者相比，患CKD及出现肌酐升高的比值比均随着合并代谢异常项目的增多而升

高(见表3-4-2(2))。上述结果提示，代谢综合征是中国成人CKD的危险因素[18]。

表3-4-2(2)代谢综合征与患慢性肾脏病及肌酐升高的比值比和95%可信区间

合并代谢综合征异常项	罹患 CKD		罹患血肌酐升高（男≥1.14 mg/dl；女≥0.97 mg/dl）	
	OD值(是否是OR值)	95%可信区间	OD 值	95%可信区间
1 项	1.51	(1.02，2.23)	1.11	(0.88，1.40)
2 项	1.5	(0.97，2.32)	1.39	(1.07，2.04)
3 项	2.13	(1.30，3.50)	1.47	(1.06，2.04)
4/5 项	2.72	(1.50，4.93)	2	(1.32，3.03)

对北京某区2 310名40岁及以上的人群调查结果与上一研究相似，合并代谢综合征者CKD患病率更高(15.4% vs 8.3%，p<0.001)；CKD的患病率随合并代谢综合征异常项的增多而升高[19]。

3.4.2 慢性肾脏病患者心血管危险因素的评估

CKD与心血管病(Cardiovascular Disease，CVD)两者关系密切。CKD患者易出现CVD的合并症，是CVD的高危因素；而CVD又是影响CKD患者预后的重要因素。

3.4.2.1 慢性肾脏病患者颈动脉内膜中层厚度的研究

颈动脉内膜中层厚度(IMT)增加可以预测普通人群未来发生心血管事件的可能性，其在CKD患者中的作用也有监测研究。

来自北京某区1 046名大于40岁的常住居民的横断面调查研究发现，与eGFR正常者相比，IMT随eGFR的下降增加；有白蛋白尿者IMT厚于均值。早期CKD患者IMT增加可能与CKD患者具有较多心血管危险有关[20]。

来自香港地区单中心对203名CKD3期及4期患者的队列研究报告显示，基线时IMT与患者年龄、血清LDL水平、Charlson合并症评分及血清C反应蛋白相关。同时合并糖尿病的患者IMT比无糖尿病患者高。平均随访48个月，IMT四分位法分析显示：无心血管事件的存活率依次为I：94.4%；II：89.8%；III：77.7%和IV：65.9%(log rank test,P=0.006)。经过COX比例风险模型多因素校正后，IMT四分位每升高一级，发生心

血管事件的风险增加41.6%；48个月时的实际生存率在不同IMT四分位分级之间没有统计学差异。IMT与这些患者肾功能的下降也无关。因此，IMT是透析前CKD患者发生CVD合并症的强预测因子，并可能用于患者的危险分层[21]。

3.4.2.2 CKD与糖尿病Ⅱ型患者冠状动脉粥样硬化性心脏病(Coronary Heart Disease，CHD)的相关研究

香港地区对4 421名糖尿病Ⅱ型患者平均随访39.4(20.3～55)个月的研究显示，CKD由1期进展到4期，全因死亡率由1.2%(95%CI，0.8～1.7)上升到18.3%(9.1～27.5)(趋势检验，P<0.001)。新增心血管终点事件发生率由2.6%(2.0~3.3)升至25.3%(15.0～35.7)(趋势检验，P<0.001)。校正年龄、性别、白蛋白尿、使用RAAS阻滞剂、血脂、血压和血糖控制等多个变量后，不同eGFR水平(≥90，60～89，30～59，和15~29ml/min/1.73m^2)的全因死亡的危险比分别为1.00，1.27，2.34和9.82(趋势检验，P<0.001)，心血管终点事件的危险比分别为1.00，1.04，1.05和3.23(趋势检验，P<0.001)，肾脏终点事件的危险比分别为1.00，1.36，3.34和27.3(趋势检验，P<0.001)。因此，eGFR降低是Ⅱ型糖尿病患者发生心血管终点事件和全因死亡的高危因素[22]。

来自香港地区7 067名的Ⅱ型糖尿病患者前瞻队列研究显示，年龄、男性、糖尿病病程、尿白蛋白/肌酐比值、eGFR、胆固醇、HDL-C及吸烟均是冠心病的危险因素。但只在有白蛋白尿的患者中可以观察到胆固醇和冠心病的线性关系。在普通人群中，HDL-C水平越高，发生CHD的危险越小。但本组患者中，HDL-C水平与冠心病呈A型相关，拐点为1.1mmol/L，而白蛋白尿和CKD是造成这种HDL-C低于1.1mmol/L时与CHD发生危险下降正相关的主要因素。因此，在Ⅱ型糖尿病患者中，白蛋白尿和CKD均可能会影响其他危险因素对冠心病的作用。白蛋白尿起到了将传统危险因素与CHD相连的作用，而CKD的发生改变了传统脂质与CHD危险的关联关系[23]。

3.4.2.3 高血压与肾功能进展的关系研究

对全国40岁以上有代表性的158 365队列人群进行随访研究，在1991年通过统一标准的方案测量血压并收集相关协变量信息；1999到2000年进行随访调查。在总共1 236 422人/年的随访中，共有380人进行了肾脏替代治疗或死于肾衰(30.7/10万人/年)。与正常血压组相比，血压正常高值组、Ⅰ期高血压组和Ⅱ期高血压组发生终末期肾病的校正风险比分别为1.30(0.98～1.74)，1.47(1.06～2.06)和2.6(1.89～3.57)，趋势性检验P<0.001。相应地，血压正常高值组、Ⅰ期高血压组和2期高血压组发生肾小球肾炎相关终末期肾病的校正风险比分别为1.32(0.82～2.11)、1.48(0.83～2.61)和

3.40(2.02～5.74)，趋势性检验P<0.001。与舒张压和脉压相比，收缩压对终末期肾病发生的预测能力更强。本研究证实了高血压与终末期肾病发生的关系，还发现血压水平与肾小球肾炎相关终末期肾病发生也存在着显著相关。因此预防终末期肾病应该结合血压的预防、治疗和控制[24]。

3.4.3 慢性肾脏病患者治疗进展

ACEI及ARB是临床用来治疗慢性肾脏病患者，以减少蛋白尿，延缓肾功能进展的重要药物。对360名非糖尿病肾病蛋白尿伴肾功能不全的患者研究显示，对苯那普利或氯沙坦进行滴定，以求达到个体能耐受的最大减少尿蛋白的剂量，经过平均3.7年随访，滴定组（苯那普利，平均20mg/d，范围10～40mg/d；氯沙坦，平均100mg/d，范围50～200mg/d）较常规剂量组(苯那普利10mg/d；氯沙坦50mg/d)可使首要联合终点事件(肌酐翻倍，进入ESRD，死亡的时间)和次要终点事件(蛋白尿水平和肾功能进展的速度)分别减少51%和53%(p分别为0.028和0.022)。在同等血压控制水平下，苯那普利和氯沙坦滴定组较常规剂量治疗组能更好的降低蛋白尿水平和延缓肾功能下降的速度。滴定组与常规剂量组在不良事件发生上无显著差异。因此，对无糖尿病、有蛋白尿和肾功能不全的患者，采用苯那普利或氯沙坦达个体能耐受的最大减少尿蛋白剂量，可获得更好的肾脏保护[25]。

3.5 心血管外科

3.5.1 中国心脏外科手术量

近4年来，中国大陆心脏外科年手术量平均每年以14%左右的速率递增。2004年90 812例，2005年104 656例，2006年118 627例，2007年达到136 015例(表3-5-1(1))。

表3-5-1 中国大陆心脏外科手术量及心脏、心肺移植量

地区	省市	2006 年		2007 年		2007 年移植量	
		总数	体外手术	总数	体外手术	心脏	心肺联合
华北	北京	15 500	10 799	16 543	118 85	45	0
	天津	3 445	2 654	4 068	3 140	8	0
	内蒙古	472	388	626	521	0	0
	山西省	1 734	1 355	1 770	1 433	0	0
	河北省	3 980	3 247	4 931	4 041	0	0
东北	辽宁省	3 079	2 405	3 125	2 467	2	0
	黑龙江	2 105	1 805	3 102	2 245	1	0
	吉林省	1 821	1 463	1 744	1 430	1	0

续 表

地区	省市	2006 年		2007 年		2007 年移植量	
		总数	体外手术	总数	体外手术	心脏	心肺联合
华东	上海	8 754	7 414	10 227	8 618	31	0
	江苏省	7 712	6 700	7 671	6 818	0	0
	浙江省	3 508	3 037	4 045	3 300	0	0
	山东省	8 876	7 595	10 340	8 520	0	0
华中	河南省	9 411	8 138	9 792	8 651	0	0
	湖北省	6 209	5 582	7 164	6 503	1	
	江西省	1 748	1 594	2 220	2 044	0	0
	安徽省	1 456	1 456	3 159	2 942	11	1
	湖南省	4 576	4 163	5 356	4 804	2	1
华南	广东省	7 523	6 623	9 042	7 773	0	1
	海南省	485	426	505	435	0	0
	广西	2 398	1 980	2 977	2 536	8	0
	福建省	3 471	3 024	4 117	3 305	14	0
西北	陕西省	6 565	4 916	7 190	5 659	3	0
	甘肃省	1 807	1 532	1 789	1 474	0	0
	青海省	752	504	682	423	0	0
	宁夏	762	444	838	465	0	0
	新疆	1 668	1 382	2 417	2 174	0	0
西南	重庆	2 340	2 147	3 046	2 801	0	0
	四川省	4 139	3 923	4 543	4 199	2	1
	云南省	1 422	1 340	1 739	1 737	1	0
	贵州省	909	786	1 174	1 066	0	0
	西藏			73	56	0	0
全国	总计	118 627	98 804	136 015	113 465	130	4

（注：数据来源于中国生物医学工程学会体外循环分会）

3.5.2 心血管疾患的外科治疗

3.5.2.1 冠状动脉病变的外科治疗

中国冠状动脉旁路移植术（CABG）注册登记研究2004～2005年结果

中国CABG注册登记研究由全国32家大中型医院协作组成。该研究对2004年1月1日至2005年12月31日在协作医院开展的CABG病例资料进行了统计分析。此期间协作

医院手术治疗病例9 247例，占全国同期CABG手术量的2/3。

2004～2005年阶段结果显示了CABG手术死亡率与年龄、性别以及个体体重指数(BMI)之间的关系(图3-5-2(1)～图3-5-2(3))。

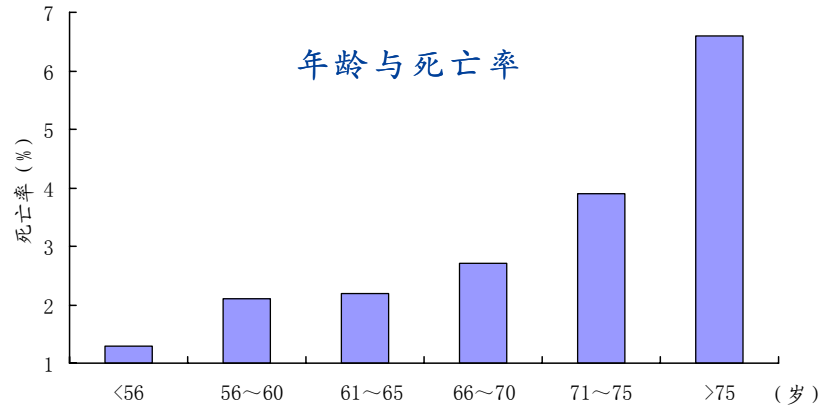

图3-5-2(1) 年龄与CABG手术死亡率

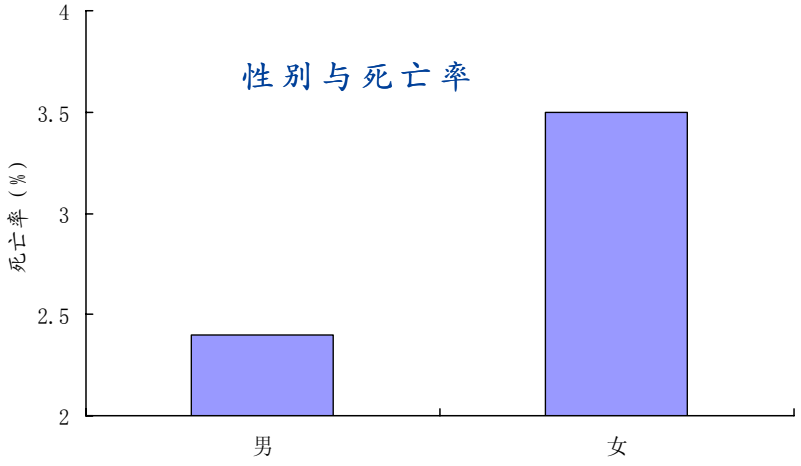

图3-5-2(2) 性别与CABG手术死亡率

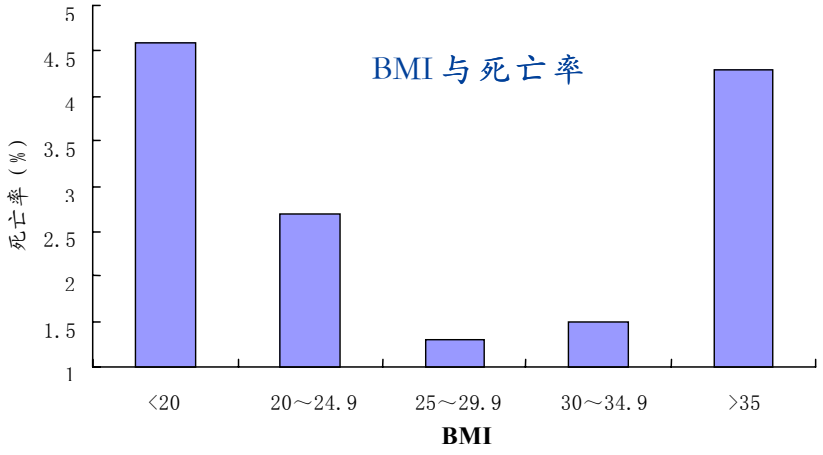

图3-5-2(3) 个体体重指数（BMI）与CABG手术死亡率

与欧洲(EuroSCORE)和美国(STS)数据相比，中国CABG注册登记研究显示：中国患者术前合并高血压、糖尿病及脑卒中比例较高，术前不稳定型心绞痛及肺动脉高压比例较高，三支病变及左主干病变比例较高；但中国患者女性比例较低，平均年龄较小，合并慢性阻塞性肺疾病、外周血管病、肾功能异常及活动性感染性心内膜炎比例较低，既往心血管手术比例较低，左室功能低下(LVEF低下)比例较低。我国患者和欧美患者各有特点，危险因素侧重不同，这和民族、人种、经济社会状况、地理状况、生活习惯等不同有关。

3.5.2.2 心脏瓣膜病变的外科治疗

2007年中国大陆有3组病例数较多的瓣膜手术治疗研究的报道。其中一组专门报道了“三瓣膜联合手术治疗”的中远期结果。另两组则偏重于瓣膜手术的围术期资料分析。(表3-5-2(1)-(5))

表3-5-2(1)中国大陆2007年大组心脏瓣膜手术情况比较

组　别	病例所属时间	例数	女性(%)	年龄（岁）	术后早期死亡率(%)
瓣膜手术组 A[26]	1993～2004	5 066 例	47.2	45.3	4.6
瓣膜手术组 B[27]	1997～2005	1 003 例	56.4	53.4±13.2	2.8
瓣膜手术组 C[28]	1985～2005	1 137 例	56.4	46.0±3.2	8.6

表3-5-2(2)中国大陆2007年大组心脏瓣膜手术种类比较

组　别	瓣膜手术位置					
	MVR(%)	AVR(%)	TVP/TVR(%)	BVR(%)	BVR+TVP(%)	BVR+TVR(%)
瓣膜手术组 A[29]	51.7	15.8	1.9	30.3		
瓣膜手术组 B[30]	55.3	13.9	2.6	27.2		0.99
瓣膜手术组 C[31]					98.2	1.8

注：MVR 指二尖瓣置换；AVR 指主动脉瓣置换；TVP 指三尖瓣成形修复；TVR 指三尖瓣置换；BVR 指二尖瓣和主动脉瓣联合置换。

表3-5-2(3)中国大陆2007年大组心脏瓣膜手术并发症情况

组　别	手术并发症(%)	低心排综合征(%)	二次开胸止血(%)	肾功能衰竭(%)	恶性心律失常(%)	脑梗塞(%)	大量心包积液(%)
瓣膜手术组 A[32]	18.2	4	3.9	2.2	1.6		
瓣膜手术组 B[33]	7.3	0.5	2.3	0.4	0.9	0.9	1.2

表3-5-2(4)中国大陆2007年大组心脏瓣膜手术的远期生存率

组　别	远期随访率	平均随访(年)	随访总人年数(病人•年)	术后累计生存率(%) 5年	10年	15年
瓣膜手术组C[34]	93.2%	4.15	3678	89.2±1.5	83.9±3.1	65.3±5.1

表3-5-2(5)中国大陆2007年大组心脏瓣膜手术后栓塞与出血情况

组　别	术后未发生血栓栓塞率(%) 5年	10年	15年	术后未发生抗凝相关出血率(%) 5年	10年	15年
瓣膜手术组C[35]	97.1±1.7	91.8±3.1	88.1±4.8	95.9±2.5	89.9±3.7	82.0±5.0

其中瓣膜手术A组[36]还统计分析了患者左心室射血分数(EF值)与瓣膜置换术围术期病死率的关系(见表3-5-2(6))。

表3-5-2(6)不同EF值瓣膜置换手术围术期的病死率

病种	EF值 <0.40(%)	0.40-0.50(%)	0.50-0.60(%)	≧0.60(%)
主动脉瓣狭窄	12.5	0	0	3.4
主动脉瓣关闭不全		9.3	2.8	1.6
二尖瓣狭窄	6.9	6.7	4.0	4.4
二尖瓣关闭不全	22.2	9.9	4.7	1.8
总计	8.6	7.8	4.1	3.9

结果显示，患者术前EF值是瓣膜手术围术期病死率的重要影响因素。EF值越低，病死率越高，但在不同瓣膜的不同病变中，EF值的预测意义不同。其在二尖瓣关闭不全病人的手术风险评估中意义最大，其次是主动脉关闭不全；而对二尖瓣狭窄和主动脉瓣狭窄的病人手术风险评估中意义相对较小。

3.6 外周血管病

外周动脉疾病(Peripheral Arterial Disease，PAD)指冠状动脉和颅内动脉以外其他动脉的疾病。下面是涉及下肢动脉硬化性疾病(Lower Extremity Arteriosclerosis Disease，LEAD)。

3.6.1 LEAD的患病率情况

LEAD是中老年人常见的临床综合征，许多流行病学研究对其患病率进行了调查，所采用的诊断方法包括间歇跛行问卷表(Rose Claudication Questionnaire)、踝肱指

数（Ankle-brachial Index，ABI）及脉搏波传导速度等无创方法。结果显示LEAD的患病率取决于被调查对象的年龄、危险因素及基础疾病。国内LEAD的有关流行病学调查结果见附表。表3-6-1中LEAD的诊断方法均为ABI＜0.90。

表3-6-1我国LEAD患病率的流行病学调查结果

人群	例数(例)	年龄(岁)	患病率（%，男/女）
浙江舟山渔民[37]	2668	≥35	2.1　(3/1.2)
MUCA 研究人群[38]	18140	＞ 35	6.0　(5.4/9.3)
北京万寿路地区老年居民[39][40][41]	2124	60～95	16.4　(12.7/18.1)
糖尿病患者[42]	1347	＞50	19.4　(18.3/20.4)
代谢综合征人群[43]	2115	32～91	22.5　(21.7/23.4)

MUCA：中国心血管病流行病学多中心合作研究

上述调查显示，LEAD的患病率根据研究人群的不同有较大区别。如在浙江舟山渔民为2.1%，北京35岁以上自然人群为6.0%，北京60岁以上老年人群为16.4%，糖尿病人群为19.4%，代谢综合征人群为22.5%，但相似的是LEAD的患病率随增龄而增高，女性患病率高于男性。

3.6.2　LEAD的危险因素

流行病学调查资料显示，LEAD的患病率随着年龄及动脉粥样硬化危险因素增多而增加。LEAD的主要病因是动脉粥样硬化，致动脉粥样硬化的危险因素如吸烟、糖尿病、血脂紊乱、高血压、高同型半胱氨酸血症均增加LEAD患病的危险性。北京地区流行病学调查的多元回归分析资料显示，LEAD的发生和严重程度与年龄、吸烟、糖尿病病程、血糖稳定程度、高收缩压、高胆固醇及高LDL-C呈正相关[44]。30%的脑血管病患者、25%的缺血性心脏病患者并存LEAD[45][46]。因此，LEAD是动脉硬化全身性疾病的重要窗口，其早期检出与治疗对全身性动脉硬化疾病诊治有重要价值。

3.7 心律失常

3.7.1 起搏器和ICD

我国最早于1962年在上海首次植入人工心脏起搏器。此后，起搏器植入总量逐年增长，生理性起搏器比例逐年提高。调查资料显示2005年全国开展起搏器植入的医院为460家，植入起搏器18 090台，男性患者占55.5%，60岁以下患者占23.6%(图3-7-1(1))。

2006年起搏器植入量约为20 000台，2007年估计超过35 000台。

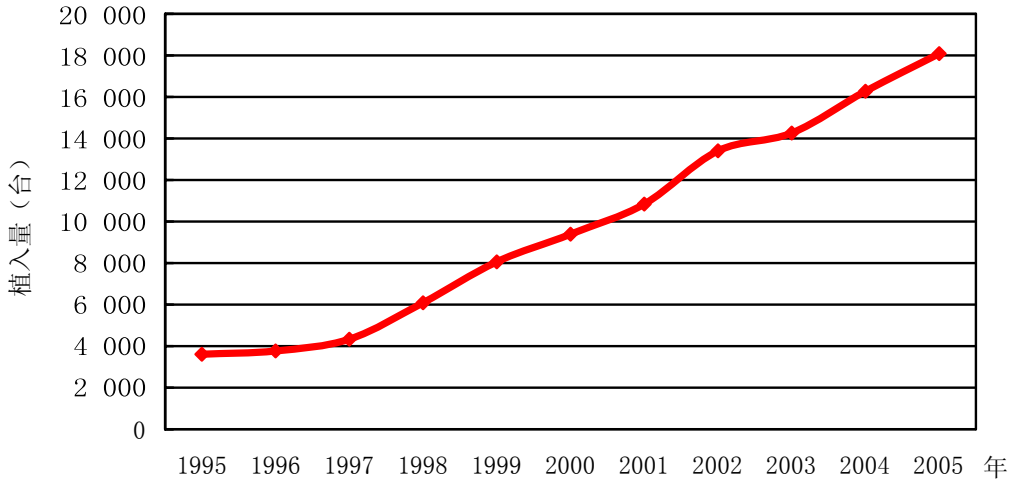

图3-7-1(1) 我国起搏器年植入量(1995～2005)

植入起搏器的类型情况：统计资料显示2005年全年植入双腔起搏器的比例达到51.5%，若加上AAI/R各种生理性起搏器，比例达到52.9%，超过非生理性起搏器。2005年植入起搏器的适应症中病态窦房结综合征占50.1%，房室阻滞占39.4%，其他占10.5%(图3-7-1(2))。2005年植入起搏器患者的病因学构成为冠心病占35.9%，心肌病占10.4%，其他占53.7%。

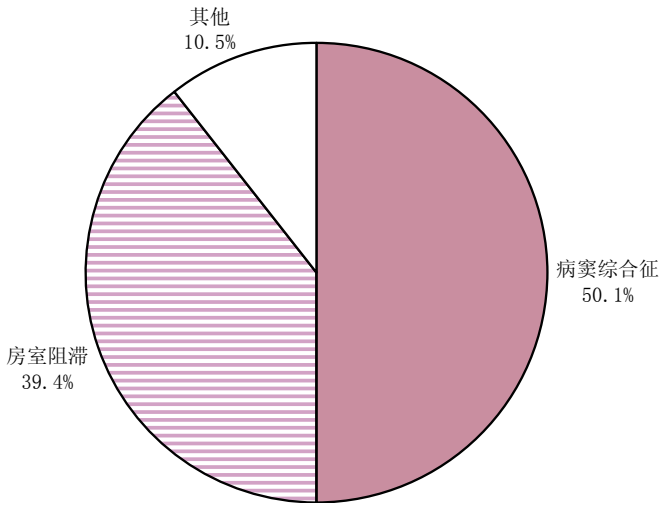

图3-7-1(2) 2005年全国起搏器植入适应证

1996年国内植入第一台经静脉ICD，至2001年，共计285台。2005年全国植入ICD186台，CRT340台，2002年至2005年ICD和CRT植入数量稳步增长(图3-7-1(3))。估计2007年全国ICD植入量超过500台。

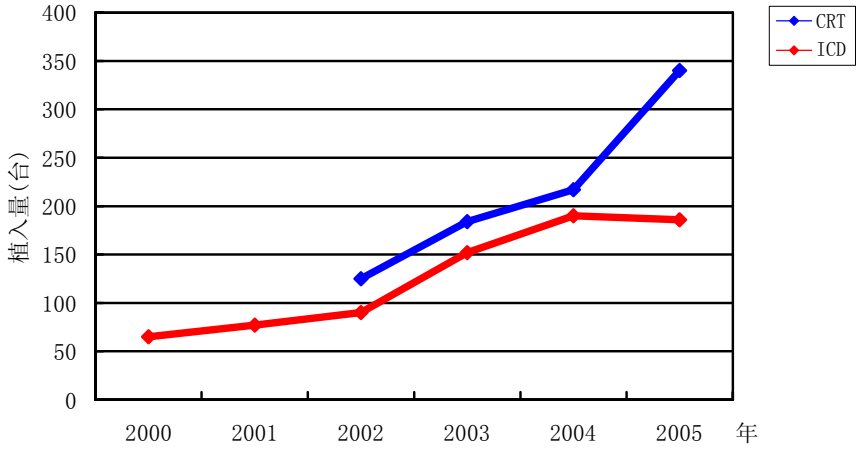

图3-7-1(3) 我国ICD、CRT年植入量(2000～2005)

3.7.2 导管消融

我国最早于1991年报告临床应用射频消融术。90年代中期后射频消融例数增长迅速，调查资料显示2000年射频消融数为10 811例(图3−7−2(1))，开展的医院达136家。2006年导管消融约为20 000例。

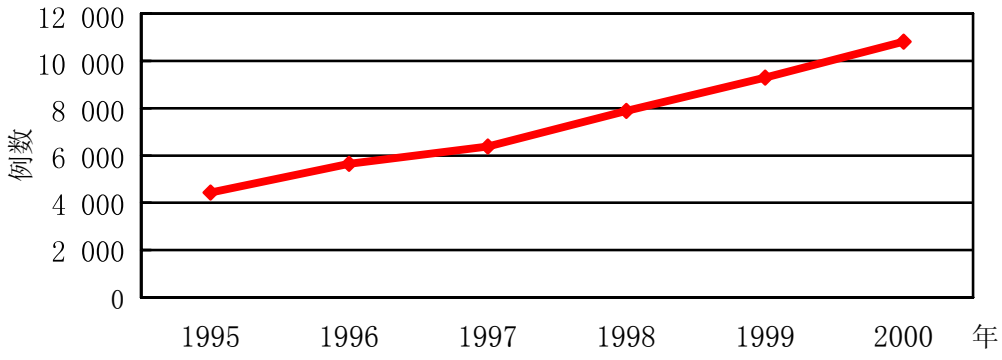

图3-7-2(1) 我国年射频消融例数(1995～2000)

2000年射频消融病种分类情况：房室结折返性室上性心动过速(AVNRT)占56.3%，

旁路参与的房室折返性室上性心动过速(AVRT)占31.7%，其余为室性及房性心律失常等(图3-7-2(2))。

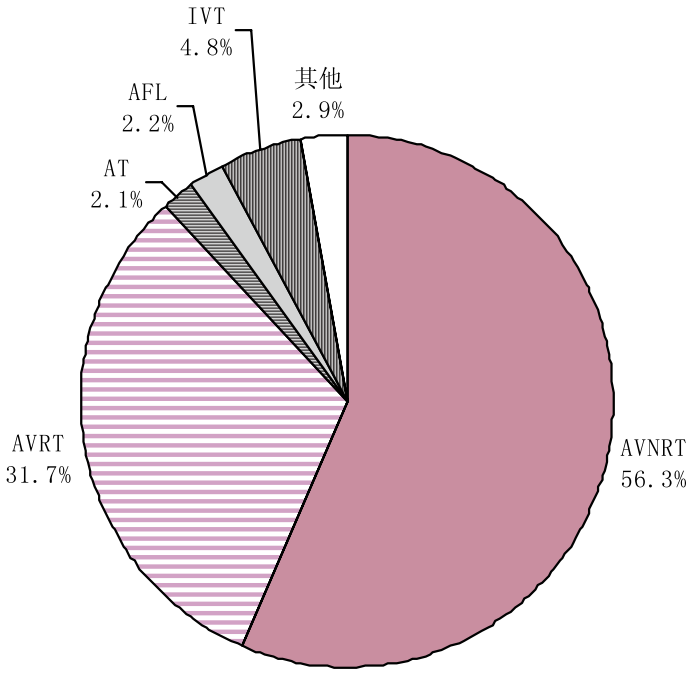

图3-7-2(2) 2000年我国行射频消融病种分类

我国房颤导管消融开展情况：我国近年来房颤导管消融例数增长迅速，2005年全国行房颤导管消融手术1 427例，至2005年底累计3 196例，图3-7-2(3)。据初步统计2006年全国完成2 160例。

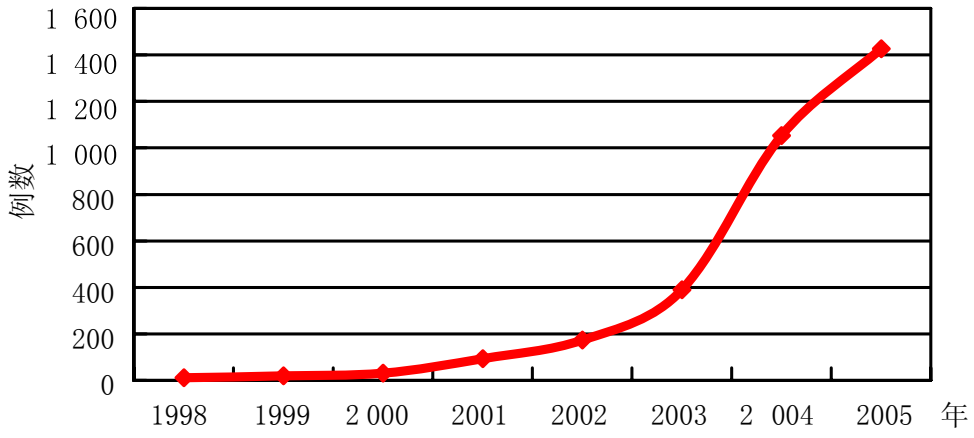

图3-7-2(3) 我国年房颤导管消融例数(1998～2005)

3.7.3 心房颤动

我国30岁以上人群房颤患病率为0.77%，根据中国1990年标准人口构成标准化后患病率为0.61%。男性房颤患病率高于女性(0.9%比0.7%)。所有房颤患者中瓣膜型、非瓣膜型及孤立性房颤所占比例分别为12.9%，65.2%和21.9%。房颤继发脑卒中患者中以缺血性脑卒中为主，房颤患者脑卒中发病率明显高于非房颤人群(12.1%比2.3%)。

中国人非瓣膜性心房颤动抗凝研究入选988例有血栓栓塞危险的房颤患者，随机分为华法林标准抗凝强度治疗组：INR2.1～2.5；华法林低抗凝强度治疗组：INR 1.6～2.0；阿斯匹林(200mg/日)组。平均随访15个月，血栓栓塞的年发生率分别为2.3%、2.6%和6.4%。华发林标准强度抗凝治疗组及低抗凝强度治疗组血栓栓塞事件的发生率均明显低于阿司匹林组(P＝0.018及P＝0.044)。而华发林标准强度抗凝治疗组与低强度抗凝组之间血栓栓塞的发生率无统计学差异。严重出血的发生率分别为2.9%、2.8%和1.0%，三组之间无显著差别(P＝0.101)。低抗凝强度(INR在1.6～2.0)的华发林治疗与标准抗凝强度(INR在2.1～2.5)同样有效。

3.7.4 心脏性猝死

对678 718人群随访1年，共2 983例死亡，其中心脏性猝死284例(9.5%)，心脏性猝死发生率为41.8/10万，男性高于女性(44.6/10万及39.0/10万)，25岁以上的心脏性猝死发生率较高，男性为61.7/10万，女性为53.3/10万。估计我国每年发生心脏性猝死54.4万例。

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第四部分 心血管病社区防治

4.1 社区防治案例一：我国三城市社区人群脑卒中综合预防[1][2][3]

流行病学抽样调查显示，我国城乡脑卒中年发病率平均为200/10万；死亡率约为130/10万；患病率为400～700/10万。依此推算，全国每年脑卒中新发病例在200万以上，每年死于脑血管病超过150万人，脑卒中幸存者有600～700万。由于本病致死、致残率很高，对国家和民众造成的危害极大。所以，探索有效的预防措施，特别是针对社区人群的有效干预方法，是国内今后一段时期努力研究的方向。

1991～2000年，国家“八五”、“九五”科技攻关立项开展社区人群脑血管病综合干预措施研究。由全国脑血管病防治研究办公室牵头，北京市神经外科研究所、复旦大学神经病学研究所、中南大学湘雅医院神经病学研究所三家单位参加。1991年启动，在北京、上海、长沙三个脑卒中高发城市开展研究。三城市分别各选择两个不相邻且有可比性的社区人群，每个社区约有5万人口，其中一个社区设为干预社区，另一个为对照社区。三城市总样本人群约30万人。项目分为两个阶段，1991～1995年为第一阶段，主要是筛查、管理高血压患者并进行干预治疗。1996～2000年为第二阶段，除继续对查出的高血压患者进行干预管理外，增加了对糖尿病患者和吸烟者的干预管理。具体措施及效果简要介绍如下：

4.1.1 在干预社区人群中采取的综合干预措施

1．对研究社区所在各级医院的医务人员进行专业培训，使他们掌握必要的知识和技能，直接负责筛查、管理人群中的脑卒中高危个体。

2．由基层医院的保健科医生通过测量血压和问卷调查，筛查出年龄≥35岁人群中的大部分高血压患者，采取每2～3个月定期随访，监测患者血压水平，并为患者提供治疗指导意见。告知患者如何有规律地监测自己的血压，如何正确服药；建议患者必要时就医，采取恰当的治疗措施。

3．1997～2000年，通过大面积检查尿糖和血糖，筛查出55岁以上人群中的糖尿病患者，并给予定期的治疗指导。通过饮食控制，适当的增加运动以及服药来控制血糖水平。

4．1996～2000年，对干预社区的吸烟者开展健康教育，并选择小样本吸烟者进行强化干预试验，使用尼古丁口香糖以及香烟替代品。

5．在全人群中实施不同形式的健康教育和健康促进活动，每2～3个月入户发放脑

卒中防治宣传单和知识手册一次；利用黑板报定期推出主题宣传栏；每年给居委会主任、社区居民以及高血压患者开展3～4次讲座，讲解高血压、冠心病、糖尿病等卒中相关疾病的知识，以及与这些疾病相关的危险因素。鼓励居民采用健康的生活方式，例如限制食盐摄入、经常性的锻炼身体、控制体重、戒烟、少饮酒等。

6．对干预社区和对照社区全人群进行严格质控的脑卒中发病、死亡和全死因监测，以科学评价防治效果。

4.1.2 综合干预措施的效果

1．1991～1995年，有38%的高血压患者在一年中至少有6个月血压水平控制在160/95mmHg以下，1996～2000年，46%的高血压患者在一年中至少有6个月血压水平控制在160/95mmHg以下。

2．1991～2000年，干预社区有2 273人(首次)发生脑卒中，对照社区有3 015人发生脑卒中。通过9年的干预，与对照社区相比较，干预社区脑卒中发病风险减少了11.4%(相对危险度0.8959，95%可信区间为0.8483～0.9460，p<0.0001)，其中缺血性卒中发病风险减少13.2%(相对危险度为0.8676，95%可信区间0.8054～0.9345，P=0.0002)，出血性卒中发病风险减少7.2%(相对危险度0.9283，95%可信区间为0.8517～1.0117，P=0.0899)。

三城市研究结果证明，在我国当前的条件下，采用开展强化健康教育和健康促进，同时重点筛查、干预管理高血压、糖尿病等脑卒中高危人群，可以有效地减少脑卒中的发病率。上述社区脑卒中综合干预措施是可行且有效的，其模式可以在我国更多的社区人群中推广应用。

4.2 社区防治案例二：首钢心血管病社区防治经验[4]

北京首钢心血管病防治工作是中国功能社区防治心血管病的成功案例，被誉为“首钢模式”的首钢心血管病防治工作始于1969年，覆盖居民近13万人，工作的核心是由工厂的厂区保健站和居民区的社区门诊和医院的心血管专业门诊、心血管病房组成的三级防治网以及由医院的预防保健部、心血管病防治所、防治科组成的三级管理网。

4.2.1 首钢经验的核心内容

由工厂的厂区保健站和居民区的社区门诊和大医院的心血管病专业门诊、心血管病房组成的三级防治网及由医院的预防保健部、心血管病防治所、工厂防治科组成的

三级管理网。通过普查、体检及门诊检查发现并确诊高血压后，建立高血压病例档案，对所有高血压病人进行分级管理，根据高血压防治方案对不同程度的高血压患者确定复查周期，根据复查血压情况调整治疗方案，直至控制平稳，对控制不稳定的重症高血压病人转到专业门诊。对行动不便的患者，社区医生深入家中治疗。对在厂区保健站管理的高血压病人，在退休后转到社区门诊继续管理，死亡病例由心血管病防治所专业医生进行归档。

对全人群进行一般性干预，包括健康宣传和改变生活方式的健康教育。对高危人群进行强化干预，包括以限盐为重点改善饮食结构，开展戒烟活动，减轻体重的指导等。

4.2.2 首钢经验工作特点

1、形成了以三级医院指导，以社区为中心，以工厂、居民区为基础的心血管病防治体系。构建了一个比较健全的预防保健体系和对心血管病的普查、预防、治疗、管理、研究等多用途的三级防治网络。

2、有一支相对稳定的心血管病防治工作的专业队伍。包括专科医生和保健医生，这对防治工作能够不间断深入发展起到了保证作用，这支专业队伍能够深入到厂区、社区和家庭，结合实际情况，制定相应的心血管病防治方案并组织实施。

3、有科研单位和院校的指导与合作。心血管病防治网络的建立和发展始终有阜外医院、安贞医院、北京大学等科研单位和院校指导，使之工作起点高，管理科学，并且符合首钢的实际情况。

4、探索出了一套符合实际情况的心血管疾病管理办法。以病人为目标，建立起了从厂区到社区，从工作区到居住区的管理网，病人无论是在工厂的工作岗位上还是退休回到居住的家中，直到生命终止都有防治专业人员管理。

5、心血管病的防治是一个系统的长期的工程。35年来不断对全人群开展健康行为干预，对心血管病人群进行监测，对病人进行长期的定期随诊，根据监测指标的变化制定相应的防治措施。

6、预防为主，防治结合是控制心血管病的根本方针。心血管病的发生是多种因素相互作用的结果，从防病入手，普及健康知识，改变不良生活习惯，达到降低发病率的目的。心血管病患者的管理率高，干预依从性好，心血管病复查率达到80%～90%，血压控制率在60%～70%。从心血管疾病的发病率和死亡率逐渐下降的趋势看，干预手段还是卓有成效的。

4.2.3 管理效果评价

1、1974～1995年2 736例高血压患者20年综合管理效果评价

首钢医院心脑血管病防治所70年代初在首钢职工中进行了高血压普查，当时高血压患病率在8%～12%，已经影响到职工的身体健康，1974年对普查发现的高血压病人进行统一管理，系统治疗。截至1995年，20年间共管理高血压病人2 736名。

在高血压管理过程中，根据血压水平的高低，进行分级管理。舒张压在95～104mmHg者，每月进行一次血压测量，舒张压在105～114mmHg者，每半月测量一次血压，舒张压大于115mmHg者，每周测量血压。在管理期间，定期复查心电图、眼底、尿常规等，并采用药物与非药物两种干预途径。通过20年坚持不懈的管理，2 736例高血压病人的血压水平随管理年限的增加而逐年下降(图4-2-3(1))。

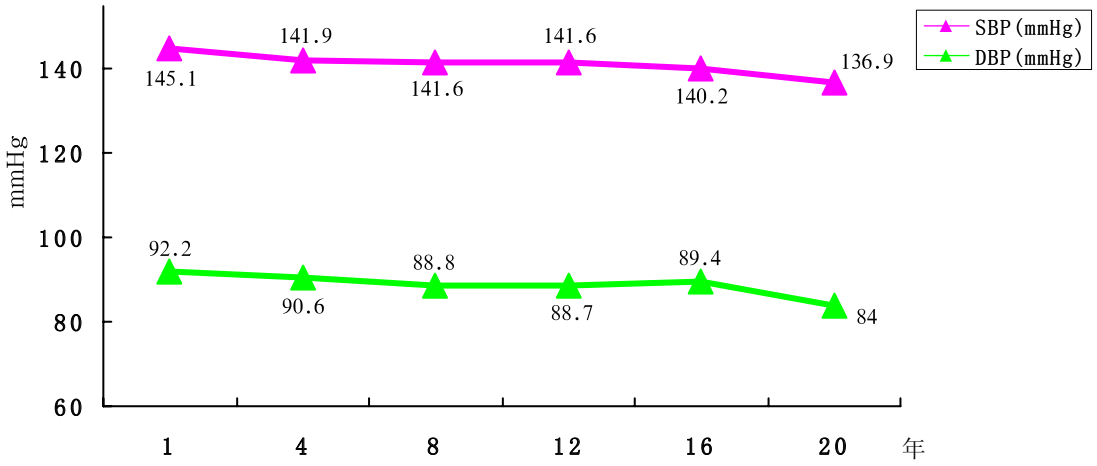

图4-2-3(1)首钢高血压管理人群（男）年限与血压水平

2、1974～2001年首钢社区28年心脑血管疾病监测结果评价

首钢医院于1975年开始按照国际标准进行人群心脑血管疾病登记工作，并对1974年心脑血管疾病的发病及死亡情况进行回顾性调查。

在首钢社区开展健康教育是从上世纪80年代开始的，28年来共管理181万人。从图4-2-3(2)可见，脑血管病的发病率呈明显下降趋势，脑卒中的发病率由138/10万最低下降到64/10万。同期死亡率也由52/10万下降到18/10万，上世纪90年代以后其发病率及死亡率基本趋于平稳，但同期心肌梗死的发病率和死亡率则呈现缓慢上升趋势。

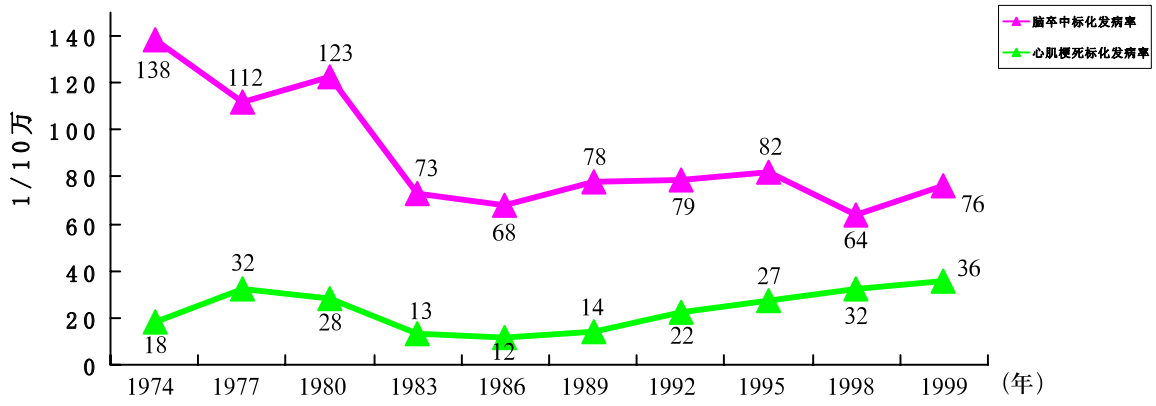

图4-2-3(2) 首钢心脑血管病标化发病率

多年的研究验证：长期、综合的干预措施，可有效控制血压水平，明显降低脑卒中的发病率和病死率。首钢经验提示心血管疾病是可以预防的。

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第五部分 心血管病卫生经济学情况

5.1 中国心血管病的疾病负担

自从1993年世界银行的年度报告《1993年世界发展报告—投资于健康》正式推出新的疾病负担指标—失能调整生命年(Disability-Adjusted Life Years，DALYs)[1]以来，全球不同地区都开始注视对疾病负担的研究结果，并以DALYs作为衡量疾病负担的指标，进而确定当地的主要卫生问题。

DALYs是对某个人群(如一个国家，一个地区)早死的寿命损失与伤残导致的健康生命年损失的综合。即它不仅要估计该人群中由于早逝而损失的寿命(YLL或YPLL)，还要估计人群中在患病伤残状态下导致的健康生命年的损失(YLD)。一个DALY代表减少一个健康生命年。近年来，尽管WHO不断对DALYs的计算方法进行改进，曾先后用两种常用计算公式(见本篇后的说明)对世界不同国家和地区(包括中国)的疾病负担进行了测算，但两种公式计算的核心内容仍然是上述死亡和伤残带来的健康生命年的损失。本篇依据这两类公式，分别计算了中国糖尿病、冠心病和脑卒中，以及北京市冠心病和脑卒中的失能调整生命年(DALYs)，同时汇总WHO和国内测算的相应数据。

5.1.1中国糖尿病、冠心病和脑卒中疾病负担

20世纪80～90年代和2002年，中国由糖尿病、冠心病和脑卒中所致的DALYs损失情况参见表5-1-1。其中糖尿病和脑卒中的疾病负担均呈逐年增高趋势，而脑卒中造成的疾病负担最高。

表5-1-1中国糖尿病、冠心病和脑卒中的疾病负担 DALYs/1 000人

年份	公式一			公式二		
	糖尿病	冠心病	脑卒中	糖尿病	冠心病	脑卒中
1980	0.71(1980)	—	6.56(1986)	0.90(1980)	—	8.12(1986)
1990	1.23（1994）	1.77（1993）	9.23（1993）	1.59（1994）	2.30（1993）	11.93（1993）
2002	1.97	—	—	2.57	—	—
WHO数据	—	3.74*(1990)	11.21*(1990)	1.61#(2002)	3.94#(2002)	11.18#(2002)

注：表中括号内为计算DALY值的具体年度。

* 1990年WHO的数据来自1993年世界发展报告－投资与健康[M]. 北京：中国财政经济出版社，1993.

2002年WHO的数据来自Death and DALY estimates for 2002 by cause for WHO Member States.

王建生等据2002年中国居民营养与健康调查结果，计算了高血压和糖尿病因早死损失的潜在寿命损失年(YPLL)，即上述的YLL，结果分别是中国2002年因高血压早死总损失了254万寿命年(1.98/1 000人)，糖尿病早死总损失了130万寿命年(1.01/1 000人)。

5.1.2北京市冠心病和脑卒中疾病负担

20世纪80～90年代和2000年，北京市因冠心病和脑卒中所致的DALYs损失情况参见表5-1-2。两种疾病的疾病负担均呈逐年增高趋势，其中脑卒中造成的疾病负担明显高于冠心病。

表5-1-2北京市冠心病和脑卒中的疾病负担 DALYs/1 000人

年份	公式一		公式二	
	冠心病	脑卒中	冠心病	脑卒中
1984	0.89	6.95	0.79	8.59
1993	4.72	13.28	6.57	16.43
2000	7.99	17.28	11.27	22.29

注：1984年冠心病的DALYs值是据急性心肌梗死的发病和死亡专率数据计算。
2000年的脑卒中DALYs反映的是1998～1999年两年平均疾病负担值。

北京市疾病预防控制中心用公式一测算了2002年北京市冠心病和脑卒中DALYs值，分别为8.13和15.77/1 000人[2]。

5.1.3　DALYs计算的参数取值和数据来源

计算DALYs时，各类参数取值时参照WHO全球疾病负担研究的统一标准，列于表5-1-3；糖尿病、冠心病和脑卒中性别和年龄别死亡率、患病率、发病率，以及全国和北京市人口数据的文献来源列于表5-1-4。

表5-1-3DALYs计算参数取值(WHO标准)

参数	取值
残疾权重 D	糖尿病：0.0605，冠心病：男为 0.317，女 0.297　脑卒中：0.27
贴现率 r	0.03
年龄权数调节因子 K	1
年龄函数参数 β	0.04
常数 C	0.1658

注：糖尿病和冠心病的残疾权重D是在WHO公布的2001年数值的基础上，根据我国糖尿病各种并发症所占比例[3]，以及急性心肌梗死所占急性冠心病事件的比例[4]，调整计算得出。

表5-1-4DALYs计算的数据文献来源

	指标	年	文献出处
糖尿病	性别年龄别患病率	2002年	王陇德主编. 中国居民营养与健康状况调查报告之一 2002 综合报告[M]. 北京：人民卫生出版社，2005：59.
	性别年龄别死亡专率	1987 年、1994 年和2003年	1. 中华人民共和国卫生部编. 1987 年和 1994 年全国卫生统计年报资料. 2. 中华人民共和国卫生部编. 2004 中国卫生统计年鉴[M]. 北京：协和医科大学出版社，2004.
冠心病	性别年龄别发病率和死亡专率	1993 年全国 16 个省市和2000年北京数据	北京市心肺血管疾病研究所主持的中国 MONICA 研究
		1984 年和 1993 年北京数据	1. Wu Zhaosu, Hong Zhaoguang, Yao Chonghua, et al. *Sino-monica-Beijing study:Report of the results between 1983～1985*[J].Chinese Medical Journal, 1987; 100(8):611～620 2. 王薇，吴兆苏，赵冬，等. 北京地区急性冠心病事件死亡率 1984～1993 年变化趋势及影响因素的探讨[J]. 心肺血管病杂志，1997，16（2）：99～102
脑卒中	性别年龄别发病率和死亡专率	1993 年全国 16 个省市和北京数据	北京市心肺血管疾病研究所主持的中国 MONICA 研究
		1986 年全国数据和1984 年、1998～1999 年北京数据	1. 薛广波，于秉学，王笑中，等. 中国城乡脑血管病的流行病学研究[J]. 第二军医大学学报，1991，12（2）：207 2. Wu Zhaosu, Hong Zhaoguang, Yao Chonghua, et al. *Sino-monica-Beijing study:Report of the results between 1983～1985*[J].Chinese Medical Journal, 1987; 100(8):611～620 3. 王文化，赵冬，吴桂贤，等. 北京市 1984～1999 年人群脑卒中发病率变化趋势分析[J]. 中华流行病学杂志，2001，22（4）：269～272
三种疾病	性别年龄别人口和死亡数据	1982年	1. 国务院人口普查办公室，国家统计局人口统计司编. 中国 1982 年人口普查资料[M]. 北京：中国统计出版社，1984. 2. 北京市人口普查办公室编. 北京市第三次人口普查机器汇总资料汇编[M]. 北京：中国统计出版社，1984.
		1990年	1. 国务院人口普查办公室，国家统计局人口统计司编. 中国 1990 年人口普查资料（第二册和第四册）[M]. 北京：中国统计出版社，1993. 2. 北京市人口普查办公室编. 北京市 1990 年人口普查资料(上下册)[M]. 北京：中国统计出版社，1993.
		2000年	1. 国务院人口普查办公室，国家统计局人口统计司编. 中国 2000 年人口普查资料[M]. 北京：中国统计出版社，2002. 2. 北京市人口普查办公室编. 北京市 2000 年人口普查资料[M]. 北京：中国统计出版社，2002.

5.2　心血管病药品销售情况

2007年中国100张床位以上医院药品总购药额为1 515亿元；其中，心血管药品总购药额为179.80亿元，占11.87%。前五位药物类别是心脑血管循环改善药，其它心肌营养药及冠脉循环改善药，钙离子拮抗剂，调节胆固醇和甘油三酯的药物和血管紧张素II拮抗剂（表5-2-1）。

表5-2-1　2007年中国心血管药品销售金额前15位排名(亿元)

药品分类	2007年
心血管药品总计	179.80
心脑血管循环改善药*	56.55
其它心肌营养药及冠脉循环改善药	26.22
钙离子拮抗剂，单一用药	19.47
调节胆固醇和甘油三酯的药物	11.71
血管紧张素 II 拮抗剂，单一用药	10.42
冠脉治疗，钙离子拮抗剂和亚硝除外	8.84
血管紧张素转换酶抑制剂，单一用药	8.22
亚硝酸盐和硝酸盐	8.15
静脉曲张治疗，全身性的	5.21
β 受体阻断剂，单一用药	4.68
抗高血压药（非草药）	1.85
利尿药	1.78
血管紧张素 II 拮抗剂，联合用药	1.19
正性肌力药物	1.04
抗心律失常药	0.92
其它心血管用药	13.55

注：　*心脑血管循环改善药主要包括灯盏细辛、菲克维兹、杏丁、金纳多、银杏天宝、舒血宁、都可喜、西比灵、脉络宁、迪艾洛维等。

数据来源：该数据是由艾美仕市场调研咨询（上海）公司北京分公司从全国 170 多个城市中的 1000 多家医院的调查结果推算得出，其中包括了化学药品和疗效明确且制剂上已完全西药化的中成药，如复方丹参滴丸、银杏叶制剂和灯盏细辛等。

5.3 对报告内容及引用数据的说明

2007年心血管病医疗费用

由于卫生部统计信息中心的第四次国家卫生服务调查将在2008年进行，因此本年度报告将不进行2007年度心血管病医疗费用的测算。代之以描述我国主要心血管病(冠心病、脑卒中)和糖尿病的疾病负担及其变化趋势。

● **DALYs 计算：**

公式一[5]：

$$DALYs = \int_{a}^{a+l} D[KC_{xe}^{\beta x} + (1 - K)]e^{r(x-a)}d_x$$

$$= \frac{KDC_e^{\beta}}{(\beta + r)^2}\{e^{-(\beta+r)l}[1 + (\beta + r)(L + a)] - [1 + (\beta + r)a]\} + \frac{D(1-K)}{r}(1 - e^{-rl})$$

公式二[6]：

$$DALYs = YLL + YLD$$

$$YLL = N \times L$$

$$YLD = I \times DW \times L$$

WHO在1993年推出公式一，在2001年推出公式二。尽管两者计算的核心内容都是YLL和YLD，但公式一全面考虑了残疾权重、贴现率、年龄权数调节因子等各项参数，而公式二仅保留了残疾权重参数。因此本报告中，我们用相同的原始数据，代入了不同的公式，得到了不同的结果。此外，关于DALYs计算，对其残疾权重和年龄权数调节因子等，至今仍存在较多的争议。

疾病负担计算时所用参数(残疾权重、贴现率等)取值，在WHO官方网站上均可查到；糖尿病患病率和死亡率主要来自有关文献和中国卫生统计年鉴，冠心病和脑卒中性别年龄别死亡率、患病率、发病率主要来源于北京市安贞医院主持的中国MONICA研究，全国和北京市的性别年龄别人口和死亡数据主要来源于1982年、1990年和2000年全国人口普查统计汇总资料。本报告在DALYs计算中未选用WHO推荐的国际标准期望寿命数据，而是根据1982年、1990年和2000年中国人口普查数据推算出中国和北京市的期望寿命。

在DALYs计算中，我们使用了DisMOD软件，主要用于①将原始数据资料中非全年龄段的年龄别发病率、患病率、死亡率等指标值，转换为全年龄段的指标值。②鉴于原始数据资料中的疾病发病率、患病率和死亡率数据之间存在不同程度的不一致性，本报告应用DisMod软件对发病率、患病率和死亡率等指标进行了内部一致性检验。同时在检验中，本报告还据有关研究报告(循证证据的级别符合年报要求)，以及该领域的专家咨询，对经过检验的指标值进行一定的调整。③应用DisMod软件，据发病率、患病率、缓解率、死亡率、RR值、病程和平均起病年龄等7个指标中的已知指标，推算DALYs计算中未知的有关指标值，如疾病发病率和病程等。

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REPORT ON CARDIOVASCULAR DISEASES IN CHINA (2007)

National Center for
Cardiovascular Diseases,China

Encyclopedia of China Publishing House

Explanation for the Report Editing

1. The report was edited by the working group composed of young and middle-aged specialists. The contents regarding the cardiovascular risk factors (hypertension, cigarette smoking, blood-lipid disorder, metabolic syndrome, overweight and obesity, diet and nutrition, deficiency of physical activity) and the epidemic Situation of cardiovascular disease were edited by the working group.

2. The contents regarding coronary heart disease, cerebral stroke, chronic kidney disease, cardiovascular surgery and arrhythmia were edited by the clinical specialists. And the contents regarding the case report of community hypertension prevention and control were edited by the specialists on community prevention and control. The contents regarding the health economics were edited by the specialists from National Health Economics Institute, Ministry of Health.

3. The editing principle and the first draft were reviewed by calling three plenary meetings of the editing specialists. The report was then finalized after having been reviewed by the core group for three times.

4. The report was edited by draw on the experience of the statistical method of reporting of cardiac disease and cerebral stroke in America.

5. The relevant data that were released before December 31 2007 should have been included in this report. If there is any missing or mistake, please contact and provide the editorial committee with the detailed data.

6. Abbreviations:

Cardiovascular Disease: CVD
Ischemic Heart Disease: IHD
Heart Failure: HF
Total cholesterol: TC
Triglyceride: TG
Low-Density Lipoprotein Cholesterol: LDL-C
High -Density Lipoprotein Cholesterol: HDL-C
Acute Myocardial Infarction: AMI
Chronic Kidney Disease: CKD
End-stage Renal Disease: ESRD
Glomerular Filtration Rate: GFR
Blood Pressure: BP
Heart Rate: HR
Body Mass Index: BMI
Relative Risk: RR
Population Attributable Risk Percent: PARP
Confidence Interval: 95%CI
Angiotensin Converting Enzyme Inhibitor: ACEI
Coronary Artery Bypass Grafting: CABG
Percutaneous Coronary Intervention: PCI
International Normalized Ratio: INR

Outline of the Report on Cardiovascular Diseases in China, 2007

Report on Cardiovascular Diseases in China in 2007 is the 3rd part of the authoritative report on the prevalence and major advances in prevention/treatment research of cardiovascular diseases (CVD) in China. It provides valuable references and evidences for the layout of national health policies and prevention/treatment of CVD. This report covers the prevalence, mortality and critical risk factors of CVD in China, as well as significant progress of clinical studies and typical examples of community-based prevention and treatment.

Detailed information, with regard to the Summary of the Report on Cardiovascular Diseases in China in 2007, is described as follows.

1. Cardiovascular Diseases Become a Major Public Health Problem in China

In the last 3 decades of Reform and Opening, the economy in China developed rapidly, and the general health status of the civilians was improved greatly. However, the prevalence of CVD increased persistently and presented a trend in increase of young patients . The high incidence, high disability and high mortality of CVD become a major public health problem in China

It is estimated that the current number of patients with CVD is at least 230 million in China, which means 2 in every 10 adults are afflicted with CVD. 2 million, or more, individuals are affected with new-onset stroke each year, and the prevalence rate of stroke patients is estimated to be greater than 7 millions. The corresponding data for new-onset and prevalent myocardial infarction are annually more than 500 thousand and 2 million patients, respectively.

About 3 million patients died of CVD per year, i.e. 8 400 per day, or 1 per 10.5 seconds. One in every three deaths are attributed to CVD.

2. Risk Factors of CVD Remain Increase

The major risk factors of CVD in China include hypertension, smoking, hypercholesterolemia, overweight/obesity, diabetes mellitus (DM), etc., which remain climbing up.

(1) Hypertension

According to the Chinese National Nutrition and Health Survey in 2002, Ministry of Health, the prevalence rate of hypertension was 18.8%, increased by approximately 31% compared with that in 1991. It is supposed that more than 200-million Chinese population have high blood pressure (BP). The epidemiological trends of hypertension in China manifest the following characteristics:

- The prevalence rate of hypertension in urban areas is higher than that in rural areas, but the difference is diminishing.
- The prevalence rate of hypertension in male group aged less than 45 is higher than that in female , while it is just the reverse over 45 years of age.
- The prevalence rate of hypertension in Northern China is higher than that in Southern China.
- The highest prevalence rate of hypertension occurs in the Tibet, while the lowest one in the Miao ethnic

minority.

● The detectable rate of high-normal BP (120～139/80～89mmHg) among Chinese population is 34%. High-normal BP has potential for hypertension development.

● The prevalence rate of isolated systolic hypertension is around 6.0% in China, which indicates that it may affect as much as 50 million individuals.

● The rates of awareness, treatment and control of hypertension are 30%, 25% and 6% in Chinese population, respectively. Although these figures have improved fairly compared with that in 1991, but they are still at lower levels.

● Hypertension in juveniles: The BP level of juveniles with the age of 7～18 was documented in the National Students; Fitness and Health Survey, Ministry of Education. In comparison with the data in 1991, the detectable rate of elevated systolic BP (SBP) in 1995 increased by 42.5% in urban boys and 45.5% in urban girls, correspondingly, it increased by 23.7% for boys and 31.0% for girls in rural areas, respectively. The highest detectable rate of elevated SBP occurred in the children of Han nationality in Northern China (2.1%～3.4%), while the lowest rate was in the Southwest region of China (0.2%～0.6%). A cohort study with 18-year follow-up on juvenile hypertension in Beijing, during the 7th 5-year Plan, revealed that total of 42.9% individuals developed over hypertension among the juveniles with high baseline BP.

(2) Cigarette Smoking

According to a national survey in 2002 in China, the rate of cigarette smoking in the population aged 15 and over was 35.8%(66.0% for men and 3.1% for women). It is estimated that the active smokers was 350 million (including15 million of juvenile smokers aged 13～18 years, and passive smokers nationwide reached 540 million . Of great importance is that there was a trend in increase of smoking rate among the juvenile population aged 15～24. Cigarette smoking is one of the most threatening risk factors not only for the morbidity and mortality of CVD but also for the tumors and respiratory diseases in the Chinese population.

The cohort studies from multiple provinces and cities showed that, in comparison with non-smokers, the risk of acute coronary heart disease and acute ischemic stroke was 1.75-fold and 1.37-fold in active smokers, respectively. A collaborative cohort study by Chinese and American investigators demonstrated a 59%～100% increase in the risk of CVD onset among active smokers.

(3) Dyslipidaemia

● According to the Chinese National Nutrition and Health Survey in 2002, the prevalence rate of dyslipidaemia was 18.6%. Supposedly, the existing patients with dyslipidaemia were almost 200 millions, in which hypercholesterolemia accounts for 2.9%, hypertriglycerolemia 11.9%, and low high-density lipoprotein cholesterol (HDL-C) 3.9%. The prevalence rate of hypercholesterolemia was higher in urban areas than that in rural areas, and was higher for men than that for women under the age of 45, while it is just the reverse over 45 years old.

● The Chinese-American cohort studies and domestic multiple studies of provinces and cities demonstrated a rise of the risk of CVD onset, following the elevation of plasma total cholesterol levels.

● *Guidelines on Prevention and Treatment of Dyslipidemia in Chinese Adults* was published in 2007. This guideline put forward the cutoffs and risk stratification of dyslipidemia, which are suitable for the Chinese population and provide crucial references and guiding principles for the prevention and treatment of dyslipidemia.

● According to a population-based sampling survey in 10 provinces and cities of mainland China from 2000 to 2001, the rates of awareness, treatment and control of hypercholesterolemia were 21.3%, 11.3% and 11.6% for men, and14.0%, 18.1% and 9.5% for women, respectively.

● An investigation for children in Beijing in 2007 revealed that the prevalence rate of dyslipidemia (plasma total cholesterol 5.20mmol/L or triglycerol [TG] 1.70mmol/L) in obese children was as high as 30%.

(4) Overweight/Obesity

● The prevalence rate of overweight/obesity in Chinese residents has been increasing persistently in the last 30 years. According to the National Nutrition and Health Survey in 2002, the prevalence rate of overweight was 17.6% and the rate of obesity was 5.6%. In comparison with the data in 1992, the figures were raised 38.6% and 80.6%, respectively. The total existing patients of both overweight and obesity is estimated to be 240 millions .

● The study outcomes from 9 provinces/cities and others in China indicated that the prevalence of hypertension was increased with the gain of body mass index (BMI) or enlargement of waist circumference.

(5) Physical Inactivity

Physical inactivity is strongly associated with the occurrence of overweight/obesity, hypertension, and DM, and it is also correlated with the total death and the death risk of CVD.

Only 34% of residents in big cities engage in sufficient physical activities, which indicate the existence of physical inactivity among most of urban residents .

(6) Diet and Nutrition

● According to the Chinese National Nutrition and Health Survey in 2002, about 86g of daily fat intake occurred in the urban residents and 73g of fat intake in the rural residents. 35% of fat-based energy intake was in the urban residents,, which was higher than the dietary recommendation of <30%.

● The average dietary salt intake in China was 15.9g per day in 2002, which greatly exceeded the salt-intake recommendation of 5g per day by WHO.

● Domestic research suggests that dietary interventions with lower-salt intake, potassium supplement or substitute for salt will reduce BP level modestly. Sufficient protein supplement can also result a minor reduction of BP level.

(7) Metabolic Syndrome

● An investigation in 2002 showed that crude prevalence of metabolic syndrome was 6.6% among Chinese population aged over 15 (according to the criteria of Chinese Medical Association Diabetes Branch). The prevalence was higher in urban areas than that in rural areas.

● The metabolic syndrome increases the hazards of coronary artery disease (CAD) and stroke.

3. Progress in Population-oriented Prevention/Treatment and Clinical Research

(1) Coronary Artery Disease (CAD)

● The crude death rate of CAD in 2006 was 57.1/105 in urban areas and 33.7/105 in rural areas in China.

● The leading risk factors of CVD include hypertension, cigarette smoking, hypercholesterolemia, overweight/obesity, DM, etc.

● Registry of Percutaneous Coronary Intervention (PCI): in Mainland China 112 580 cases of PCI were registered in 2006, which increased more than 16 000 cases of PCI in comparison with that in 2005.

● Subgroup analysis of China Coronary Secondary Prevention Study (CCSPS) indicated that Xuezhikang

was effective and safe for the treatment of myocardial infarction in the elderly, and could dramatically reduce cardiovascular events in patients with type 2 DM or CAD.

(2) Stroke

● Intervention outcomes of Health Education and Health Promotion Project, which was implemented in three communities of Beijing, Shanghai and Changsha from 1991 to 2000, demonstrated that in the intervention group, the hazards of all-type stroke, ischemic stroke and hemorrhagic stroke were decreased by 11.4%, 13.2% and 7.2%, respectively.

● The risk factors of stroke include hypertension, dyslipidemia, atrial fibrillation, DM and so on.

● Secondary Prevention of Stroke

A 6-year randomized controlled clinical trial of antihypertensive treatment implied that the fall of BP level of patients with cerebrovascular disease can obviously reduce 2/5 recurrent risk of stoke.

● According to the report from the Antithrombotic therapy for Atrial Fibrillation Collaborative Group, indicated that Warfarin (international normalized ratio [INR] 2.0～3.0) was more beneficial for the patients with atrial fibrillation to reduce the risk of ischemic stroke and the hazard of death, compared with Aspirin.

(3) Chronic Kidney Disease (CKD)

● The prevalence rate of CKD in patients with CAD is 24.8% in China.

● CKD is a high risk factor of cardiovascular events in patients with DM.

● In comparison with normal BP, the relative risk of end-stage renal disease in individuals aged over 40 years with high-normal BP, grade 1 and grade 2 hypertension is 1.3, 1.5 and 2.6, respectively.

(4) Cardiovascular Surgery

● In the last 4 years, the operation volume of cardiovascular surgery in China Mainland increased annually by 14%, and it was 136 015 in 2007.

● 130 heart transplants were performed in 2007.

● The mortality of coronary artery bypass graft (CABG) is higher for men than for women, and it elevated in patients with BMI ＜20 or＞35 kg/m^2.

● Early mortality of valvular-heart-disease surgery is 2.8%～8.6%. The postoperative 5-year, 10-year and 15-year survival is 89%, 84%, and 65%, respectively.

(5) Peripheral Artery Disease (PAD)

The prevalence rate of 1ow extremity arteriosclerosis disease in China is 2.1%～22.5%, with smoking, DM, dyslipidemia and hypertension as the major risk factors.

(6) Arrhythmia

● Around 35 000 patients underwent permanent cardiac pacemaker implantations in 2007, half of them were sufferers from sick sinus syndrome.

● Approximate 20 000 cases of radiofrequency ablation were performed in 2007 for treatment of tachycardiac arrhythmia, 88% of which was supraventricular tachycardia.

● The prevalence of atrial fibrillation in Chinese population aged over 30 years is 0.77%, and application of radiofrequency ablation in treatment of atrial fibrillation develops rapidly.

● The incidence of sudden cardiac death in China is 41.8/100 000 (44.6/100 000 for male and 39.0/100 000 for female). It is estimated that 544 000 cardiac sudden deaths occur annually.

(7) Typical Examples of Community-based Prevention and Treatment on CVD

● Experiences from Capital Steel Corporation: Under the direction of cardiological experts in Beijing Fuwai Hospital from 1969, prevention and treatment of CVD were actively carried out, in the community of Capital Steel Corporation. A network of cardiovascular management was established, which comprises tertiary hospitals, cardiovascular institute and public health service and adopts classified management of hypertension. These efforts have achieved remarkable results.

2 736 hypertensives were enrolled in integrated management of hypertension from 1974 to 1995, and the average BP levels in male patients dropped 145/92 mmHg from to 137/84 mmHg.

Data from a 28-year disease surveillance from 1974 to 2001 in the community of Capital Steel Corporation demonstrates that the incidence and mortality of stroke declined from 138/100 000 and 52/100 000 to 64/100 000 and 18/100 000, respectively.

● Community-based Comprehensive Intervention on Stroke in 3 Cities in China.

The 8th and 9th Five-Year National Programs for Key Science and Technology Projects were carried out from 1991～2000 on the community-based comprehensive intervention for cerebrovascular disease in Beijing, Shanghai and Changsha. With conduction of Health Education and Promotion Project as well as active antihypertensive therapy in susceptible population for 9 years, the risk of stroke was decreased by 11.4% in the intervention community in comparison with that in controls.

Chapter 1
Cardiovascular Diseases

1.1 The Number of Existing Patients with CVD

It is estimated that the number of existing patients with CVD (including coronary artery disease, stroke, heart failure and hypertension, etc.) is about 230 millions in China, which means 2 CVD patients in every 10 adults . In the total CVD sufferers, 200 million are patients with hypertension, 7 million patients with strokes, 2 millions with myocardial infarction, 4.2 millions with heart failure, 5 millions with cor pulmonale, 2.5 millions with rheumatic heart disease, and 2 millions with congenital heart diseases.

1.2 Death of CVD

It is estimated that about 3 million patients die of CVD every year, i.e. 1 in every 3 deaths is attributed to CVD. It means that there are 8 400 patient death of CVD every day, or 1 death of CVD in about every 10.5 seconds.

1.3 Mortality and All-Causes of Death of CVD

(1) The mortality of CVD is still at lofty level in China, which exactly like the data in 1990, 1995, 2000 and 2005. The mortality of CVD ranked first and was still higher than that of tumor or other diseases in 2006. (Figure 1-3 (1), Figure1-3 (2)).[1]

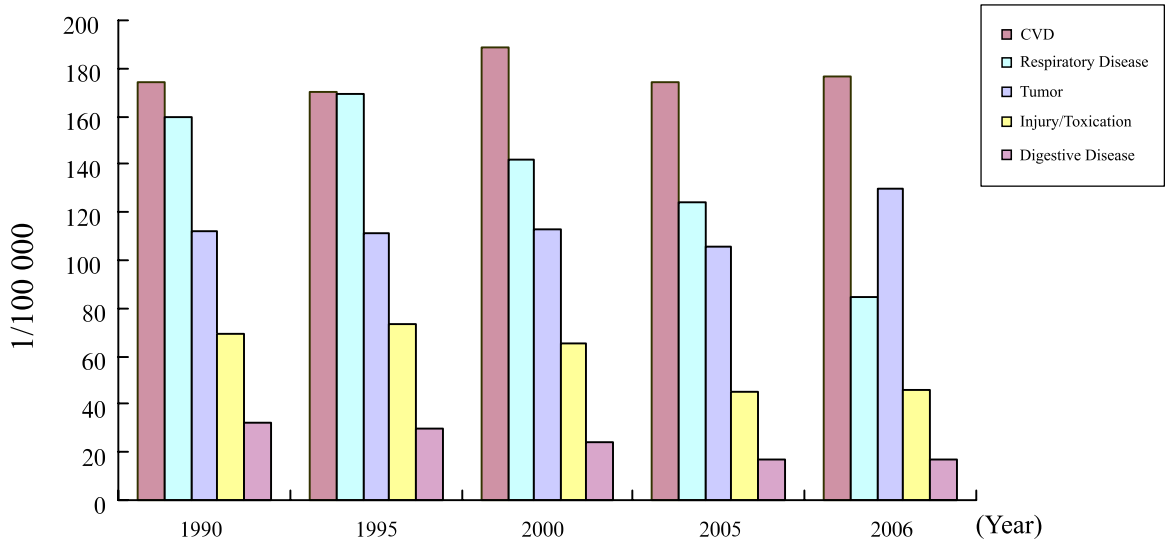

Figure 1-3 (1) Mortality of Major Diseases in Chinese Rural Residents in the Last 16 Years

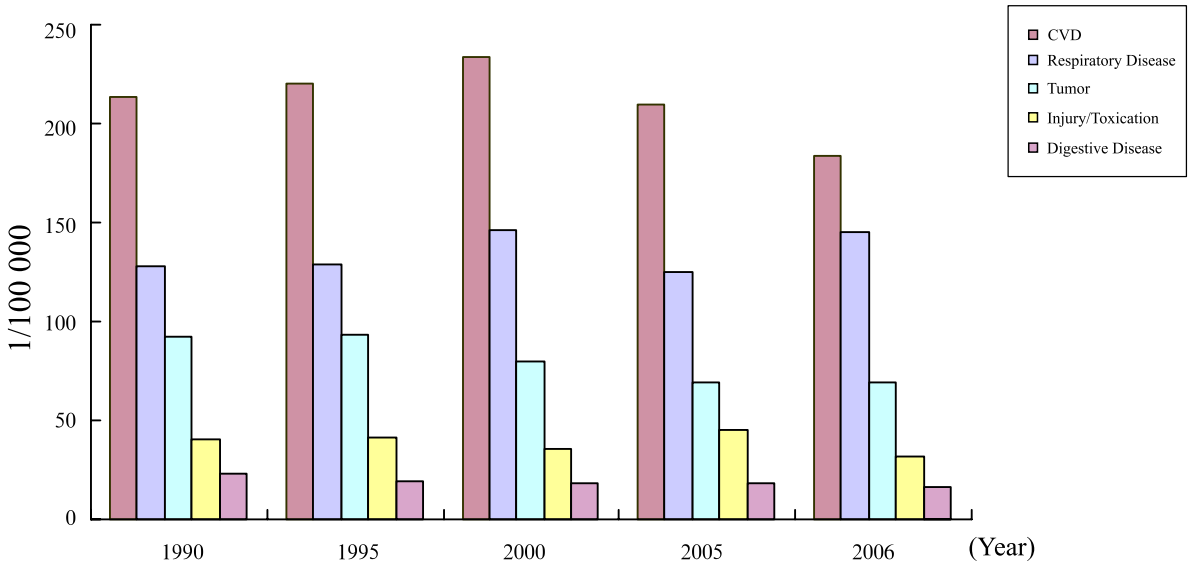

Figure 1-3 (2) Mortality of Major Diseases in Chinese Rural Residents in the Last 16 Years

(2) In all-cause death of major diseases in Chinese residents, CVD is the leading cause. (Figure 1-3 (3), Figure 1-3 (4))

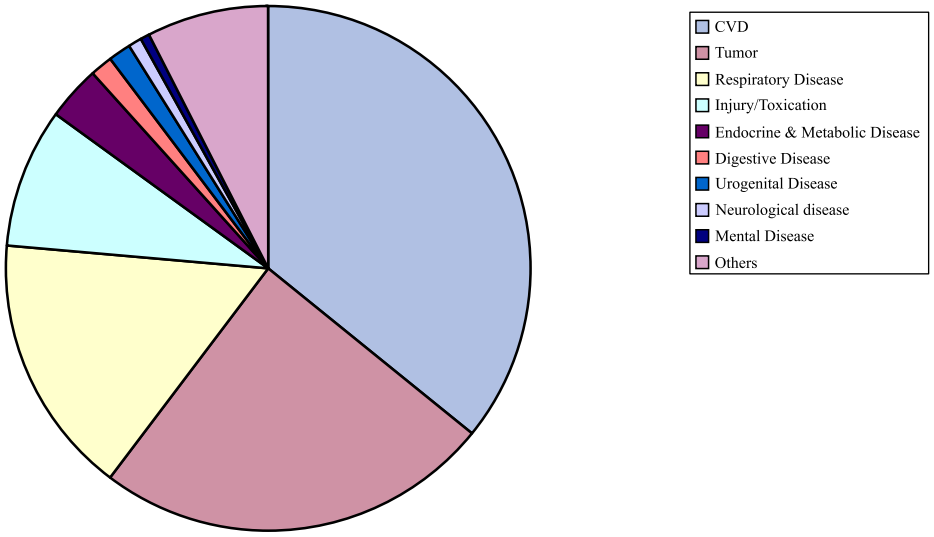

Figure 1-3 (3) Death Constituents of Major Diseases in Chinese Rural Residents (%)

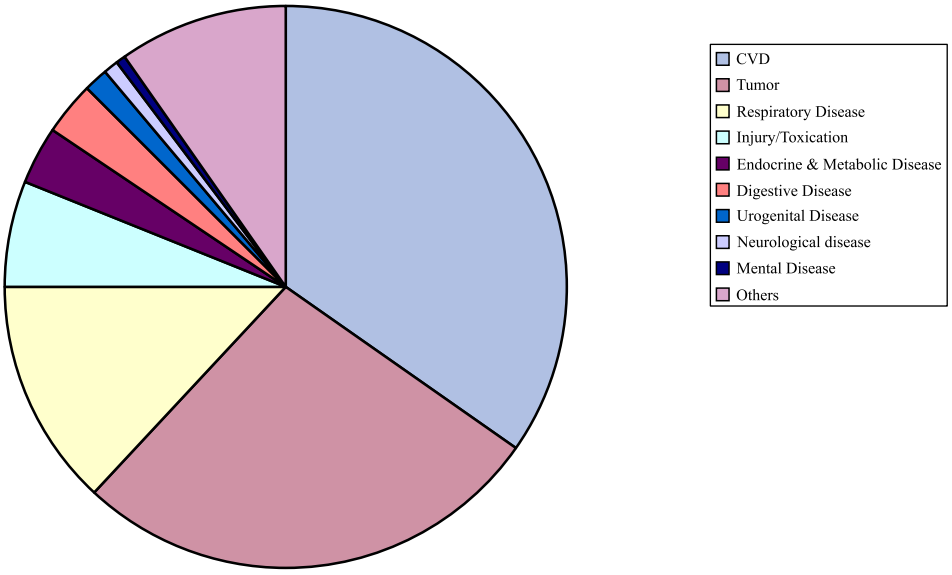

Figure 1-3 (4) Death Constituents of Major Diseases in Chinese Rural Residents (%)

1.4 A 21-Year Follow-up for the Cause of Death in Male Employees of Capital Steel Corporation

Based on World Health Organization Monitoring of Trends and Determinants in Cardiovascular Disease (WHO MONICA) Project[2], implemented a mean 20.8 years of followed-up study for the total of 5 137 male employees aged 45 in Capital Steel Corporation in China, in which 760 deaths occurred in the period. All-cause mortality was $733/10^5$ person-year, and age-standardized mortality rate was $643/10^5$ person-year. Three leading causes of death include tumor, stroke and heart disease, the mortality of which was $231/10^5$, $139/10^5$ and $96.4/10^5$ person-year, respectively. According to the international convention, stroke and heart disease are collectively called CVD, thus, the mortality of CVD is paramount to that of other diseases. The major risk factors of the first 3 deaths were hypertension, smoking and hypercholesterolemia, the relative risk of total death were 1.62[95%CI (1.37～1.90), 1.44 95%CI (1.17～1.77)] and 1.27 95%CI(1.06～1.54), respectively.

1.5 Investigation on the Cause of Death in Veterans in Xi'an[3]

1 268 male veterans aged 55 and over were recruited in 1987 for the physical examination and standard questionnaire in every two years. The total 18-years of follow-up lasts until the end of 2005. There were 491 deaths, 748 survivals and 29 among the population involved in the follow-up. The adjusted mortality rate was $2\,616/10^5$ person-year. Three leading causes of death were cancer, cardiocerebrovascular disease and chronic obstructive pulmonary disease, the death ratio of them accounted for 39.71%, 28.10% and 16.90%, respectively.

References

[1] *Health Statistic Yearbood 2007*;Ministry of Health of the People's Republic of China

[2] Duan Xiufang, Wu Xigui, Yu Xuehai et al. *Major causes of death among male steelworkers in Beijing: a prospective study. Chinese Journal of Cardiology 2006,34(7):651～654.*

[3] Sai XY, He Y, Men K, etal. *All-cause mortality and risk factors in a cohort of retired military male veterans, Xi'an, China: an 18-year follow up study*. *BMC Public Health. 2007; 7: 290.*

Chapter 2
Risk Factors of Cardiovascular Diseases

2.1 Hypertension

2.1.1 Primary Hypertension

2.1.1.1 Level of Blood Pressure in Chinese Population

According to a survey on the Status of Nutrition and Health of the Chinese People in 2002[1], the mean level of blood pressure in Chinese population rose with the increase of age. For the participants under 45 years of age, the level of systolic blood pressure (SBP) was higher for men than that for women; whilefor the participants over 45 years, it was higher for women than for men. Although the level of diastolic blood pressure (DBP) was lower for women among the groups with different age, compared with men, the difference of DBP presented a downward trend when they were over 45 years of age(Table 2-1-1(1)).

Table 2-1-1(1) The Average Level of Blood Pressure in Chinese Populations Aged 15~74 Years

Age Group	SBP(mmHg)		DBP (mmHg)	
	Male	Female	Male	Female
15~24	112.4	107.6	71.9	69.8
25~34	115.7	109.4	75.6	71.5
35~44	118.4	114.8	78.1	74.9
45~54	122.9	123.1	80.0	78.3
55~64	129.3	130.4	80.7	79.1
65~74	135.2	136.8	79.8	78.7

A survey on the Status Nutrition and Health of the Chinese People was implemented in 2002[2]. The analytic result of hypertension in different ethnic groups presented that based on the available research documents of 152 683 participants aged 15 years, the average level of SBP was the highest among men and women of Man ethnic, it was 126.2 mmHg and 125.7 mmHg respectively; however, the average level of DBP was the highest among men and women of Tibetan people, it was 85.7 mmHg and 81.6 mmHg respectively (Table 2-1-1(2))

Table 2-1-1(2) The average Level of Blood Pressure among Chinese Populations Aged more than 15 Years in Different Ethnics

Ethnic	SBP(mmHg)		DBP (mmHg)	
	Male	Female	Male	Female
Han	123.3	120.3	78.6	75.9
Mongolia	123.3	123.3	78.2	77.1
Hui	120.4	118.3	78.2	75.3
Tibetan	124.8	117.0	85.7	81.6

Continue

Ethnic	SBP(mmHg)		DBP (mmHg)	
	Male	Female	Male	Female
Miao	116.2	111.0	73.0	69.7
Zhuang	123.8	116.7	77.4	72.7
Buyi	119.7	117.3	77.1	73.5
Man	126.2	125.7	79.4	77.7
Tujia	122.6	121.0	74.4	73.1
Other	118.2	114.3	76.9	74.6
Total	123.1	120.0	78.5	75.7

2.1.1.2 Prevalence of Hypertension

There were four national large-scale sampling surveys on prevalence of hypertension since P.R. China has established . The outcomes showed a significant upward trend in prevalence rate of hypertension (Figure 2-1-1(1)).

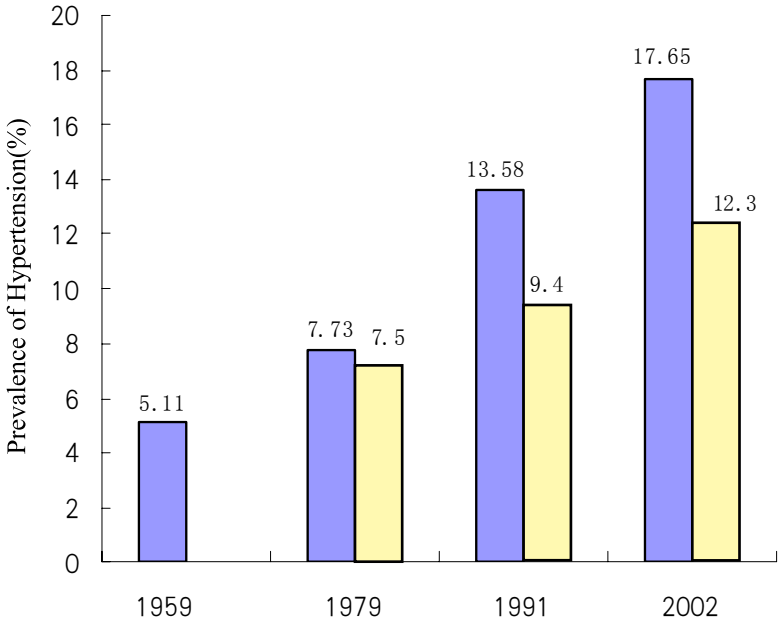

Figure 2-1-1(1) Comparison of Prevalence Rate of Hypertension among Populations Aged over 15 in Four Sampling Surveys Nationwide of China

Note:

It stands for an estimated national prevalence in the same year. The diagnostic criteria of hypertension was somewhat different among various surveys: in 1959, it was DBP>90 and /or SBP>140 under the age of 39 , over 40 years old, SBP would be 10mmHg more with the increase of age in every 10 years ; in 1979-1980: SBP≥141and /or DBP≥91, regardless any anti-hypertensive drug taken within 2 weeks; in 1991: SBP≥140 and /or DBP≥90, or taking anti-hypertensive drug in recent 2 weeks; in 2002: the same as the criteria in 1991.

It stands for age-standardized prevalence. All four surveys used the same criteria that referred between1979～1980. The total population of 1964 was used as a standardized population (aged over 15). Blood pressure unit was mmHg in all four surveys.

The data from a survey on the Status of Nutrition and Health of the Chinese People in 2002 showed[3] that the prevalence of high blood pressure in Chinese adults aged over 18 years was 18.8%, it is higher in males than that in females, and the prevalence presented an upward trend with the increase of age (Table 2-1-1(3)).

Table 2-1-1(3) Gender and age distribution of hypertension prevalence in a survey on Nutrition and Health of the Chinese People in 2002 (%)

Sex and Age	Total	Urban	Rural
Total	18.8	19.3	18.6
Males	20.2	21.8	19.6
Females	18.0	17.9	18.0
Young People(18-44) Years Old			
Subtotal	9.1	9.4	9.0
Males	12.7	14.5	12.0
Females	6.7	6.1	6.9
Middle-age People(45-59) Years Old			
Subtotal	29.3	32.8	28.0
Males	28.6	33.1	26.9
Females	30.0	32.6	29.1
The Elderly(≥60) Years Old			
Subtotal	49.1	54.4	47.2
Males	48.1	54.0	46.0
Females	50.2	54.9	48.4

The prevalence in different age groups was showed in Figure 2-1-1(2), according to grouping of age in every 5 years. No matter males or females, the prevalence of hypertension remained a significant upward trend with the increase of age. For the patients under the age of 40, the increase of prevalence was much significant in males than that in females; for the patients over the age of 40, it was higher in females than in males[4].

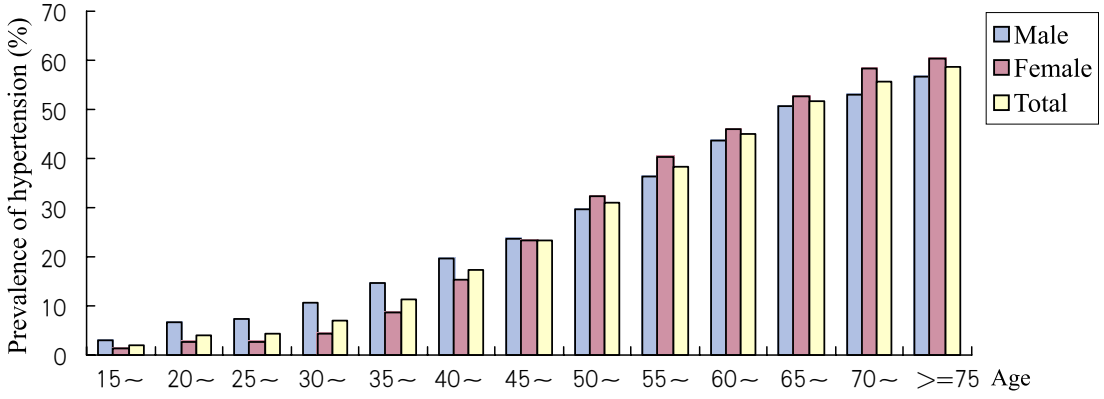

Figure 2-1-1(2) Prevalence of Hypertension among Different Age Populations of China in 2002

Reference: Survey on the Status of Nutrition and Health of the Chinese People in 2002, the Fourth: Hypertension. Beijing: The People's Health Publication, 23～36.

Note: the diagnostic criteria of hypertension: SBP≥140mmHg or DBP≥90mmHg or take any anti-hypertensive drug in recent 2 weeks antihypertensive drug within 2 weeks.

Prevalence of hypertension from 1979 to 2002 showed a trend of increase both in males and in females (Figure 2-1-1(3)). No matter male group or female group, there was a rapid increase in populations aged over 40 years; and there was an obvious difference of the prevalence in various periods [5].

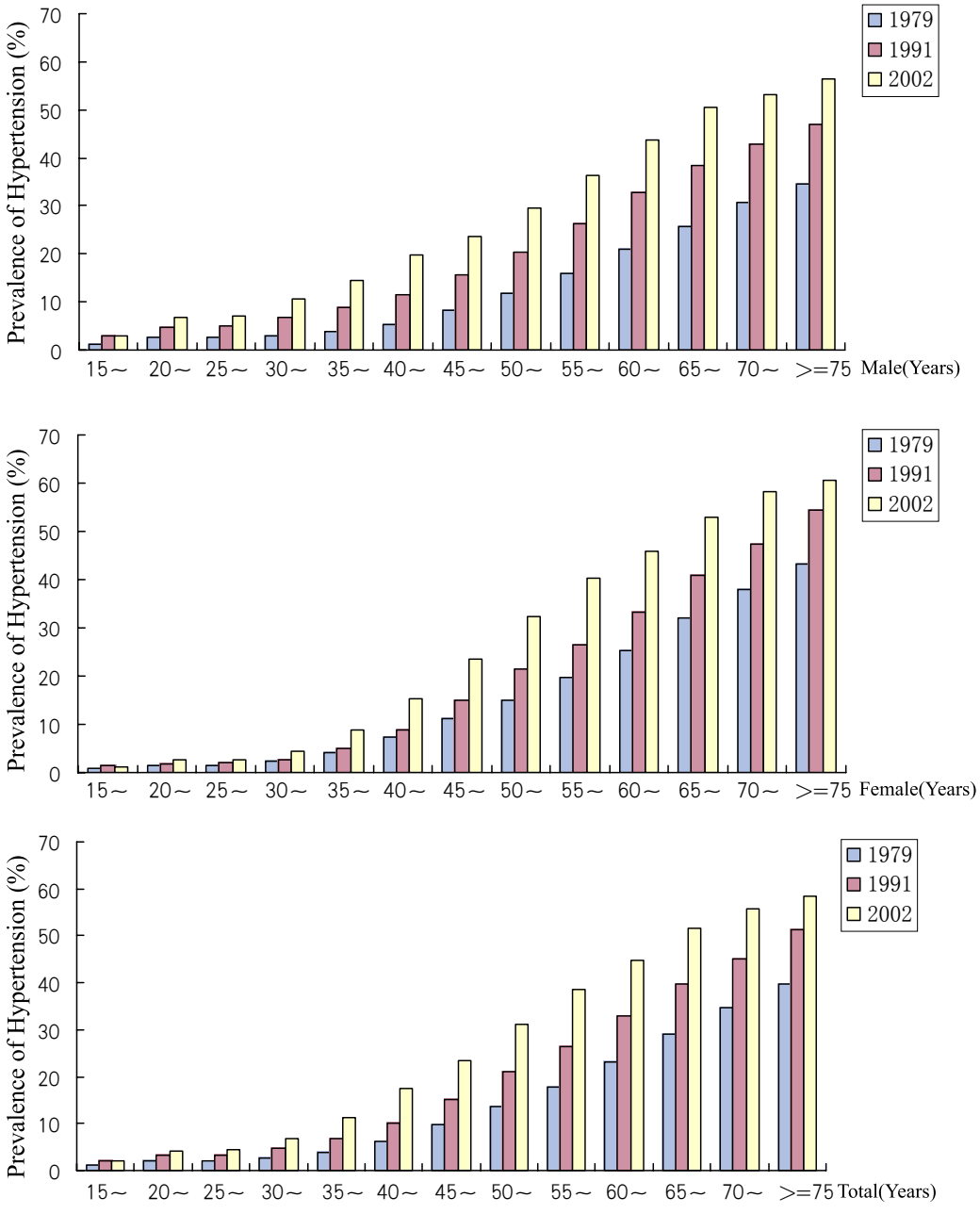

Figure 2-1-1(3) Trend on Prevalence of Hypertension in Different Age Groups between 1979～2002

Reference: Survey on the Status of Nutrition and Health of the Chinese People in 2002, the Fourth: Hypertension. Beijing: The People's Health Publication, 23～36.

Note: the diagnostic criteria of hypertension in 1979: SBP≥140mmHg or DBP≥90mmHg; the criteria in 1991 and 2002: SBP≥140mmHg or DBP≥90mmHg or take any anti-hypertensive drug within 2 weeks .

The investigational data in 2002 showed that the prevalence of hypertension between urban areas and rural areas still remained a difference in China; and also there was significant difference between northern areas and southern areas except for Class III and Class IV village areas (Figure 2-1-1(4)).

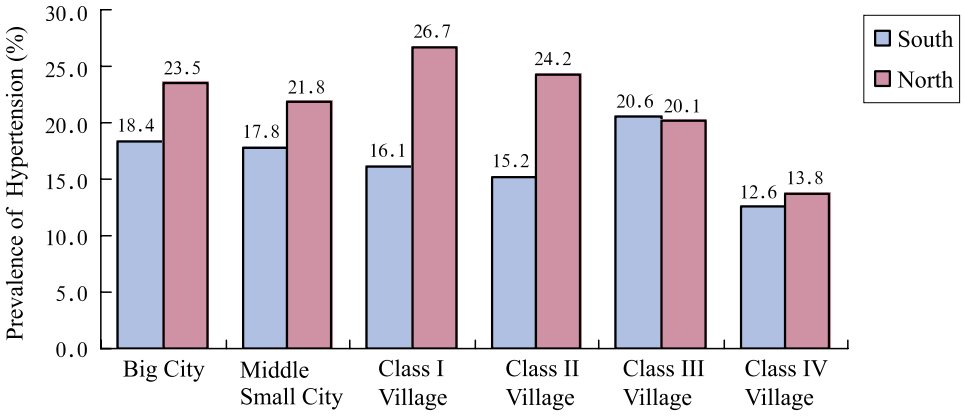

Figure 2-1-1(4) Prevalence of Hypertension among Chinese Populations of Different Regions in 2002

Reference: Survey on the Status of Nutrition and Health of the Chinese People in 2002, the Fourth: Hypertension. Beijing: The People's Health Publication, 23～36.

Note: the diagnostic criteria of hypertension: SBP≥140mmHg or DBP≥90mmHg or take any anti-hypertensive drug within 2 weeks.

The outcomes of surveys on prevalence of hypertension in different periods showed that there was significant difference between urban areas and rural areas, or between different regions. The standardized prevalence in urban areas reached 19.3%, and it was 18.6% in rural areas in 2002. But the difference between urban areas and rural areas presented a trend of reduction(Figure 2-1-1(5)).

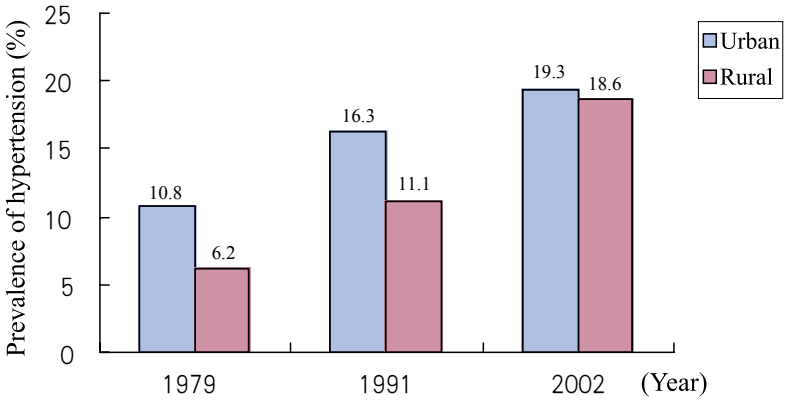

Figure 2-1-1(5) Trend of Hypertension Prevalence in Different Periods

Reference: Survey on the Status of Nutrition and Health of the Chinese People in 2002, the Fourth: Hypertension. Beijing: The People's Health Publication, 23～36.

Note: the diagnostic criteria of hypertension in 1979: SBP≥140mmHg or DBP≥90mmHg; the criteria in 1991 and 2002: SBP≥140mmHg or DBP≥90mmHg or take any anti-hypertensive drug within 2 weeks.

The outcome of the survey on prevalence of hypertension[6], which had 29076 participants, aged 35～85 from 14 provinces of China in 2002, showed that the standardized prevalence in different provinces and cities was 18.68% to 42.61% (Table 2-1-1(4)).

Table 2-1-1(4) Area Distribution of Hypertension Prevalence in Patients of 35～85 Years Old in 14 Provinces and Cities,2002

Region	Participants	Prevalence(%)	Standardized Prevalence(%)
Tianjin	1988	40.69	30.8
Inner mongolia	2029	33.86	42.61
Hebei	2006	48.75	41.05
Shanxi	2031	28.61	28.94
Henna	2696	41.43	41.59
Shandong	1992	16.87	18.6
Zhejiang	2107	36.4	31.45
Hubei	2163	24.13	21.16
Hunan	1741	34.06	24.91
Sichuan	2083	27.36	18.68
Guangdong	2005	27.36	24.91
Jiangxi	2125	34.12	27.71
Yunnan	2278	40.34	30.8
Shanxi	1832	38.1	31.47

The analytic data of hypertension in various ethnic groups[7] showed that in total of 152683 research data available for the participants aged more than 15 years, prevalence of hypertension among Tibetan people was the highest (24.7%), and the prevalence in Miao was the lowest (7.7%). Comparison with that in 1991, there was a biggest increment of the prevalence in Man, however, there was a reduction in Mongolia (Table 2-1-1(5)).

Table 2-1-1(5) Changes of theStandardized Prevalence of Hypertension in Different Nationlity Groups in Different Periods(%)

Ethnic	Male		Female		Total	
	1991	2002	1991	2002	1991	2002
Han	11.6	17.7	10.3	15.3	11.3	16.2
Mongolia	21.1	18.8	15.6	17.2	18.2	17.6
Hui	10.4	16.2	9.3	16.2	9.8	16.0
Tibet	19.5	25.6	16.4	24	17.8	24.7
Miao	8.3	9.2	7.0	6.1	7.7	7.7
Zhuang	9.4	16.1	7.5	8.3	8.8	11.8
Buyi	11.6	13.9	7.8	10.7	9.5	12.4
Man	13.4	23.1	11.1	18.7	12.3	20.5

2.1.1.3 Detectable Rate of High-normal Blood Pressure

In a survey on Nutrition and Health of Chinese people in 2002, according to the definition of *Hypertension Guidelines for Prevention and Control in China in 2005*, the total research data for 147 472 participants aged 18 years and over were classified by BP value, in which, the participants with high-normal BP accounted for 34%; the proportion of normal BP value for men was lower than for women; by contrast, the proportion of high-normal BP value for men was higher, ,compared with that for women (Figure 2-1-1(6)).

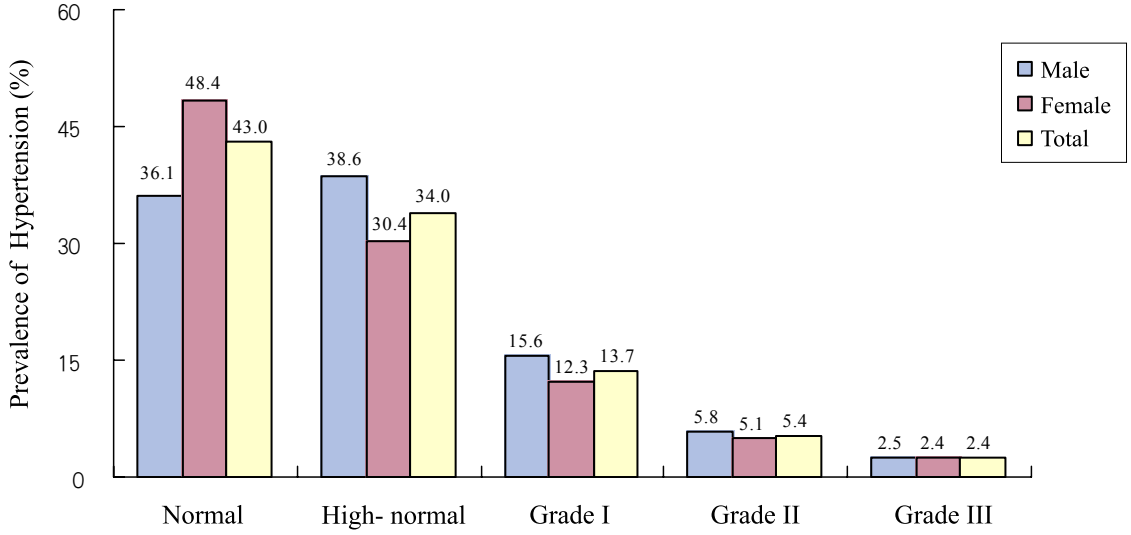

Figure 2-1-1(6) The Classification of Blood Pressure in Chinese Adults in 2002

Reference: Survey on the Status of Nutrition and Health of the Chinese People in 2002, the Fourth: Hypertension. Beijing: The People's Health Publication, 23～36.

Note: Classification of blood 2005 pressure levels was defined by the definition of hypertension guidelines for prevention and control in China.

Table 2-1-1(6) Detectable Rate of High-normal Blood Pressure in Chinese Adults in Different Periods(%)

Age grour	Male		Female		Total	
	2002	1991	2002	1991	2002	1991
18～	37.0	34.8	23.4	16.8	28.5	25.4
25～	40.3	36.0	25.1	17.4	30.9	26.0
35～	41.7	36.5	32.8	24.7	36.7	30.2
45～	40.3	35.9	36.1	30.2	38.0	32.9
55～	36.7	33.8	33.2	31.7	34.9	32.7
65～	31.6	32.3	28.9	30.1	30.3	31.2
75～	29.3	30.5	27.0	27.4	28.1	28.7
Total	38.6	35.2	30.4	23.5	34.0	29.0

It was reported[8] that high-normal blood pressure increased a 56% onset risk of stroke , a 44% risk of coronary heart disease and a 52% risk of overall CVD ; in the events of CHD, stroke and overall CVD, the attributable risk (AR) of high-normal blood pressure was 12.4%, 15.2% and 14.4%.

2.1.1.4 Isolated Systolic Hypertension

According to the data of survey in 2002[9], the standardized prevalence of isolated systolic hypertension (ISH) was 6.0% in Chinese adults, of which, 5.4% for men and 6.9% for women. It was estimated that there were 50-million existing adult patients with ISH in China. Generally, the prevalence of ISH presented an upward trend with the increase of age, especially in the people over 40 years of age . For people under 40 years old, the prevalence was higher for men than for women ; by contrast, for people over 40 years of age, it was higher for women, compared with that for men (Figure 2-1-1(7)).

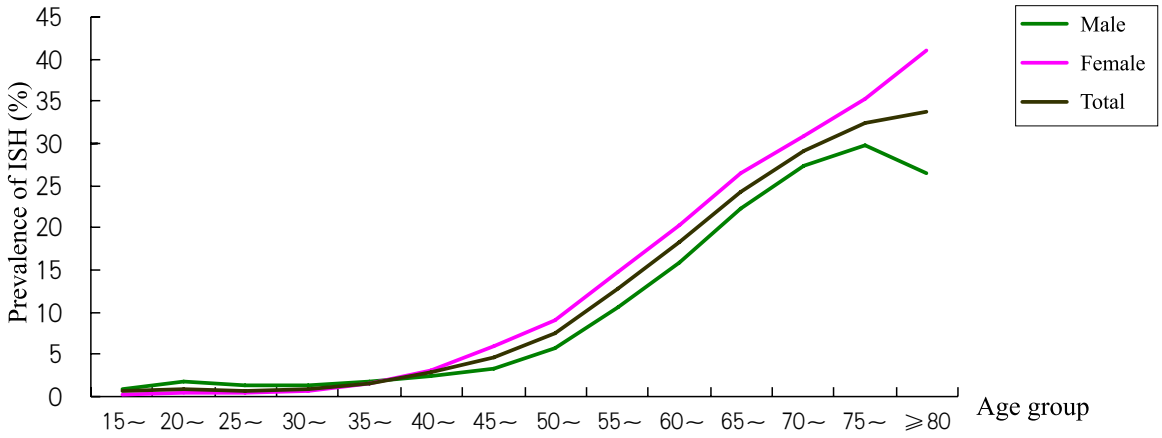

Figure 2-1-1(7) The Standardized Prevalence of ISH by Age Group in China

Reference: Survey on the Status of Nutrition and Health of the Chinese People in 2002, the Fourth: Hypertension. Beijing: The People's Health Publication, 37～48.

Note: prevalence adjusted by regions.

The prevalence of ISH also showed higher in northern areas, and lower in southern areas. But the difference between prevalence rates of ISH and hypertension was that no matter in northern areas or in southern areas, it was higher for women than for men, and higher in rural areas than in urban areas (Table 2-1-1(7)、Table 2-1-1(8)).

Table 2-1-1(7) The Standardized Prevalence of ISH in Chinese Adults in Regions of Urban and Rural in 2002

Sex	Total	Total in Urban	Total in Rural	Big City	Middle-small City	Class I Area	Class II Area	Class III Area	Class IV Area
Male	5.4	4.9	5.6	5.4	4.8	6.5	5.8	5.2	3.9
Female	6.9	6.7	6.9	7.0	6.5	8.2	6.9	77.5	5.0
Total	6.1	5.8	6.2	6.2	5.6	7.3	6.2	6.3	4.4

Table 2-1-1(8) The Standardized Prevalence of ISH in Chinese Population Aged 60 and over in Northern and Southern Areas in 2002

Sex	Urban		Rural	
	Southern Area	Northern Area	Southern Area	Northern Area
Male	4.5	5.4	5.1	5.9
Female	6.6	6.8	6.5	7.5
Total	5.6	6.0	5.7	6.7

Among the participants aged≥60 years, prevalence of ISH was 25.1%. In addition, it was higher in urban areas than in rural areas, and higher for women than for men. In rural, there was highest prevalence in Class I areas, and followed successively in the areas of Class II, Class III and Class IV (Table 2-1-1(9)). Although the prevalence of ISH was still higher in northern area than in southern area, the difference of prevalence between two areas was comparatively small (Table 2-1-1(10)).

Table 2-1-1(9) The Standardized Prevalence of ISH among Chinese Population Aged 60 and over in Different Areas of Urban and Rural in 2002

Sex	Total	Total in Urban	Total in Rural	Big City	Middle-small City	Class I Area	Class II Area	Class III Area	Class IV Area
Male	22.2	22.4	22.1	23.6	21.8	26.1	22.8	20.0	16.1
Female	28.3	29.5	27.8	31.2	28.8	32.6	27.7	29.5	20.4
Total	25.1	26.0	24.8	27.7	25.3	29.3	24.9	24.6	18.3

Table 2-1-1(10) The Standardized Prevalence of ISH in Chinese Population Aged 60 and over in Northern and Southern Areas in 2002

Sex	Urban		Rural	
	Southern Area	Northern Area	Southern Area	Northern Area
Male	22.5	22.3	21.1	22.5
Female	29.1	29.7	26.8	29.1
Total	25.8	26.1	24.0	25.6

For the adult patients with hypertension, the prevalence of ISH was higher for women than for men in different age groups, meanwhile(Figure 2-1-1(8)), it was higher in rural than in urban (Table 2-1-1(11)) and higher in southern areas than in northern areas (Figure 2-1-1(9)). The characteristic of ISH prevalence, compared with hypertension prevalence, was somewhat different .

Table 2-1-1(11) The Standardized Prevalence of ISH in Chinese Adult Patients with Hypertension in the Urban and Rural Areas in 2002

Sex	Total	Total in Urban	Total in Rural	Big City	Middle-small City	Class I Area	Class II Area	Class III Area	Class IV Area
Male	19.5	14.3	21.6	15.5	13.8	23.2	21.0	19.8	22.7
Female	25.3	21.8	26.7	22.6	21.4	2.8	26.2	25.0	27.1
Total	22.3	17.8	24.2	18.9	17.4	26.0	23.5	22.6	25.0

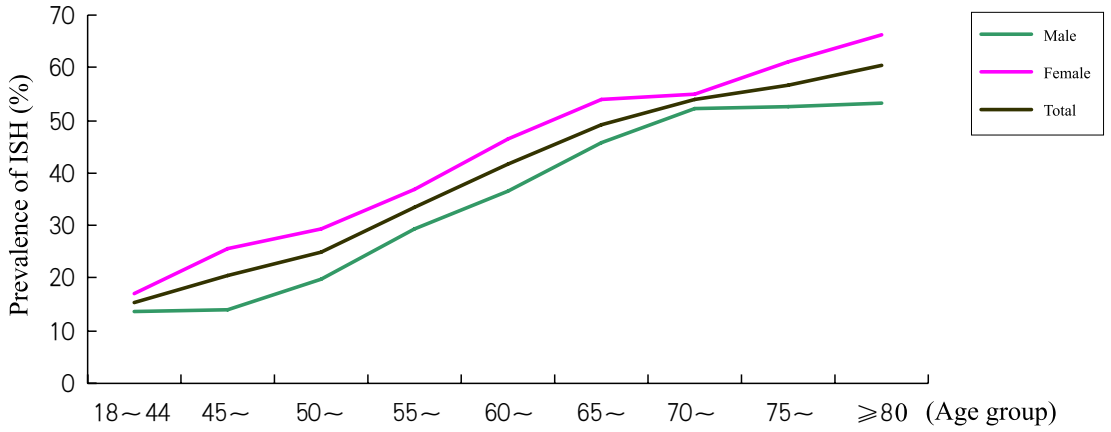

Figure 2-1-1(8) The Standardized Prevalence of ISH among Adult Patients with Hypertension in Different Age Groups

Reference: Survey on the Status of Nutrition and Health of the Chinese People in 2002, the Fourth: Hypertension. Beijing: The People's Health Publication, 37～48

Figure 2-1-1(9) The Standardized Prevalence of ISH in Adult Patients with Hypertension in the North and the South

Reference: Survey on the Status of Nutrition and Health of the Chinese People in 2002, the Fourth: Hypertension. Beijing: The People's Health Publication, 37～48.

Note: prevalence adjusted by regions.

2.1.1.5 Awareness, Treatment and Control of Hypertension

The outcomes of survey [10] in 2002 showed that the percentage of hypertension awareness, treatment and control among Chinese population was 30.6%, 24.7% and 6.1% respectively; for the patients under treatment, the control rate reached to 25%. Hypertension awareness, treatment and control remained an improvement with increase of age, and it was higher in urban areas than in rural areas (Table 2-1-1(12)).

Table 2-1-1(12) Rates of Awareness, Treatment and Control among Hhypertensive Patients in China(%)

	Age Group	Urban Area	Rural Area	Total
Awareness Rate	18~	17.8	11.6	13.6
	45~	40.8	25.1	31.0
	60~	48.5	26.8	37.6
	Sub-total	41.1	22.5	30.2
Treatment Rate	18~	11.8	7.9	9.1
	45~	34.1	19.4	25.0
	60~	43.1	21.3	32.2
	Sub-total	35.1	17.4	24.7
Control Rate	18~	4.2	2.1	2.7
	45~	10.0	3.8	6.2
	60~	11.3	3.9	7.6
	Sub-total	9.7	3.5	6.1
Treatment and Control Rates	18~	36.3	26.8	30.7
	45~	29.7	20.2	25.2
	60~	26.6	19.1	24.1
	Sub-total	28.2	20.4	25.0

This study[11] observed a total of 26 655 out patients of hypertension control the control rate was 50.2% and 56.7% after taking drug for 4 weeks and 12 weeks, respectively. The rate was different among hypertension patients with various types. The difference between the treatment and control rates also existed among hypertensive patients with different risk stratification, in addition, the higher the risk stratification, the lower the rate was. The control rates in patients with diabetes or nephropathy were significant lower than the mean level of control rate (Table 2-1-1(13)).

Table 2-1-1(13) Hypertension Control Rate among the Patients with Different Characteristics in Different Periods (%)

Duration of Treatment	ISH	IDH	SDH	Moderate Risk	Low Risk	High Risk	Very High Risk	Diabetes	Nephropathy	Total
4	56.0	69.1	48.1	84.6	69.6	43.7	40.9	18.9	27.7	50.2
12	57.9	72.6	55.6	93.9	79.5	54.1	49.9	30.3	45.5	56.7

ISH: Isolated Systolic Hypertension, IDH: Isolated Diastolic Hypertension, SDH: Systolic and Diastolic Hypertension.

2.1.1.6 Direct and Indirect Factors Involved in the Prevalence of Hypertension

Age is an unchangeable risk factor of hypertension, no matter men or women, the onset risk of hypertension rose by times . In comparison with men aged 15～24, the risk in men aged 65～74 was 22 times . For women with the same age, the onset risk was as high as 57 times (Table 2-1-1(14)).

Table 2-1-1(14) The Relative Risk of Hypertension in Different Age Groups in China

Age Group	Male		Female	
	Prevalence	OR（95%CI）	Prevalence	OR（95%CI）
15~24	4.76	1	2.13	1
25~34	9.45	2.09（1.85,2.36）	3.82	1.82（1.56,2.13）
35~44	17.27	4.18（3.72,4.68）	11.88	6.19（5.37,7.14）
45~54	27.24	7.49（6.69,8.39）	28.42	18.25（15.89,20.95）
55~64	40.79	13.78（12.30,15.43	43.66	35.61（30.97,40.95）
65~74	52.46	22.07（19.64,24.79）	55.7	57.77（50.09,66.63）

With respect to the relative risk of hypertension between genders in all age groups, it was higher for men than for women under the age of 45, and higher for women than for men when they were over 45 of age (Table 2-1-1(15)).

Table 2-1-1(15) The Onset Risk of Hypertension among Chinese Population with Different Genders

Age Group	Gender	Prevalence(%)	OR（95%CI）
15~24	Male	4.76	1
	Female	2.13	0.44（0.37,0.52）
25~34	Male	9.45	1
	Female	3.82	0.38（0.35,0.42）
35~44	Male	17.27	1
	Female	11.88	0.65（0.61,0.69）
45~54	Male	27.24	1
	Female	28.42	1.06（1.01,1.11）
55~64	Male	40.79	1
	Female	43.66	1.13（1.07,1.190
65~74	Male	52.46	1
	Female	55.7	1.14（1.07,1.22）

The onset risk of hypertension in patients with family history was 2 times as high as patients without family history. The more the alcohol intake, the higher the risk of hypertension was. In comparison with people with normal weight, the one risk of hypertension among people with overweight or obesity increased. No matter triglyceride or cholesterol or high dense lipoprotein cholesterol (HDL-C), the patients with blood-lipid abnormal will be at a high risk of hypertension as compared to ones with normal blood-lipid (Table 2-1-1(16)).

Table 2-1-1(16) Risk of Hypertension Onset for Chinese Population with Different Risk Factors

Risk Factor	Level of RF	Prevalence(%)	OR（95%CI）
His. of Hypert	NO	18.22	1
	Yes	30.38	1.96（1.90,2.20）
Amount of Alcohol Intake(g/d)	<4.8	24.04	1
	≥4.80,<10.51	23.65	0.98（0.86,1.12）
	≥10.51,<19.94	26.25	1.13（0.99,1.28）
	≥19.94,<40.03	30.2	1.37（1.2,1.55）
	≥40.03	35.22	1.72（1.52,1.94）
Overweight/Obesity	Thin	13.7	0.8（0.8,0.9）
	Normal	16.5	1.0
	Overweight	33.3	2.5（2.5,2.6）
	Obesity	51.2	5.3（5.1,5.5）
Triglyceride	Normal	20.69	1
	High	37.2	2,27（2.15,2.4）
Cholesterol	Normal	21.29	1
	High	43.26	2.82（2.56,3.11）
High Dense Lipoprotein Cholesterol	Normal	22.68	1
	Low	25.47	1.17（1.08,1.260）

2.1.2 Secondary Hypertension

There is no large sampling survey on prevalence of secondary hypertension. It is reported[12] that secondary hypertension accounted for 14% among all in-patients with hypertension. The details of subgroup showed in Figure 2-1-2.

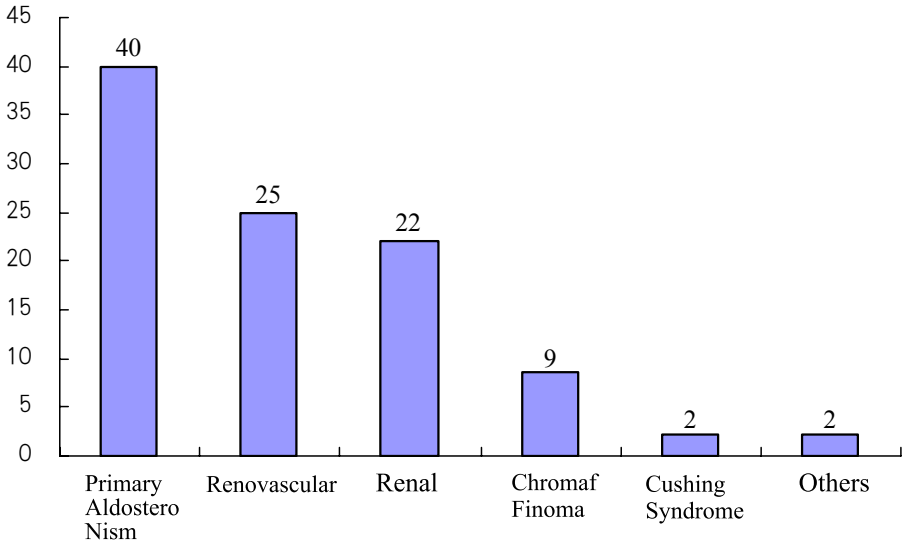

Figure 2-1-2 Subgroup Distribution of Secondary Hypertension among Inpatients(%)

2.1.3 Childhood Hypertension

A survey on total 6 278 children aged 6～13 showed[13] that the prevalence of childhood hypertension reached 3.04% in total, 3.16% in urban areas, 2.76% in rural areas, according to the diagnosis criteria recommended by national heart, lung, blood institute of USA, namely adjusted by height, the 95th percentile of blood pressure (systolic and diastolic) in children aged 6～13 years (Table 2-1-3(1)). If classifying the weight to obesity (more than 20%), overweight (more then 10%～20%) and normal according to the weight for height standard recommended by WHO, the prevalence of hypertension was 36.88% in obese group, it was greatly higher than overweight group (2.18%) , and much higher than normal group (0.28%). There was a positive correlation between prevalence of hypertension and childhood obesity (Table 2-1-3(2)).

Table 2-1-3(1) Prevalence of Hypertension among Children in Jinnan Urban and Rural Areas

	Urban	Rural	Total
Boy	2.72	1.56	2.36
Girl	4.20	5.57	4.62
Total	3.16	2.76	3.04

Table 2-1-3(2) Prevalence of Childhood Hypertension by Physical Status in Jinan Uurban and Rural Areas

	Cases	No. of patients	Prevalence rate(%)
Obesity	141	50	36.88
Overweight	336	7	2.18
Normal	971	3	0.28

2.1.3.1 Detectable Rate and Tendency of High-normal Blood Pressure in Chinese School-age Children

A survey on physical and healthy of Chinese students was conducted in every five years between 1985 and 2005, which was jointly organized by Ministry of Education, State Physical Culture Administration, Ministry of Health, State Civil Affairs Administration and Ministry of Technology and Science. It provided a large-scale dynamic basic data concerning the physical and healthy statusof the students. In the survey, adhered to a principle combined cross-sectional with sampling of whole population; and about 140～400 thousand school children aged 7～18 years were selected from 30 provinces, autonomous region and municipality (except for Tibet) across China. Blood pressure measurement was taken in total five surveys, but only the detectable rates of high-normal blood pressure in surveys of 1991 and 1995 we issued in public[14][15]. Since different record measures of DBP existed in various surveys, the fourth sound of KorotKoff in the year 1991, and the fifth sound of KorotKoff in 1995, caused a less comparability of DBP level between both surveys. Therefore, only the detectable rate of high-normal SBP was described in the following.

The detectable rate of high-normal SBP defined the 95th percentile value by gender and age group in survey of 1991 as the diagnostic criteria (Table 1). In comparison of 1991, the detectable rate of high-normal SBP in boys and girls of urban and rural areas all increased significantly in 1995. For urban boys and girls, the rate increased by 42.5% and 45.5%, respectively, meanwhile, it exceeded the increase of detectable rate of high-normal SBP in rural boys and girls, respectively (23.7% and 31.0%).

Table 2-1-3(3) The 95th Percentile Screening Criteria of Hhigh-normal Blood Pressure in Chinese Adolescences Aged 7～18years in China(SBP/DBP,mmHg)*

Age	SBP		DBP	
	Boy	Girl	Boy	Girl
7	110	110	75	75
8	112	112	76	76
9	114	114	78	78
10	118	120	80	80
11	120	120	80	80
12	122	121	80	80
13	124	121	80	80
14	126	122	81	80
15	130	122	83	80
16	132	124	85	82
17	134	124	86	82
18	134	124	86	82

* According to the 95th percentile of blood pressure (both systolic and diastolic) of Han group (pooled data, including urban and rural, male and female) by age based on the national survey in 1991.

Figure 2-1-3(1) Detectable Rate of High-normal SBP in Chinese Children by Ggender and Region in the Years of 1991 and 1995

2.1.3.2 Regional Distribution of High-normal Rate of Blood Pressure in Chinese School-age Children

According to the screening criteria in Table 2-1-3(3), Figure 2-1-3(2) demonstrated the region distribution characteristics of detectable rates of high-normal SBP and DBP among school-age children of Han in urban and rural areas: no matter urban areas or rural areas, and boys or girls, the rate was the highest in northern China (2.1%～3.4%), followed by the northeast (1.4%～2.3%), and the lowest rate existed in southwest of China (0.2%～0.6%); of which, the rate of high-normal BP was higher in rural children than urban children in both regions of the north and the east of China.

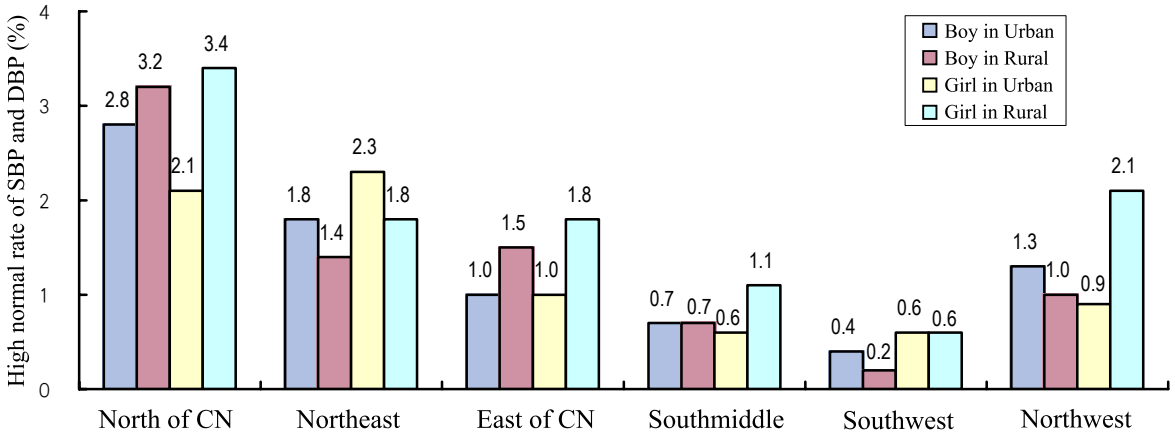

Figure 2-1-3(2) High-normal Rate of SBP and DBP in Chinese School Age Children by Region in 1995

2.1.3.3 Long-term Cohort Study on Childhood Hypertension in China

In 2004, Capital children institute conducted a population cohort study on children blood pressure in 1987, (during the 7th National Five Plan Project) . An 18-year follow-up study for those children found that in the children with a baseline of hypertension status, 42.9% of them finally developed to adult patients with hypertension (Figure2-1-3(3))[16]. It is verified that children with high-normal blood pressure are the high-risk population to be adult patients with hypertension.

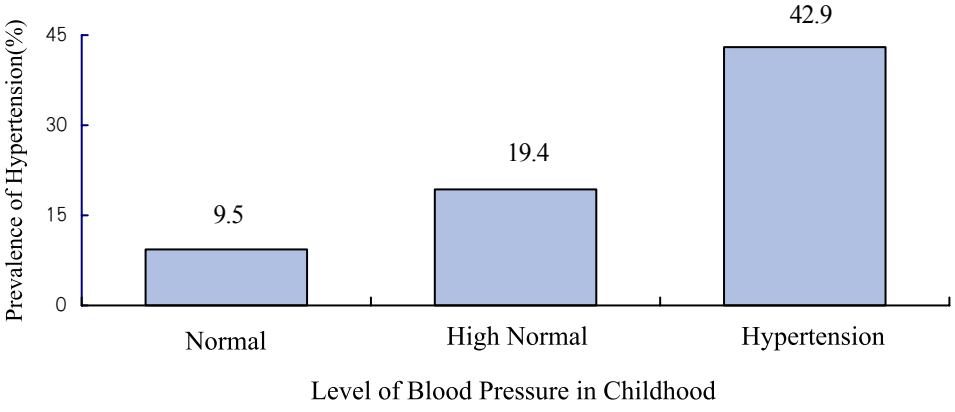

Figure2-1-3(3) Baseline BP (in 1987) and Prevalence of Hypertension in Adults (in 2004)

2.2 Tobacco Use

2.2.1 Epidemic Situation of Cigarette Smoking

2.2.1.1 Overall Prevalence

The outcomes of National Sample Survey conducted in 2002 showed the rate of tobacco use was 35.8% among Chinese population aged 15 years and over, in which, the male and the female smokers accounted for 66.0% and 3.1%, respectively. An estimated 350-million Chinese people aged 15 and over are current smokers. Furthermore, 540 millions were passive smokers. The prevalence rate of smoking was higher among the rural population compared with that among the urban population. Conclusive evidence indicate that both active smoking and passive smoking can cause various diseases, including cancers and coronary heart diseases etc., and result in over 1-million people death of smoking-related illnesses every year. It is estimated, by 2030, that there will be 33% of the male people with middle age death of smoking-related diseases[17].

The outcomes of survey in 2002 presented a 1.8% decline of smoking rate among Chinese population aged 15 and over, compared with that in 1996. Among which, 3.1 of decline in men and 1.0 of that in women (using the standardized data of 2000 National Census to make a comparison between two outcomes of the surveys); The drop of smoking rate was more markedly among the urban residence than that among the rural residence, which made a wider gap between the two populations. However, owing to increment and aging of Chinese population, the number of total smokers was 30 million more than that in 1996. Meanwhile, the rate of smoking cessation increased from 9.42% in 1996 to 11.5% in 2002[18]. The smoking prevalence among Chinese men has been sustained at a high level. Especially among male physicians and teachers, the smoking rate was more than 50%; the smoking rate of the Chinese male physicians was one of the highest in the world, accounting for about 57% of the total Chinese smokers[19]. Meanwhile, the rate of smoking cessation among smoking physicians was only 10.8 %, and nearly 90% of them were unwilling to quit smoking[20].

Table 2-2-1(1) A Comparison among the Surveys of Smoking Prevalence in Chinese Population Aged 15 and Over

Survey Year	Sample Size	Smoking Rate of Men	Smoking Rate of Women	Total Rate
1984	519 000	61.0%	7.0%	33.9%
1996	122 000	66.9%	4.2%	37.6%
2002	167 000	66.0%	3.08%	35.8%

Note:There was a difference of smoking definition in 3 surveys:

- In 1984 National Sample Survey of Smoking Prevalence, “smoker” was defined as a person who has smoked at least 1 cigarette per day for 1 year or longer at the time of survey.
- In 1996 National Prevalence Survey of Smoking Pattern, “smoker” was defined as a person who has smoked daily for at least 6 months at the time of survey.
- In 2002 National Behavioral Risk Factors Surveillance, “smoker” was defined as a person who has smoked at least 100 cigarettes at the time of survey.

It is noted that there is a tendency toward a younger age of smoking initiation in China. Although the age-specific smoking rate in 2002 was lower than that in 1996 in most populations, the smoking rate was climbing up in 2002. At present, the current smokers reach about 15 millions among the total of 130-million adolescents aged 13～18. Meanwhile, the people who is willing to have a smoke were 40 millions or over. There was also

a tendency toward a younger age of smoking initiation among Chinese adolescents, and both the attempting rate and the current smoking rate of schoolgirls were increasing. The outcomes of the survey in 2005 showed that the current smoking rate of Chinese adolescents was 11.5% in which, 18.4% for schoolboys and 3.6% for schoolgirls. The current smoking rate was rapidly increasing with the age among Chinese schoolboys [21].

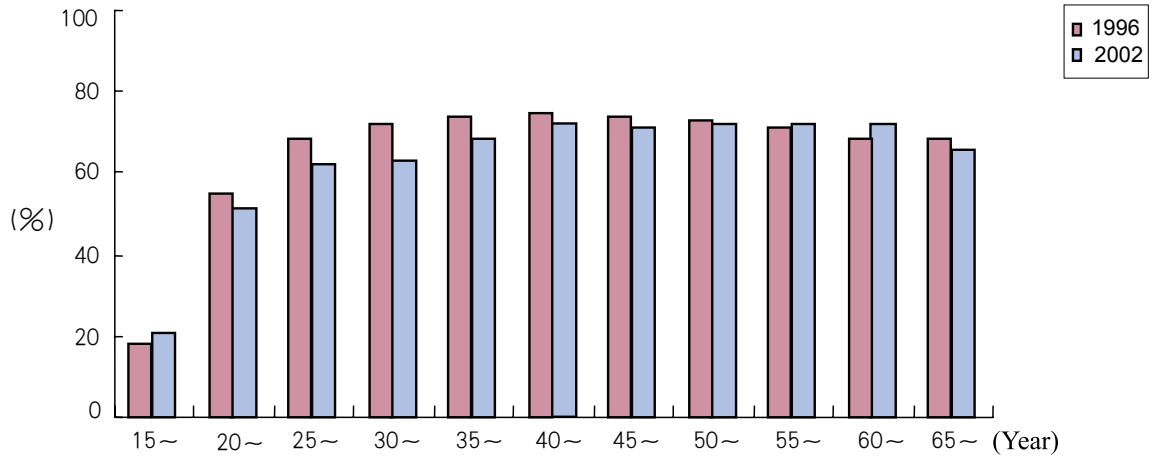

Figure 2-2-1(1) A Comparison of Smoking Rate among Chinese Men Aged 15 and over between 2002 and 1996

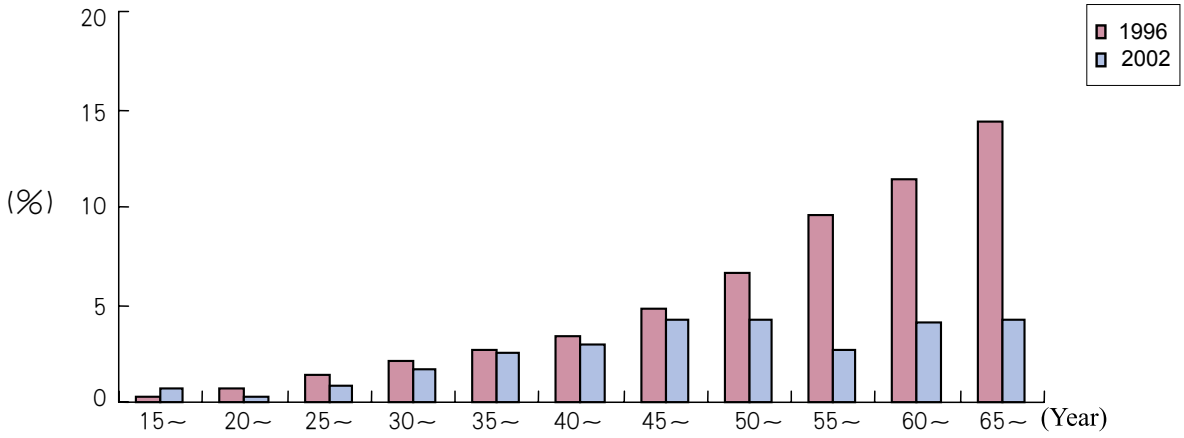

Figure 2-2-1(2) A Comparison of Smoking Rate among Chinese Women Aged 15 and over between 2002 and 1996

2.2.2 Passive Smoking

The outcomes of the survey in 2002 showed that the proportion of passive smoking in non-smokers was 51.9%(Figure 2-2-2). A comparison among three surveys of smoking prevalence in 1984, 1996 and 2002 found that the situation of passive smoking was not improved. Currently, about half of adolescents are suffering the harm of passive smoking in China. It is estimated that about 180-million children and approximately 65-

million teenagers aged 13～18 are exposing to environmental tobacco smoke, among the adolescents. 43.9% of exposure occurs in their homes and 55.8% of exposure in public places[22].

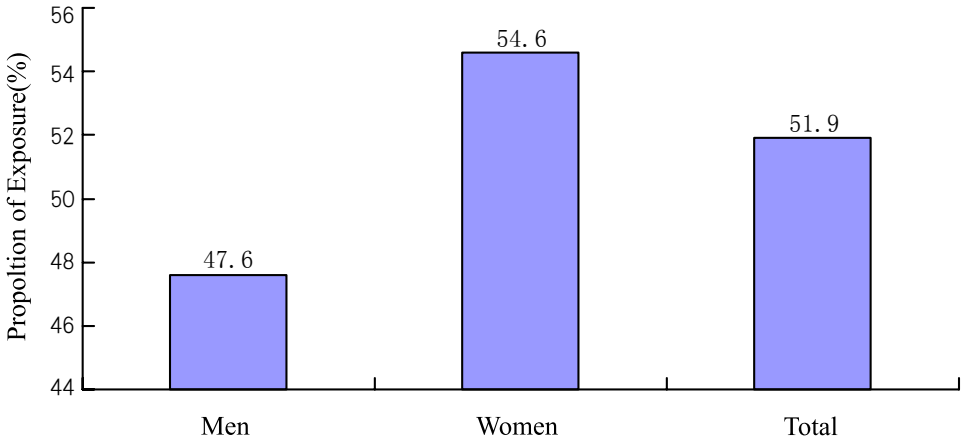

Figure 2-2-2 Proportion of Exposure to Secondhand Smoke among Nonsmokers in China

* Definition of passive smoking: Non-smoker has to be exposed to smoker's tobacco smoke at least 15 minutes one day a week.

2.2.3 Hazards of Active Smoking and Passive Smoking

Both cigarette smoking and passive smoking are the one of the major preventable causes of deaths among the adults of China. The relative risk (RR) of smoking population and the population attributable risk (PAR) of death associated with smoking in China was 1.23(95%CI 1.18～1.27) and 7.9% respectively; in which, 1.18 (1.13～1.23) of RR and 10.0% of PAR for men, and 1.27(1.19～1.34) of RR and 3.5% of PAR for women[23].

2.2.3.1 Impact of Cigarette Smoking on the Onset and Death of Cardiovascular Diseases

Cigarette Smoking is the One of Independent Risk Factors of CVD and Stroke Events

A 10-year follow-up study on 30 000 population aged 35～64 years (the Chinese Multi-Provincial Cohort Study, CMCS) showed that hypertension, cigarette smoking, diabetes mellitus (DM), high total cholesterol/low HDL- cholesterol were the independent risk factors for acute coronary heart disease (CHD) events. In addition, hypertension, DM, high total cholesterol/low HDL, cigarette smoking and obese were the independent risk factors for acute ischemic stroke events. Among people aged 35～64 years, 19.9% of acute coronary disease events and 11% of acute ischemic stroke events were attributed to cigarette smoking. A multivariate regression analysis found that the risk of coronary disease events, ischaemic stroke events and haemorrhage stroke events among Chinese smokers was 1.75 times, 1.37 times risk and 1.21 times respectively, compared with that in Chinese nonsmokers[24]. There were the similar outcomes in the 15-year follow-up study involved in 10 000

participants between China and the USA. The study revealed that 31.9% of ischaemic CVD events (CHD and ischemic stroke) among Chinese population aged 35～59 years were attributed to cigarette smoking. In the male smokers and the female smokers, the risk of ischemic CVD onset was increased by 100% [RR=2.04, 95%CI(1.43～2.92)] and 59%[RR=1.59, 95%CI(1.10～2.30)] respectively, compared with that in nonsmokers [25].

Cigarette Smoking and Deep Vein Thrombosis,DVT [26]

A total of 547 inpatients aged 14 years and over with post-trauma DVT of orthopedic participated in a follow-up study in Tianjin Hospital between November 2003 and October 2004, in which, the mean age of the subjects was 39.6 years, and total smokers accounted for 26.7%. The results of study showed that the possibility of DVT occurrence in smokers was 2.34 times compared to non-smokers[95% CI (1.04～1.47)], when extra factors was under control.

Joint Effect of Cigarette Smoking and Alcohol Consumption on Mortality [27]

A total of 66 743 men aged 30～89 were recruited in a follow-up study in Shanghai, being a part of study with total 297 396 people per years in China from 1996 to 2000. The results of study found that there were 982 deaths from cancers and 776 deaths from CVD in total of 2 514 deaths, Drinking alcohol in moderate amounts, such as 1～7 units per week, was correlated with the reduction of death risk, particularly in the reduction of CVD death risk (the hazard rate [HR=0.7, 95%CI(0.5, 1.0)] Compared to never-smokers, all-cause mortality of both former and current smokers rose significantly, and the death risk increased with the amount of smoking. Among all moderate drinkers, the HR of total death was 0.8[95%CI(0.6, 1.0)] for non-smokers, 1.0[95%CI(0.9, 1.2)] for moderate smokers and 1.4[95%CI(1.2, 1.7)] for heavy smokers. The death risk of the participants with heavy drinking and smoking was the highest [HR=1.9, 95%CI(1.6, 2.4)]. The conclusion of study was that the benefit of moderate alcohol consumption was offset by cigarette smoking, although it could reduce the death risk of CVD.

2.2.3.2 Impact of Passive Smoking on the Onset and Death of Cardiovascular Diseases

Impact of passive smoking on the onset of cardiovascular diseases

There was an upward trend in the onset risk of CVD both among cigarette smokers and among passive smokers. The hazard of passive smoking on cardiovascular system had been verified 10 years ago. Then the hazard degree of passive smoking had been further analyzed by following studies. The results of a combined meta-analysis for 18-item epidemiological studies demonstrated the onset risk of CHD in passive smokers increased by 25%[RR=1.25, 95%CI (1.17～1.32)]; in which, the cohort study showed a 21% of increase in onset risk in passive smokers[RR=1.21, 95%CI (1.14～1.30)], and the case-control study indicated a 51% of increase in the onset risk in passive smokers[RR=1.51, 95%CI (1.26～1.81)][28].

Correlations between the prevalence rate of stroke and passive smoking among non-smoking women exposed to cigarette smokes from their husbands in Shanghai, China [29]

A total of 60 377 Chinese women aged 40～70 years participated in a Women's Health cohort study Shanghai from 1997 to 2000. The outcomes of study found there was an upward trend in the onset risk of stroke following the increase of cigarette smoking amount in nonsmoking housewives, for example, if a

husband smoked 1～9 cigarettes, 10～19 cigarettes and more than 20 cigarettes per day, the onset risk of stroke for his wife was 28%, 32% and 62%, respectively.

Table 2-2-3(1) Odds Ratios for Stroke among Female Nonsmokers according to Their Husbands' Smoking Status, Shanghai Women's Health Study, China, 1997～2000

Husbands' Smoking Status	Total Participants	Cases of Disease	Age-adjusted OR	95%CI	Multi-factor OR	95% CI
Never Smoking (Control)	22,982	213	1.00		1.00	
Formerly Smoking	5,108	74	1.03	0.79,1.35	0.94	0.71,1.24
Currently Smoking	32,287	239	1.47	1.22,1.78	1.41	1.16,1.72

* Adjusted for age, level of education, occupation, family income, alcohol consumption, exercise, body mass index, menopausal status, hormone therapy, oral contraceptive use, history of hypertension and diabetes, and use of antihypertensive medication and aspirin.

Impact of Passive Smoking on Onset and Death of Cardiovascular Diseases

Based on the application of statistic method, it was estimated to be 100 000 deaths of passive smoking among Chinese population in 2002. In which, about 31 300 nonsmokers died from CHD that was caused by passive smoking[30]. A prospective cohort study in Shanghai presented that HR of all-cause death increased 15% among nonsmoking women exposed to environmental tobacco smoke from their husbands [HR=1.15 95%CI (1.01～1.31)], in which, HR of death from CVD increased 37% [HR=1.37,95%CI (1.06～1.78)]; For childhood exposed to "secondhand" smoke, the HR went up to 26% [RR=1.26,95%CI (0.94～1.69)][31].

A Follow-up Study of Death Cause for the Male Retired Officers, Xi'an, China[32]

An 11-year follow-up study for total of 1 268 male retired military officers aged 55 and over in Xi'an, China showed that the mortality of vascular disease was 28.10%. Compared with the non-smokers, the total mortality and CHD mortality among current smokers were 1.37 folds[HR=1.369 95%CI(1.083～1.731)] and 1.81 folds [HR=1.805 95%CI(1.022～3.188)] respectively. Multivariate analysis showed that some factors, such as age, daily cigarettes amount[HR=1.026 95%CI(1.013～1.039)], SBP, triglyceride, family history , existing diseases , body mass index, and smoking age started [HR=0.988 95%CI (0.978～0.999)] , were associated with all-cause mortality. The conclusions of the study are that smoking is one of the leading causes of death among the male senior people in China; Quit-smoking can reduce all-cause deaths and death from CVD.

Table 2-2-3(2) Hazard Ratios and 95% CI for Cigarette Smoking for all Cause Mortality

Smoking Status	Crude HR[1]	95% CI	Adjusted HR[2]	95% CI	P
Cigarettes Per Day(Number)	1.023	1.015～1.032	1.026	1.013～1.039	<0.001
Duration of Smoking(Year)	1.012	1.006～1.017	1.005	0.997～1.013	0.218
Age of Starting Smoking(Year)	1.003	0.996～1.011	0.988	0.978～0.999	0.028

1: crude hazard ratio; 2: adjusted hazard ratio (adjusted for age, systolic blood pressure, triglycerides, cigarettes per day, duration of smoking, age of starting smoking, exercise, BMI, negative affairs, family history of diseases including hypertension, stroke and cancer, and existing all kinds of diseases at baseline).

Table 2-2-3(3) Hazard Ratio and 95% CI of Continuous Variables Related Tosmoking for all Cause Mortality

	Deaths	HR	95% CI	P	P for Trend
Smoking Status*	491				
Non Smokers	126	1.000			
Former Smokers	193	1.089	0.865～1.372	0.467	
Current Smokers	172	1.369	1.083～1.731	0.009	
Smoking Index	172				<0.001
<350	34	1.000			
350～569	29	1.163	0.901～1.501	0.2457	
570～749	48	1.531	1.188～1.974	0.001	
≥ 750	61	2.069	1.642～2.606	<0.001	
Age of Starting Smoking(Year)	365				0.038
<19	101	1.000			
19～22	109	0.823	0.627～1.078	0.157	
23～27	74	0.763	0.565～1.029	0.077	
>27	81	0.720	0.537～0.966	0.028	
Cigarettes Per Day(Number)	365				<0.001
1～9	49	1.000			
10～14	32	1.093	0.700～1.707	0.694	
15～19	130	1.316	0.947～1.828	0.101	
≥ 20	154	1.831	1.327～2.527	0.001	

*Adjusted for age, systolic blood pressure, BMI, total cholesterol, triglycerides, regular alcohol consumption, Exercise, as well as existing disease at baseline.

BMI was grouped by Chinese standard.

BMI was Grouped by Chinese Standard. Smoking, Quitting and Mortality in an Elderly Cohort of 56 000 Hong Kong Chinese[33][34]

Mortality by smoking status was examined in a prospective cohort study of 56 167 (18 749 men, 37 416 women) Chinese aged over or equal 65 years enrolled from 1998 to 2000 in Hong Kong, with the mean follow-up of 4.1 years. The results indicated that the adjusted RRs (95% CI) for all-cause mortality in former and current male smokers were 1.39 (1.23～1.56) and 1.75 (1.53～2.00), compared with never smokers. Risks of death from all causes were increasing significantly with the number of cigarettes smoked per day in current smokers (trend test, P <0.001) RRs (95% CI) were 1.24 (1.04～1.47) and 1.57 (1.28～1.94) for all cardiovascular deaths, and 1.49 (1.30～1.72) and 2.20 (1.88～2.57) in former and current smokers for all deaths from cancer, respectively. Quitters had significantly lower risks of death than current smokers from all causes, including stroke and CVD. The conclusion drew from this study was in old age, smoking continues to be a major cause of death, and quitting is beneficial.

2.3 Dyslipidemia

2.3.1 Prevalence of Dyslipidemia in Chinese Adults

According to *The Survey on Nutrition and Health in Chinese Residents in 2002* The prevalence of dyslipidemia in adults (18 years old) was 18.6%, and the estimated number of adult patients with dyslipidemia was 200 million on the base of the prevalence survey in 2006. The prevalence was 2.9% for hypercholesterolemia (TC5.72mmol/L) 3.9% for borderline high cholesterol levels (TC: 5.20~5.71 mmol/L) 11.9% for high TG, and 7.4% for low HDL-cholesterol (HDL-C<1.04mmol/L), respectively.

The prevalence of both hypercholesterolemia and gradually rose with increase of age; it was significantly higher for men compared to women in young group, and much higher for women compared to men in the aged and middle-aged groups the prevalence was higher in urban population than that in rural population (Figure 2-3-1(1) Figure 2-3-1(2))[35].

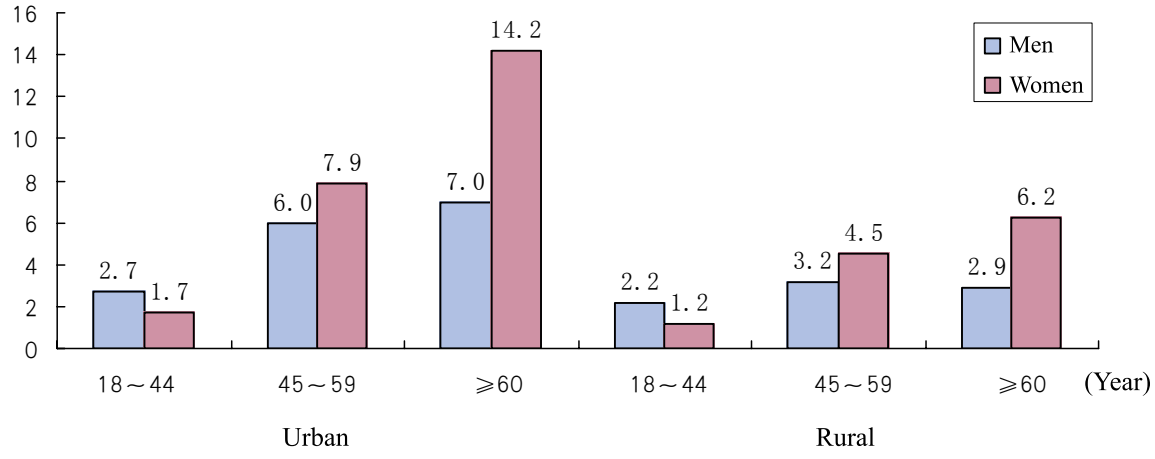

Figure2-3-1(1) Age, Gender and Region (Between Urban and Rural Areas) Distribution in Prevalence of Hypercholesterolemia (TC≥5.72mmol/L) among Chinese Adults (%, Adjusted and Weighed by Age and Region)

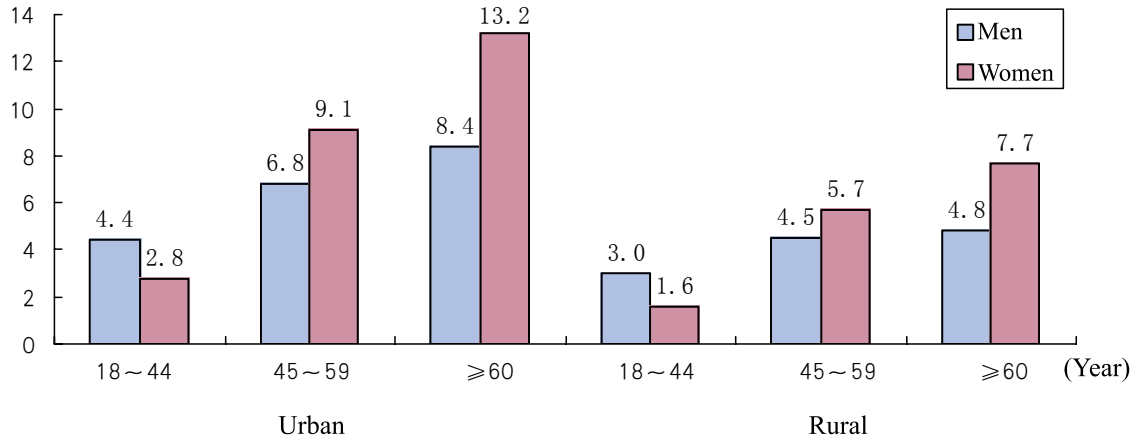

Figure2-3-1(2) Age, Gender and Region (between Urban and Rural Areas) Distribution in Prevalence of Hypercholesterolemia (TC≥5.72mmol/L) among Chinese Adults (%, Adjusted and Weighed by Age and Region)

From 2005 Jun to Sept, an epidemic survey on the blood-lipid levels of CHD patients and the prevalence of dyslipidemia was conducted in 52 cardiac departments of hospitals in 7 cities such as Beijing, Shanghai etc. A total of 3 513 valid cases were included in the survey. Total incidence of blood-lipid pathobolism for all participants was 79.7%, and the incidence in subject groups with <50, 50~59, 60~69, and 70 years of age was 90.6%, 86.9%, 80.0% ,72.5% , respectively. The incidence rate of TC, LDL-C, HDL-C and TG disorders presented a trend of reduction with increase of age. The similar tendency existed in total incidence of blood-lipid pathobolism [36].

2.3.2 Blood-lipid Levels and Ischemic Cardiovascular Diseases

A correlation analysis between blood-lipid levels and ischemic cardiovascular diseases, for the data of PRC-USA Collaborative Study of Cardiopulmonary Epidemiology and China Multi-Provincial Cardiovascular-disease Cohort Study published, was conducted by unified research methods in Fu Wai Hospital of the Chinese Academy of Medical Science and Institute of cardiopulmonary vascular diseases of Beijing (Table 2-3-2). The outcomes of analysis provided an important evidence for formulating *The Guidelines on the Management of Dyslipidemia in Chinese Adults* and defining a borderline diagnosis of dyslipidemia and a layering plan of dyslipidemic hazard, which were suitable for the characteristics of Chinese population. . The diagnostic criteria of dyslipidemia in Chinese population were consistent with international related criterion [37].

Table 2-3-2 The Incidence and RR of Ischemic Cardiovascular Diseases and Levels of Blood-lipid between Two Groups of Cohort Population

Levels of Blood-Lipid (mmol/L)	USA-PRC Cohorts				11 Province Cohorts			
	Cases	Incidence/ 100 000 p.y.	RR	95%CI	Cases	Incidence/ 100 000 p.y.	RR	95%CI
TC								
<5.18	7 850	200	1.0		21 800	229	1.0	
5.18~5.67	1 163	342	1.2	0.9～1.6	4 353	326	1.3	1.0～1.6
5.70~6.19	635	435	1.7	1.2～2.3	2 530	355	1.3	1.0～1.8
≥6.22	574	502	1.7	1.2～2.3	3 016	475	1.6	1.2～2.1
LDL-C								
<3.37	7 898	214	1.0		22 774	233	1.0	
3.37~4.12	1 206	352	1.4	1.1～1.8	4 509	369	1.3	1.0～1.6
4.14~4.90	355	460	1.5	0.9～2.3	1 686	421	1.4	1.0～2.0
≥4.92	166	466	1.5	0.8～2.8	1 055	608	2.0	1.4～2.9
HDL-C								
≥1.55	2 687	255	1.0		11 268	191	1.0	
1.04~1.53	6 161	240	1.1	0.8～1.4	16 200	281	1.2	1.0～1.5
<1.04	1 374	262	1.1	0.8～1.6	4 232	425	1.5	1.2～2.0
TG								
<1.70	8 346	226	1.0		23 979	255	1.0	
1.70~2.25	755	348	1.0	0.7～1.4	3 467	303	0.9	0.7～1.2
≥2.26	666	425	1.1	0.7～1.5	2 926	352	1.0	0.7～1.3

Note: RR estimated by multi-factorial analysis. For different grouping of TC and LDL-C, the variables were adjusted by age, gender, tobacco use , diabetes, obesity, low HDL-C and hypertension; for the grouping of HDL-C, the variables were adjusted age, gender, tobacco use, diabetes, SBP, BMI and TC; and adjusted by age, gender, tobacco use, diabetes, SBP, BMI and HDL-C for the various grouping of TG.

2.3.3 Prevention and Treatment of Dyslipidemia

2.3.3.1 Relevant Layering Criteria of Blood-lipid Levels and Hazard Layering Plan of Dyslipidemia

The Guidelines on the Management of Dyslipidemia in Chinese Adults by Cardiovascular Branch of Chinese Medical Academy etc. was published in 2007 [38]. The classification of lipids and related CVD risk is shown in Table 2-3-3(1) and Table 2-3-3(2) respectively.

Table 2-3-3 (1) Relevant Layering Criteria of Blood-lipid Levels

Layering	Blood Lipids mmol/L (mg/dl)			
	TC	LDL-C	HDL-C	TG
Optimal	<5.18 (200)	<3.37 (130)	≥1.04 (40)	<1.70 (150)
Borderline high	5.18～6.19 (200～239)	3.37～4.12 (130～159)		1.76～2.25 (150～199)
High	≥6.22 (240)	≥4.14 (160)	≥1.55 (60)	≥2.26 (200)
Low			<1.04 (40)	

Table 2-3-3(2) Hazard Layering Plan of Dyslipidemia

Risk Factor	Hazard Layering	
	TC 5.18～6.19mmol/L (200～239mg/dl) LDL-C 3.37～4.12mmol/L (130～159 mg/dl)	TC≥6.22mmol/L (240mg/dl) LDL-C≥4.14mmol/L (160mg/dl)
No Hypertension and Other Risk Factors<3	Low Risk	Low Risk
Hypertension or Other Risk Factors≥3	Low Risk	Middle Risk
Hypertension and Other Risk Ractors≥1	Middle Risk	High Risk
CHD and Other Diseases With Equivalent Risk	High Risk	High Risk

Other risk factors include: age(men aged ≥45, women aged ≥55years),tobacco use, low HDL-C, obesity and family history of early ischemic cardiovascular disease.

2.3.3.2 Clinical Control of Dyslipidemia

A sampling survey, for natural populations aged 35~74 in 10 provinces of China between 2000 and 2001, indicated among participants with serum TC6.22mmol/L or taking anti-dyslipidemia drugs, the proportion of awareness, treatment and control of hypercholesterolemia was 21.3%,14.0%,11.3% for men, and 18.1%～11.6%,9.5% for women as well as among participants with serum TC5.18mmol/L or taking anti-dyslipidemia drugs, it was 8.8%,3.5%, 1.9% for men and 7.5%～3.4%,1.5% for women. [39]

In 2006, the second national survey on clinical management of dyslipidemia, including 2 237 individuals, was conducted in 21 provincial hospitals and 6 county hospital in 12 cities nationwide, such as Beijing, Shanghai, Guangzhou, Wuhan, Hangzhou, Nanjing, Changsha, Shenyang, Xiamen, Zhuhai, Chengdu, Wulumuqi and 1 county (Shanxi Yuxian). The outcomes of the survey presented that total control rate of participants with drug therapy of cholesterol-adjusting was 34% and 50% respectively; and the control rate presented a trend of reduction($P<0.001$) with the elevation of hazard layering levels in patients, in accordance with NCEP ATP(2004) and the criteria of *Guidelines on the Management of Dyslipidemia in Chinese Adults* (2007) (Figure 2-3-3-2(1), Figure 2-3-3-2(2))[40]. The control rate of cholesterol adjustment among various hazard layering groups increased significantly in 2006, compared with that in the first survey on clinical control of blood lipids in 2000 (Table 2-3-3-2(1)) [41].

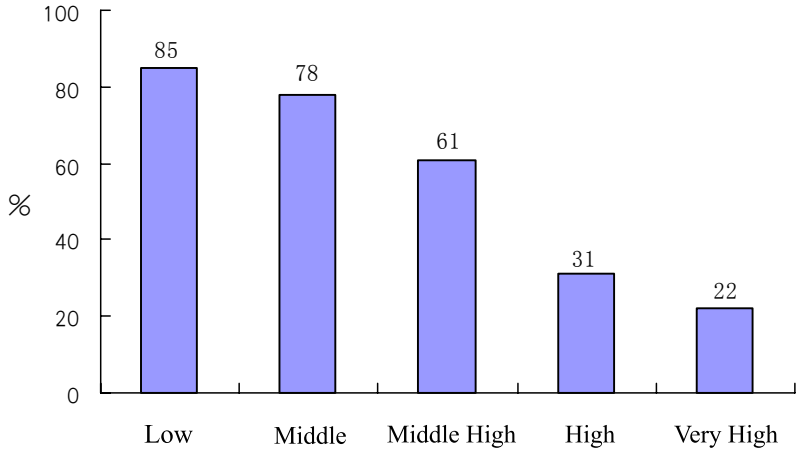

Figure 2-3-3-2(1) Control Rate among Hazard Layering Groups(According to the Target of LDL-Cin NCEP ATP, 2004)

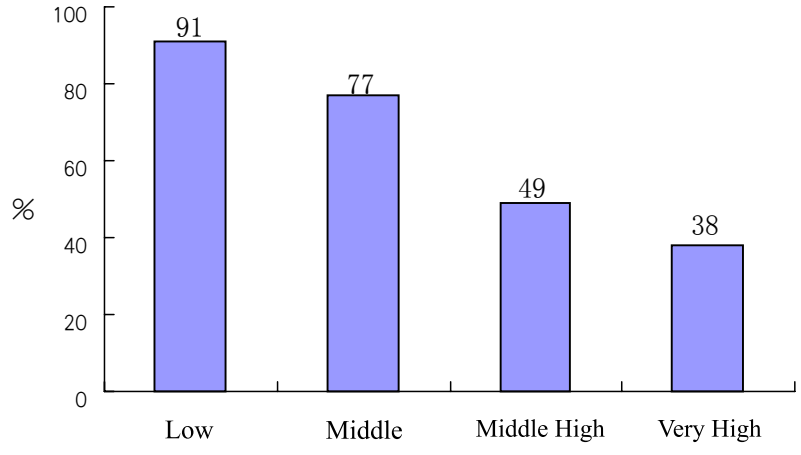

Figure 2-3-3-2(2) Control Rate among Hazard Layering Groups(According to the Target of LDL-C in *Guidelines on the Management of Dyslipidemia in Chinese Adults*)

Table 2-3-3-2 (1) Relevant Layering Criteria of Blood-lipid Levels

Classification	2000		2006	
	Cases	%	Cases	%
RF(-), ASD(-)	49	44.9	4	50.0
RF(+), ASD(-)	1 308	31.7	370	45.9*
ASD (-)	779	16.6	165	26.7*

*P<0.01

RF: risk factor;ASD:atherosclerotic diseases

2.3.4 Prevalence of Dyslipidemia in Children

Currently, there are no consistent diagnostic criteria of dyslipidemia in China, and no national survey results in public. The outcomes of several large-scale surveys in children since 1987 are summarized in Table 2-3-4.

Table 2-3-4 The Prevalence of Dyslipidemia among Chinese Children in Large-scale Studies During Different Periods (%)

Area	Year	Age	Sample Size	High TC	High TG	Low HDL-C
Beijing[42]	1987	7~19	1201	1.3	4.2	0.4*
Guang Dong#[43]	2005	3~14	6188	2.1	2.2	8.0*
Beijing#[44]	2007	6~18	19593	1.2	8.8	–

High TC: TC≥200mg/dl(5.17mmol/L)

High TG:TG≥150mg/dl(1.70mmol/L)

Low HDL-C: HDL-C<40mg/dl(1.04mmol/L)

*HDL-C<35mg/dl(0.9mmol/L)

#Fasting capillary blood was used.

The data of survey in Beijing children in 2007 showed that, no matter with or without family history , such as CVD, diabetes, dyslipidemia and obesity, the prevalence of dyslipidemia (TC≥5.20mmol/L, TG≥1.70mmol/L) in obese children was higher, accounting for about 30% (Figure 2-3-3) [45].

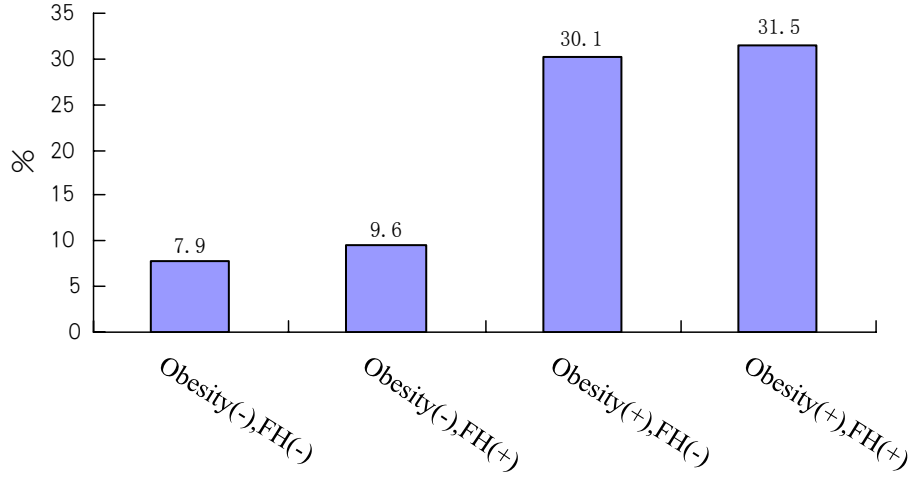

Figure2-3-3 Comparison of Dyslipidemic Prevalence among Children with or without Obesity and Family History.

2.4 Overweight and Obesity

In recent 2～3 decades, the prevalence of overweight and obesity in China has been increasing dramatically. According to the National Nutrition and Health Survey of Chinese residents in 2002, there were about 200-million people with overweight (BMI: 24～27.9kg/m^2) and about 60-million with obesity (BMI≥28kg/m^2) in China. It was estimated that the number of people with overweight or obesity reached 240 million and 70 million, respectively, based on the statistics of census in 2006,

The outcomes of 1993～2004 continuing cross-sectional survey in 9 provinces of China showed that the prevalence of central obesity (waist circumference≥85cm for male, waist circumference≥80cm for female) increased significantly (Figure 2-4(1))[46] both in men and in women, the average annual increase was 2.1% for men and 1.6% for women.

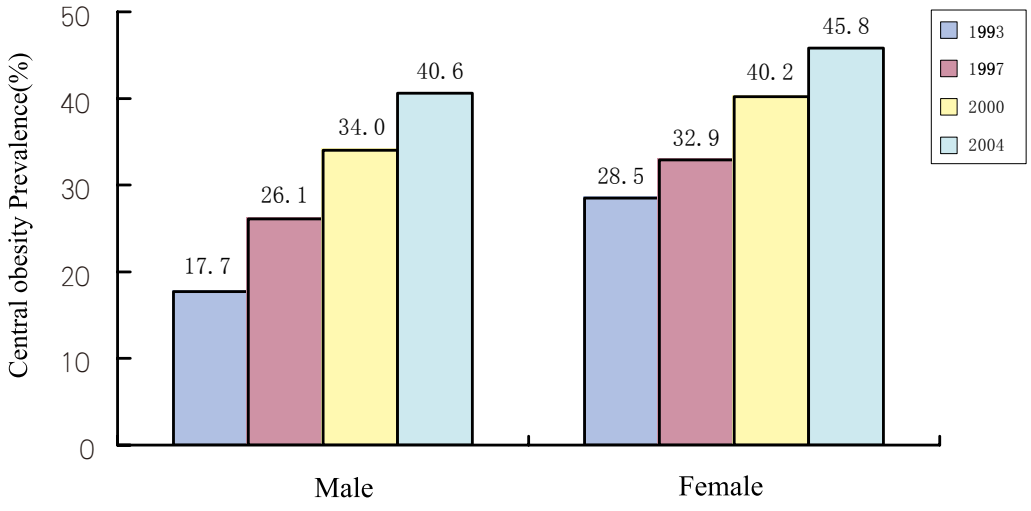

Figure 2-4(1) A Trend in Prevalence of Central-obesity in 9 Provinces of China (1993～2004)

A cross-sectional survey among the senior people aged over 60 [47] showed a 56.3% of prevalence rate of overweight/obesity (BMI≥25kg/m^2) (53.9% for men and 57.9% for women).

The outcomes of the InterASIA prospective study, including about 10 000 participants showed the incidence of hypertension rose significantly following the increase of baseline BMI (Figure 2-4(2))[48]. In a four-year follow up study in 9 provinces of China, analyzed the data of all 4 552 cases involved in the survey of year 2000. The results revealed a positive correlation of incidence between hypertension and either BMI or waist circumference, as well as the hazard of hypertension onset was higher among participants with both general obesity and central obesity (Table 2-4 (1))[49]. The InterASIA study also showed that waist circumference and the ratio of waist circumference to hip circumference, as being two indicators of central obesity, were more closely associated with the onset of diabetes and impaired glucose tolerance (Table 2-4(2))[50].

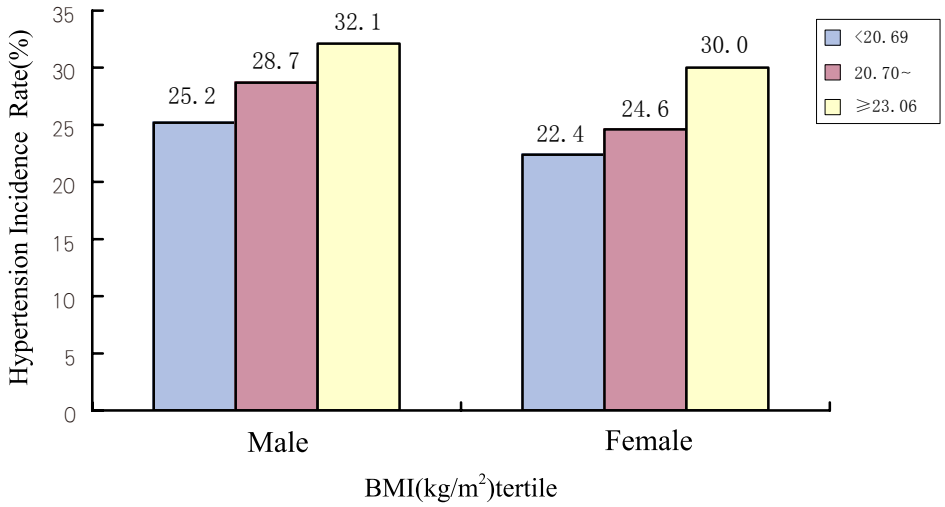

Figure 2-4(2) Relationship Between Baseline BMI(kg/m^2) and 8-Year Cumulative Hyppertension Incidence Rate(Age Adjusted)

Table2-4(1) The Onset Risk of Hypertension among 4-year Follow-up Populations with Different BMI and Waist Circumferences

Group	Male		Female	
	RR	95%CI	RR	95%CI
Normal	1.00	-	1.00	-
General Overweight/Obesity Only	1.74	1.15～2.62	2.05	1.33～3.15
Central Obesity Only	2.00	1.39～2.89	1.60	1.08～2.36
Both General Overweight/Obesity and Central Obesity	2.84	2.14～3.77	2.73	2.05～3.65

Note:Adjusted for age, education, physical activity and alcohol drinking, in logistic regression analysis.

Table 2-4(2) Correlation between the Measuring Index of Obesity and Diabetes (Comparison of Areas Under ROC Curve for Subjects Receiving Test)

	Areas Under ROC Curve	
	Diabetes [Area (95% CI)]	IGT [Area (95% CI)]
WHR	0.666 (0.647～0.685)	0.638 (0.619～0.655)
WC (cm)	0.661 (0.643～0.682)	0.637 (0.615～0.654)
BMI (kg/m2)	0.622 (0.601～0.642)	0.607 (0.589～0.627)

ROC, receiver operating characteristic; IFG, impaired fasting glucose; CI, confidence interval; WHR, waist-to-hip ratio; WC, waist circumference. Comparison among obesity measurements for identifying diabetes: WHR vs. BMI: x^2=21.74, p<0.0001; WC vs. BMI: x^2=47.86, p<0.0001; WHR vs. WC: 2=0.47, p>0.05. Comparison among obesity measurements for identifying IFG: WHR vs. BMI: x^2=11.50, p<0.001; WC vs. BMI: x^2=29.85, p<0.0001; WHR vs. WC: x^2=0.05, p>0.05.

2.5 Deficiency of Physical Activities

Physical activity deficiency is an important risk factor of cardiovascular diseases. In the National Nutrition and Health Survey of Chinese residents in 2002, the data analysis of physical activities for 30 000 professional population aged 18～59 showed that there was a significant difference in proportion of sufficient physical activities between rural areas and urban areas[51], and the occupational physical activities contributed the most part of all physical activities, followed by the household work, and the physical exercise was even less.

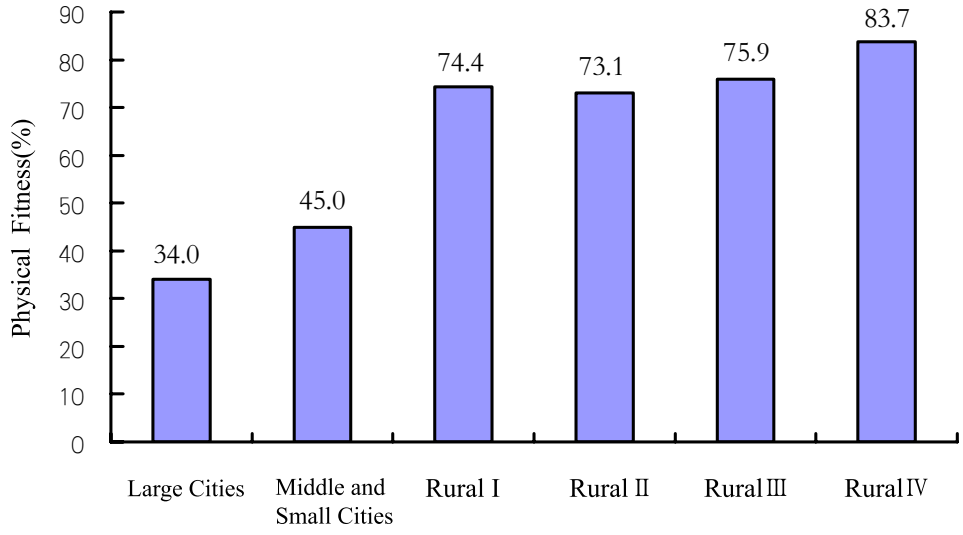

Figure 2-5(1) Physical Fitness of Chinese Residents

The National Nutrition and Health Survey of Chinese residents in 2002 also showed, the physical activities in adults was closely associated with overweight/obesity (BMI≥24) (Figure 2-5(2)[52]), other risk factors of cardiovascular diseases and the metabolic syndrome (Figure 2-5(3)[53]).

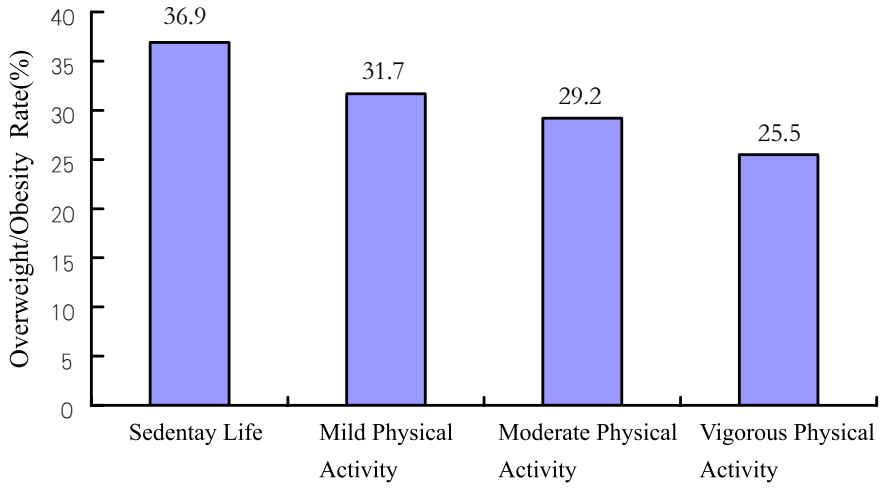

Figure 2-5(2) Relationship between the Intensity Level of Physical Activity and Overweight/Obesity Rate

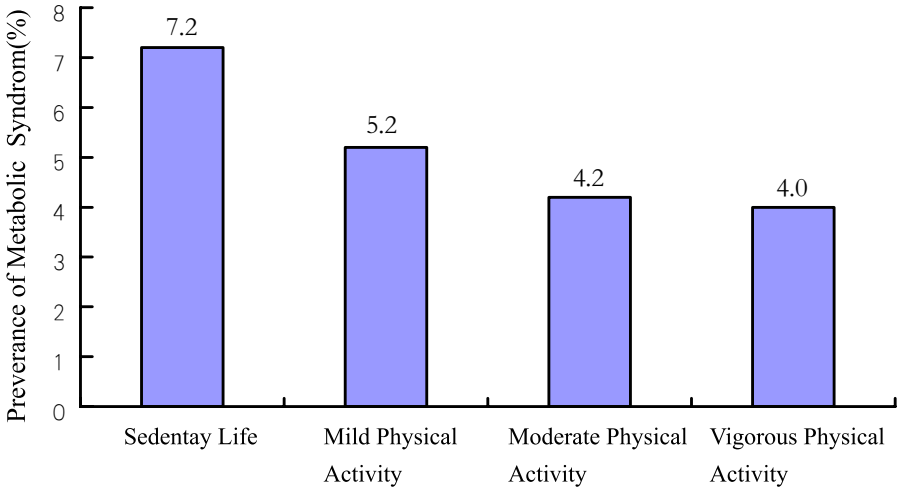

Figure 2-5(3) Relationship between the Intensity Level of Physical Activity and Metabolic Syndrom

A total of 75 000 women aged 47～70 participated in a 5.7-year follow-up study during Shanghai Women's Health Investigation. The results showed that the total amount of baseline physical activities and the amount of physical exercise presented not only a negative relation to the risk of total deaths, but also a close relation to the deaths of cardiovascular diseases (Table 2-5(1))[54].

Table 2-5(1) Relative Risk of the Amount of Baseline Physical Activities (MET-hour/Day), Total Deaths and Deaths of Cardiovascular Diseases

Baseline Physical Activity	Total Deaths		Deaths of Cardiovascular Diseases	
	RR	95%CI	RR	95%CI
Total Amount of Physical Activity				
≤9.9	1.00	-	1.00	-
10.0～13.6	0.81	0.69～0.96	0.94	0.66～1.33
13.7～18.0	0.67	0.57～0.80	0.75	0.52～1.08
≥18.1	0.61	0.51～0.73	0.66	0.46～0.95
P Value of Trend Test	0.000		0.012	
Amount of Physical Exercise				
0	1.00	-	1.00	-
0.1～3.4	0.84	0.69～0.96	0.91	0.70～1.19
3.5～7.0	0.77	0.57～0.80	0.68	0.39～1.18
≥7.1	0.64	0.51～0.73	0.23	0.02～1.64
P Value of Trend Test	0.008		0.038	

Note: (1) MET,Metabolic Equivalent;(2) Adjusted for age, marriage status, education status, family income, smoking, drinking, number of pregnancy, oral contraceptive intake, menopause, other types of physical activity and other chronic disease (including diabetes, hypertension, respiratory disease, chronic hepatitis), in C Cox regression analysis.

An average of 4.6-year follow-up study, also found that both daily physical activities and leisure-time physical activities were negatively associated with the incidence of diabetes type Ⅱ (Table 2-5(2))[55].

Table 2-5(2) Relative Risk of Baseline Physical Activities (MET-hour/Day) and Incidence of Type 2 Diabetes (N=64 130)

	RR	95%CI
Daily Physical Activity		
<7.85	1.00	
7.85～11.26	0.99	0.85～1.15
11.27~15.20	0.92	0.79～1.07
>15.20	0.86	0.73～0.99
P value of Trend Test	0.02	
Leasure Physical Activity		
0	1.00	
<1.4	0.89	0.76～1.03
1.5～3.5	0.99	0.85～1.15
>3.5	0.83	0.70～0.97
P value of trend test	0.05	

Note: (1)MET,Metabolic Equivalent; (2) The included subjects has no prior history of diabetes at study, subjects with prior history of stroke, coronary heart disease and malignant tumor are excluded. (3) Adjusted for baseline age, energy intake, education, income, occupation, smoking, drinking and hypertension, in Cox regression analysis.

2.6 Diet and Nutrition

Since the recent two decades , in general, the nutritional status of Chinese people has greatly improved with a social and economic revolution in China. However, there still remained some unreasonable dietary habits, as well as nutrient intake inefficient or exceeded. Those factors mainly include [56]:

1.Amount of grain food intakes decreased greatly. The grain intake for urban and for rural populations was 366g and 416g per capita in 2002. Compared with the National Nutrition Surveys in 1982 and 1992, the grain intake for urban population decreased by 20% and 10% , and for rural population decreased by 22% and 14%, respectively. In addition, the reduction of grain intake caused a decrease of percent total energy from carbohydrate. Among urban population, the percent total energy from carbohydrate was 51.9%, lower than the baseline of recommended intake of carbohydrate (55%～65%).

2.Amount of fat intake increased considerably. Fat intake was 86g for urban population and 73g for rural population in 2002, of which, over 50% (44g for urban and 41g for rural populations) was from cooking oil. The proportion of fat for energy content increased obviously, in which, the percent total energy from fat for urban population was up to 35%, remarkably higher than the recommended amount of intake by the Dietary Guideline of Chinese population (<30%).

3.Amount of vegetable and fruit intakes are still low, and the status has not improved apparently in the recent two decades. In 2002, the amount of daily vegetable and fruit intakes per capita was about 276g and 45g, respectively.

4.The status of high-salt intake has not been changed. In 2002, although the dietary sodium intake decreased somewhat (with 11.9%) compared to 1992, the daily sodium intake still was as high as 6 268mg/day (that is equal to 15.9g /day of salt).

A total of 10 000 participants of the Qingdao Port Health Study in 2002 showed that the amount of vegetable and fruit intakes was significantly associated with the risk factors of cardiovascular diseases (CVD) (Figure 2-6(1)) [57]. A prospective study in Shanghai, including total about 75 000 female participants (aged 40～70), found that the total deaths and the death risk of CVD decreased significantly among female participants with higher scores in fruit-enriched dietary model had lower risk of all cause mortality and mortality (Table 2-6) [58].

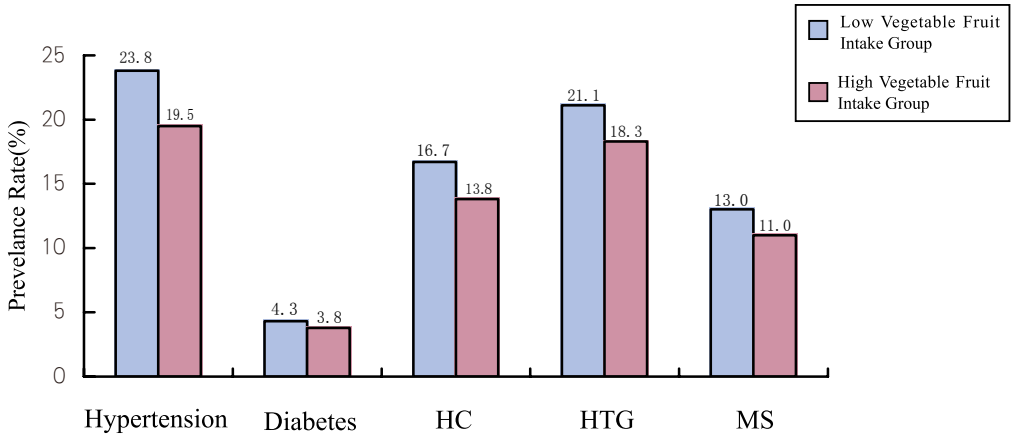

Figure 2-6 (1) Relationship Between Vegetable Fruit Intake and Cardiovascular Risk Factor Level

Table 2-6 Relative Risk of Baseline Fruit Intake Level vs. Total Deaths and Deaths of CVD

Fruit-Rich Dietary Pattern Score	Total Deaths		Deaths of CVD	
	RR	95%CI	RR	95%CI
1st Quartile	1.00	-	1.00	-
2nd Quartile	0.96	0.84～1.09	0.86	0.67～1.11
3rd Quartile	0.91	0.79～1.04	0.79	0.60～1.05
4th Quartile	0.80	0.69～0.94	0.71	0.51～0.98
P value for Trend Test	0.0090		0.0309	

Note: By Cox regression, adjusted for age, BMI, marriage status, income, smoking, alcohol intake, drinking tea, ginseng intake and energy consumption from physical activity.

In the GenSalt study [59]total of 676 subjects with moderate high blood pressure (BP) (high-normal BP or stage 1 hypertension) involved in an intervention study of salt reduction and potassium supplementation. The intervention contained three 7-day stages of low-salt intake (3g/day, 1st stage), high-salt intake (18g/day, 2nd stage), and 18g high-salt intake plus 2.3g potassium supplementation (3rd stage). Compared with baseline BP (Figure 2-6(2)), the levels of BP significantly decreased in low-salt intake stage, and greatly increased in high-salt intake stage, the intervention of high-salt intake plus potassium supplementation also caused a decrease of BP level, but not as low as low-salt intake alone.

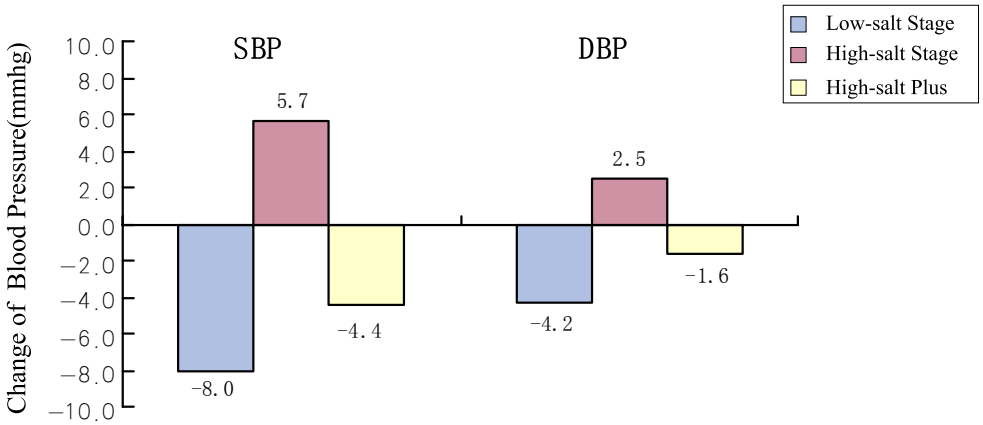

Figure 2-6(2) Change of Blood Pressure in Different Stages

Influence of sodium and potassium on blood pressure was also proved in the China Salt Substitute Study [60]. This was double-blinded, randomized, controlled interventional study. A total of 608 study subjects with the risk factors of CVD were divided into two groups with either normal salt or low-sodium salt for a 12-month period of intervention, there was no limitation of amount of salt intake for both groups during the intervention. For the study subjects in low-sodium group, the systolic blood pressure (SBP) and diastolic blood pressure (DBP) meanly decreased 3.7 mmHg of ($P<0.001$) and 0.7 mmHg respectively, compared with the

control group. However, there was no significant statistic difference between two groups (P=0.2).

In a randomized, double-blinded and multi-center controlled trial of vegetable protein intervention[61], total of 302 participants aged 35～64,with high-normal BP or stage 1 hypertension, were randomly divided into groups of intervention and control. During the 3-month study, a 40g/day of soybean protein supplied continuously for the intervention group , while the control group was given placebo (complex carbohydrate). The study outcomes presented that the increase of soybean protein intake resulted in 4～6mmHg reduction of SBP and a 2-3mmHg decrease of DBP. It was suggested that increased soybean protein intake might play a certain role in prevention and treatment of hypertension(Figure 2-6(3)).

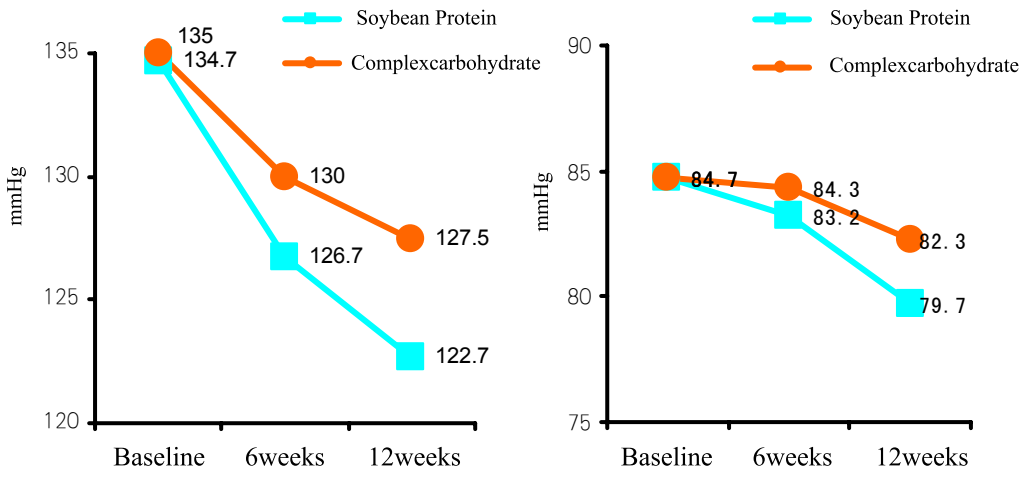

Figure 2-6(3) Randomized Clinical Trial of Soybean Protein for Prevention of Hypertension

2.7 Metabolic Ryndrome

2.7.1 Epidemic Trend of Metabolic Syndrome in China

2.7.1.1 Prevalence Rate of Metabolic Syndrome (MS)

In population aged over 18 National Nutrition and Health Survey, a multi-stage cross-sectional population sampling study[62], for population aged over15 from 31 provinces, autonomous regions and municipalities was carried out in 2002, Total of 48 556 subjects involved in epidemiological analysis of MS. Crude prevalence rate of MS among population aged over 18 was 6.6% according to the diagnostic criteria of MS, based on Chinese Diabetes Association (CDS) 2004, based on the ATPIII criteria of adult hypercholesterolemia of NCEP in USA the crude rate was 13.8%.

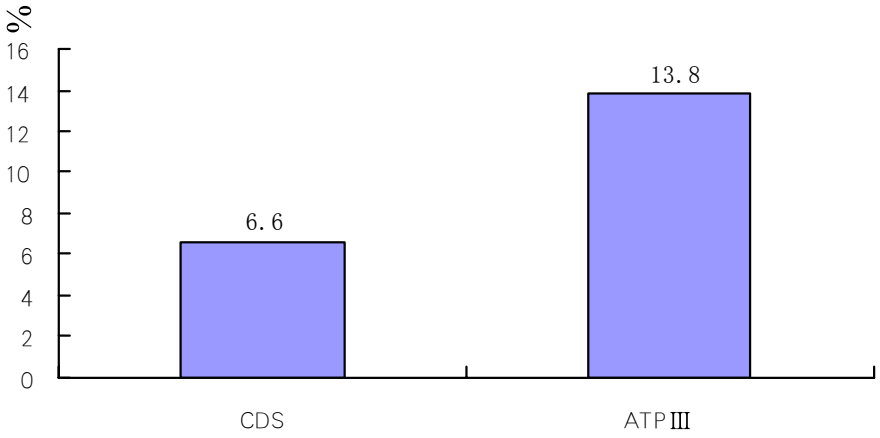

Figure 2-7-1 (1) Prevalence Rate of MS Diagnosed by Different Criteria

2.7.1.2 Prevalence Rate of MS in Different Gender[63]

According to CDS diagnostic criteria of MS, prevalence rate of MS was close in both genders (6.4% in male and 6.8% in female), there was no significant statistic difference. Based on ATPIII diagnostic criteria of MS, it was higher significantly in female than that in male (10.9% in male and 17.1% in female)P<0.001.

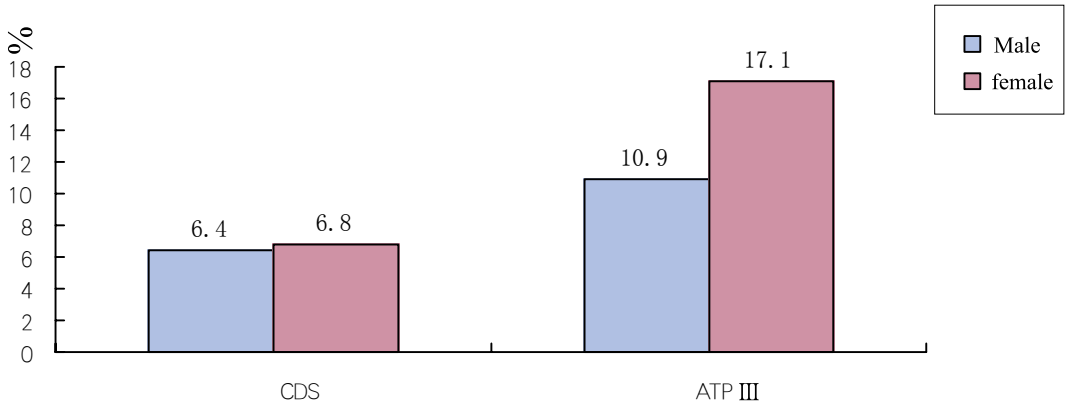

Figure 2-7-1(2) Prevalence of MS in Different Gender

2.7.1.3 Prevalence Rate of MS in Different Age Groups

(1)Prevalence rate of MS in adults with different age:[64]Prevalence of MS increased with the age increasing (CDS criteria) It manifested spiking to maximum in the group of 65 to 70 years old, and than falling. The same trend manifested in male and female. While it was higher in male than that in female less than 50 years old, and lower than that in female over 50 years old.

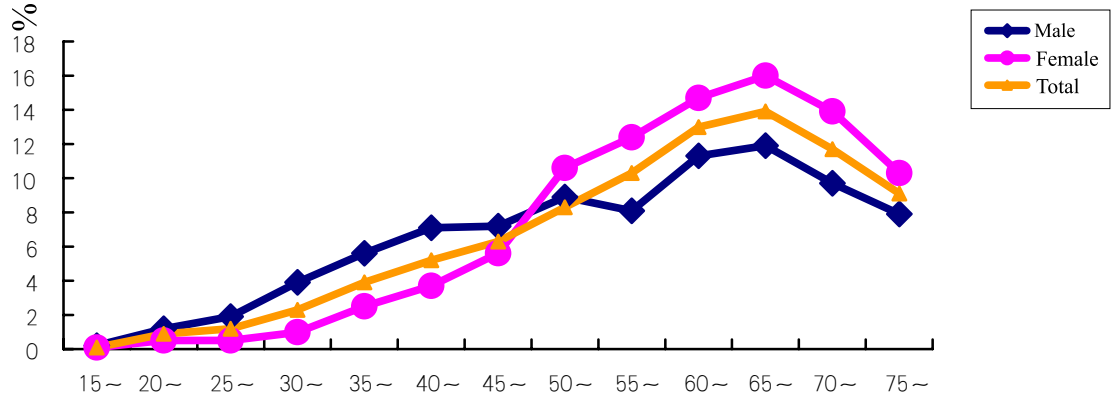

Figure 2-7-1(3) The Prevalence of MS in Different Age Group Over 18 Years Old

(2)The prevalence of MS in child and adolescent:[65] A survey was carried out in 2004, in total of 3 471 aged from 6 to 18 years old children and adolescents from 7 districts in Beijing received the investigation. The prevalence of MS in obese and overweight children was higher than that in normal weight children respectively (IDF criteria and NCEPIII criteria) (P<0.001)

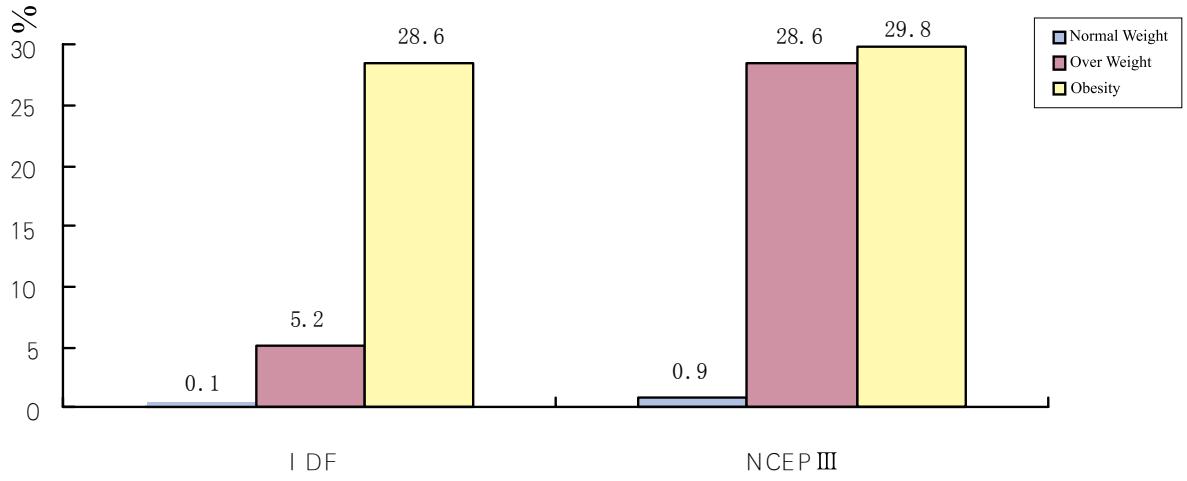

Figure 2-7-1(4) The Prevalence of MS in Child and Adolescent

2.7.1.4 The Prevalence Rate of MS in Different Area [66]

The prevalence rate of MS over 15 years old was 9.7% in urban and 4.6% in rural. It was higher in big city with the rate of 11.4%, and in the third kind of region in rural with the rate of 6.1%.

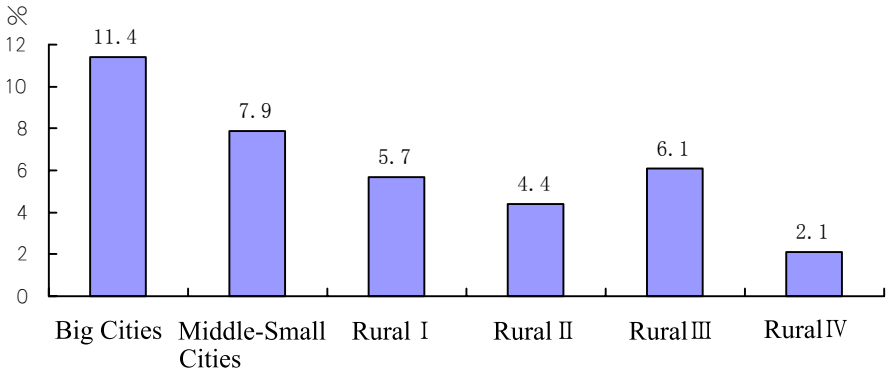

Figure 2-7-1(5) The Prevalence Rate of MS in Different Area

2.7.1.5 Proportion of Different type of MS [67]

It was the most type of MS with components of obesity or overweight plus hypertension plus lipid disorder featured by hyper-triglyceride and hypo HDL-cholesterol in China, the proportion was 53.7% out of the total MS.

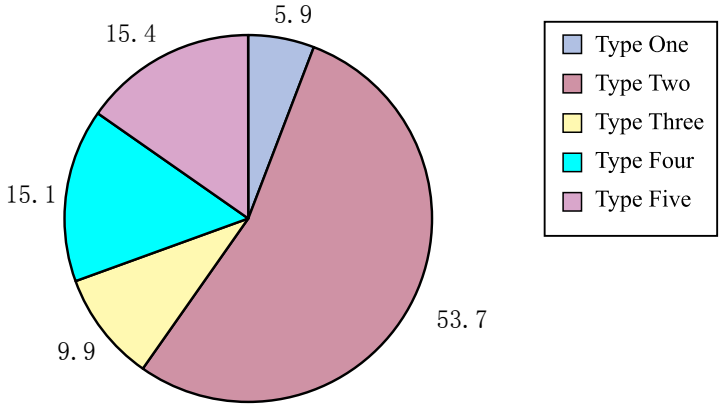

Figure 2-7-1(6) Proportion of Different Type of MS

Note: Type one: diabetes or impaired glucose regulation plus hypertension plus lipid disorder; Type two:obesity or overweight plus hypertension plus lipid disorder;Type three:obesity or overweight plus diabetes or impaired glucose regulation plus lipid disorder; Type four;obesity or overweight plus diabetes or impaired glucose regulation plus hypertension; Type five:obesity or overweight plus diabetes or impaired glucose regulation plus hypertension plus lipid disorder

2.7.1.6 The Trend of the MS Prevalence Change (in Qingdao Port Health Study)[68]

Surveys was carried out in individuals aged from 18 to 54 years old in Qingdao city in 2000 and 2004 respectively. The prevalence rate of MS (ATPIII criteria) was 10.0% in 2000 (N=11 364) and 12.5% in 2004 (N=10 834) The prevalence rate of MS was range from 6.0% to 8.9% in female, and the rate increased by 48.3%. The prevalence rate of MS was range from 13.9% to16.1% in female, and the rate increased by15.8%.

2.7.2 Relationship of MS and Cardiovascular Disease[69]

A total of 30 378 subjects aged from 35 to 64 years old were recruited from 11 provinces in the CMCS in 1992 and followed-up for new CHD and stroke event for 10 years. The incidence rate of CHD was207.9/100 000 and 101.1/100 000 respectively in population with MS (N=5 534) and without MS(N=24 844)in baseline and the incidence rate of ischemic stroke was 450.5/100 000 and 159.7/100 000 respectively. And the incidence rate of hemorrhagic stroke was 130.6/100 000 and 67.2/100 000 respectively.

Table 2-7-2 Incidence Rates (1/100000 Person Years) and Hazard Ratios of CVD

CVD	Non-MetS	MetS
CHD		
Incidence	101.1	207.9
HR(95%CI)	1	1.80 (1.36～2.37)
Ischemic stroke		
Incidence	159.7	450.5
HR(95%CI)	1	2.41 (1.98～2.37)
Hemorrhagic		
Incidence	67.2	130.6
HR(95%CI)	1	1.63 (1.16～2.30)

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Chapter 3
Cardiovascular Diseases

3.1 Coronary Heart Diseases, Acute Coronary Artery Syndrome and Angina Pectoris

3.1.1 Epidemiological Studies of Coronary Heart Disease

3.1.1.1 Mortality and Epidemic Trend of Coronary Heart Disease (CHD) in Chinese Population [1]

Crude Death Rate of CHD in 2006

According to the data from *Health Statistic Yearbook of Ministry of Health of China in 2007,* the crude death rate of CHD was 57.1/10^6 among urban residents in 2006, it accounted for 60.9% of all cardiac deaths. In rural residents, the crude death rate was 33.74/10^6, accounting for 47% of the all. Generally, the crude death rate of CHD was higher in urban areas than in rural areas, and higher for men than for women (Figure 3-1-1(1) & Table 3-1-1(1)).

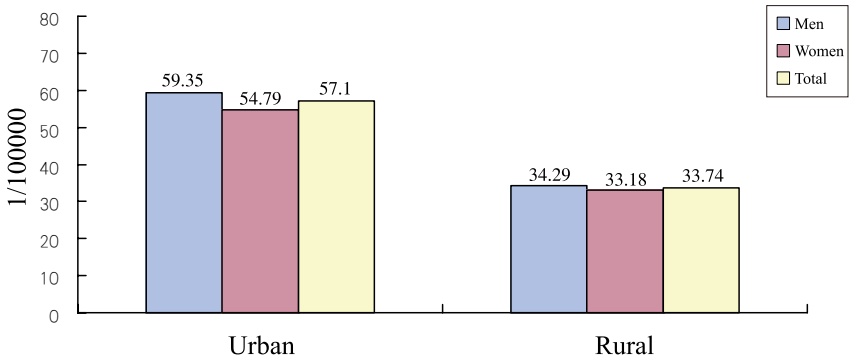

Figure 3-1-1(1) Comparison of CHD Crude Death Rate Between Different Genders in Chinese Urban and Rural Areas in 2006

Table 3-1-1(1) Crude rate of CHD in 2006 (1/100 000)

	Total of Urban Area			Large City		
	Total	Men	Women	Total	Men	Women
AMI	25.53	28.47	22.51	30.96	34.56	27.31
Other CHD	31.57	30.88	32.28	43.16	41.87	44.46
CHD Total	57.1	59.35	54.79	74.12	76.43	71.77
Cardiac Disease Total	93.69	95.95	91.36	107.87	110.24	105.46
Percentage of CHD Deaths	60.9%	61.9%	60.0%	68.7%	69.3%	68.1%

Continue

	Middle- or Small-city			Rural Area		
	Total	Men	Women	Total	Men	Women
AMI	18.61	20.82	16.3	18.4	20.24	16.49
Other CHD	16.81	17.07	16.53	15.34	14.05	16.69
CHD Total	35.42	37.89	32.83	33.74	34.29	33.18
Cardiac Disease Total	75.61	77.99	73.13	71.84	71.79	71.9
Percentage of CHD Deaths	46.8%	48.6%	44.9%	47.0%	47.8%	46.1%

(1) Age-Specific Death Rates of CHD in Urban Population of China in 2006 (1/100 000)

The mortality of CHD in urban areas rose with the increase of age, and it was higher for men than for women in different age groups. A similar indexation of the mortality to age was presented in the trend of increase (Figure 3-1-1(2), Table 3-1-1(2)).

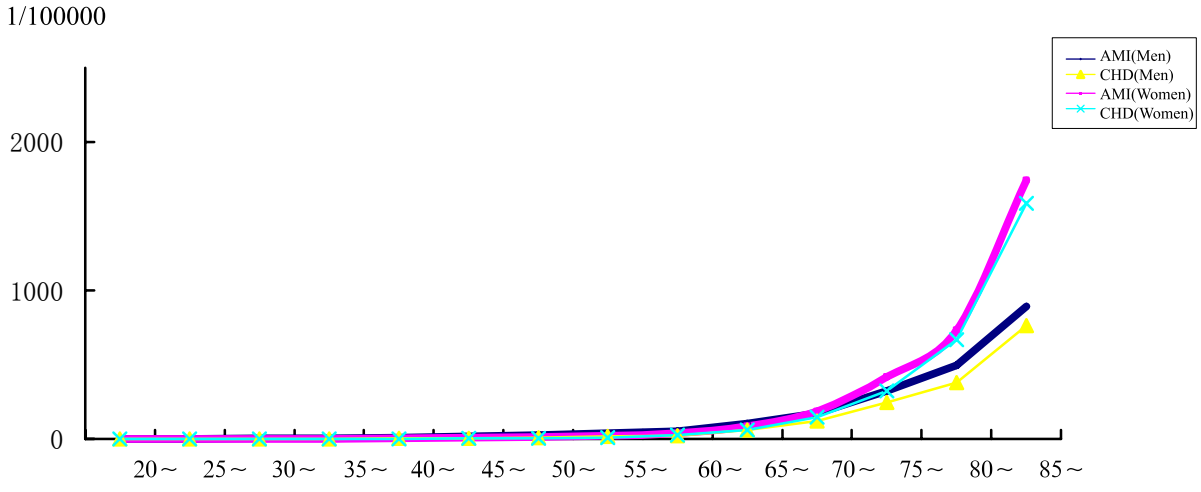

Figure 3-1-1(2) Comparison of Age-specific Death Rates of CHD among Groups with Different Gender and Age in Urban Areas

Table 3-1-1(2) Age-specific Death Rates of CHD in Rural Population of China in 2006 (1/100 000)

		20~	25~	30~	35~	40~	45~	50~
Men	AMI Other CHD	0.66	0.90	2.60	3.99	9.79	15.60	25.73
	AMI Other CHD	0.27	0.28	0.61	1.31	4.02	6.63	14.19
Women	AMI Other CHD	0.42	0.24	0.63	1.95	2.91	3.97	9.31
	AMI Other CHD	0.06	0.12	0.29	0.41	1.39	2.22	4.81
Total	AMI Other CHD	0.54	0.58	1.64	2.99	6.44	9.88	17.57
	AMI Other CHD	0.17	0.20	0.45	0.87	2.74	4.46	9.52

Continue

		55~	60~	65~	70~	75~	80~	85~
Men	AMI Other CHD	38.99	49.60	102.19	173.16	325.43	496.76	894.12
	AMI Other CHD	20.55	39.63	85.76	183.51	418.99	734.85	1743.46
Women	AMI Other CHD	15.84	23.24	60.65	119.78	244.07	379.28	764.97
	AMI Other CHD	10.66	24.55	62.47	146.79	321.28	666.96	1585.22
Total	AMI Other CHD	27.49	36.30	81.05	145.48	281.91	429.30	811.99
	AMI Other CHD	15.64	32.02	73.91	164.47	366.73	695.86	1642.83

(2) Age-Specific Death Rates of CHD in Rural Population of China in 2006 (1/100 000)

In rural areas, increase of age-specific death rates presented a similar index relation to age, but generally remained a lower level compared with that in urban areas (Figure 3-1-1(3)), Table3-1-1(3)).

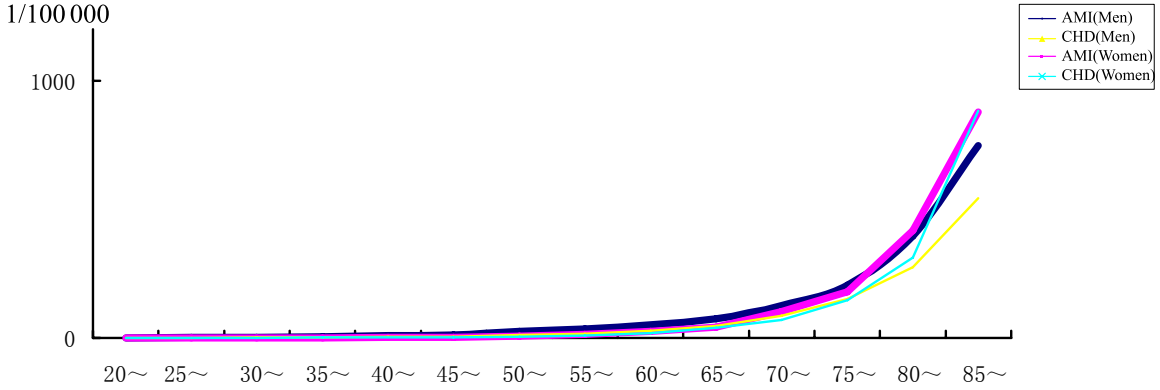

Figure 3-1-1(3) Comparison of Age- specific Death rates of CHD among Groups with Different Gender and Age in Rural Areas

Table 3-1-1(3) Age-specific Death Rates of CHD in Rural Population of China in 2006 (1/100 000)

Sex	The Type of CHD	20~	25~	30~	35~	40~	45~	50~
Men	AMI	0.75	1.20	2.33	5.63	10.36	11.08	25.15
	Other CHD	0.08	0.13	0.49	0.87	2.17	2.92	7.57
Women	AMI	0.25	0.41	1.31	2.27	5.23	5.06	11.63
	Other CHD	0.17	0.20	0.37	1.17	1.40	3.10	5.02
Total	AMI	0.50	0.81	1.82	3.97	7.85	8.12	18.58
	Other CHD	0.13	0.17	0.43	1.02	1.79	3.01	6.33

Continue

Sex	The Type of CHD	55~	60~	65~	70~	75~	80~	85~
Men	AMI	34.38	50.83	74.08	126.28	204.20	396.40	749.12
	Other CHD	12.96	26.12	41.77	102.62	179.14	416.62	877.37
Women	AMI	17.46	27.86	46.02	86.80	152.35	274.95	542.55
	Other CHD	10.31	19.60	39.36	69.06	147.39	311.23	883.91
Total	AMI	26.22	39.89	60.30	105.85	175.29	322.57	608.45
	Other CHD	11.68	23.02	40.58	85.25	161.43	352.55	881.82

3.1.1.2 Risk Factors of CHD

Hypertension

A multi-province cohort study was carried out, which included the analyses of correlation between baseline BP levels among total 30 378 subjects aged 35～64 in 11 Chinese provinces in 1992, and CVD events (CHD and stroke) from 1992 to 2003. The results show that: (1) the prevalence rate of high-normal BP (SBP 130～139 mm Hg, and/ or DBP 85～89 mm Hg) was 32.1 % among the Chinese population aged 35～64, the ratio of high-normal BP to hypertension was 1.2:1. (2) Multivariate regression analysis revealed that high-normal BP increased a 44% of CHD risk [RR = 1.441, 95 % CI(0.996, 2.086)] and a 52 % of the total risk of CVD onset [RR = 1.522; 95 % CI(1.206, 1.919)], compared with the normal BP. (3) 14.4 % of total CVD events was attributed to high-normal BP, in which, high-normal BP contributed a 12.4 % of CHD [2].

Another cohort study started in 1993 with subjects above 60 years old focused on correlation between the levels of BP in the elderly and coronary heart disease . A total of 3 440 elderly people aged 60 and over in sampling survey of 1993 enrolled in an 11-year follow-up study. The results show that (1) the incidence of recent CHD and stroke was 16.9% and 15.4%, in the population with baseline hypertension, it was significantly higher compared with that in normal BP group (13.2% vs. 10.1%); (2) the incidence of CHD increased along with the rising of baseline SBP or DBP level; (3) CHD incidence in the female elderly with the same level of BP was higher than that in the male elderly; (4) the incidence of cardio- and cerebro-vascular diseases was higher in the younger elderly, compared with that in the older elderly[3].

Coexistence of Multiple Risk Factors

A clinical survey on clinical diagnosis for total of 2 993 patients with CHD was conducted by using selective coronary angiography as a golden standard. The results of survey showed that the positive rate of coronary angiography rose with the increase of coexisting risk factors (such as aging, male, diabetes, hyperlipemia, hypertension and smoking). The percentage of coronary multi-vessel lesions increased significantly, as well as the percentage of severe and occlusive lesions presented an upward trend [4].

A cross-sectional survey of China Heart Survey (CHS) showed that (1) the prevalence of chronic kidney disease (CKD) was 24.8% among total 3 513 diagnosed inpatients with CHD. Compared with CHD patients without CKD, CHD patients with CKD were more likely to suffer hypertension (49.5% vs. 42.8%; P = 0.001), diabetes (43.1% vs. 29.5; P < 0.001); and the level of high-density lipoprotein was relatively lower. It was suggested that the more active measures of risk factor control should be taken for those patients [5].

3.1.2 Study of Percutaneous Coronary Intervention (PCI) Registry

3.1.2.1 Number of PCI from 2002 to 2006 in Mainland China

3.1.2.2 Study of Multi-link Vision and Multi MiniVision Stent Registry in Asian Patients with Coronary Artery Disease: A Prospective, Multi-center Study

An observational, prospective, multi-center, non-randomized post-marketing registry study was conducted in 14 clinical centers of Asia to demonstrate the efficacy of the (BMS) ML Vision / ML MiniVision stents. A total of 429 Asian people with coronary artery disease (CAD) mean age of (61.7±7.4) years, and 77.2% of men, with 449 lesions, (3.0±0.5) mm of the average reference vessel diameter of target lesions , and (15.7±5.0)

mm of mean length were enrolled in and implanted bare metal stents (BMS)-ML Vision/ML MiniVision stents. The clinical outcomes of participants were observed during hospitalization and 6-month follow-ups. Results show in Table 3-1-2.

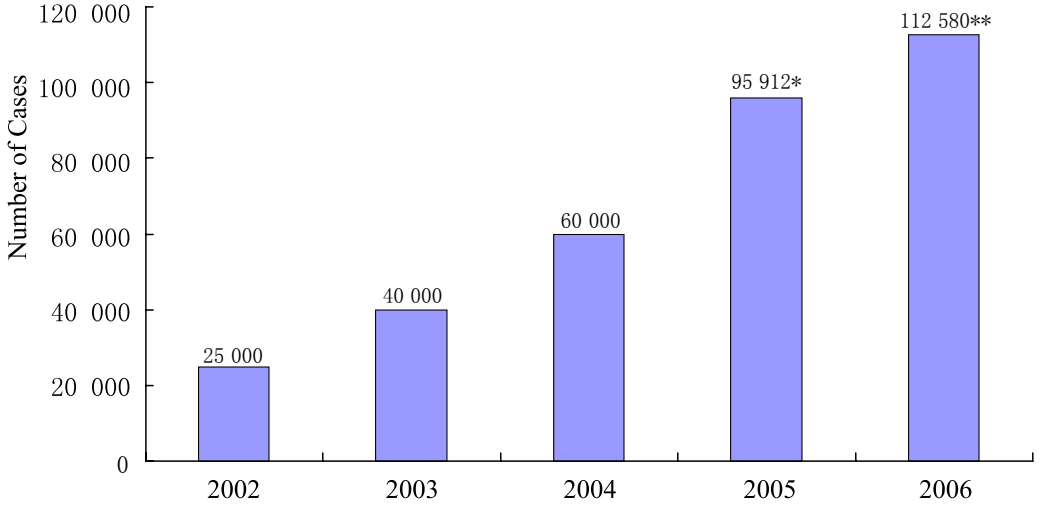

Figure 3-1-2-1(1) Number of PCI from 2002 to 2006 in China

Sources:*LV Shu-Zheng, Song Xian-Tao, Chen Yun-Dai, et al. *Chin Med J 2006;34(11):966～970.*
Sources:**LV Shu-Zheng, Chen Yun-Dai, Song Xian-Tao. *Chin Med J 2007;35(9):871～872.*

Table 3-1-2 Outcomes during Hospitalization and Follow-up (n=429)

Events	Number of Patients	Percent (%)
Primary Procedural Success	426	99.3
In-hospital MACE	2	0.5
Out-of-Hospital to 6-month MACE	27	6.3
Total 6-month MACE	29	6.8
Death	2	0.5
Q-MI	0	0
Non-Q MI	1	0.2
Recurrent Angina	20	4.7
TLR	6	

Sources: Xu Ya-wei, Wei Yi-dong, Tang Kai, et al. *Chin Med J 2007;120(12):1093～1096*

Mace: Major adverse cardiac events; MI: Myocardial infarction; TLR: Target lesion revascularization; TVR: Target vessel revascularization.

The current registry showed the excellent 6-month clinical outcomes of ML Vision/ML minivision stents in Asian patients with CAD.

3.1.3 Thrombolytic Therapy of Acute Myocardial Infarction

A comparison of acute myocardial infarction thrombolytic therapy between recombinant staphylokinase and recombinant tissue-Type plasminogen activator, a randomized multi-center clinical trial.

A multi-center, randomized paralle1 and controlled clinical trial was conducted in 12 hospitals across China from January 2002 to October 2003 to compare the safety and clinical efficacy of recombinant staphylokinase (r-Sak) with recombinant tissue-type plasminogen activator(rt-PA)in patients with acute myocardial infarction(AMI) Two hundred and ten patients (age70 years)with ST segment elevated AMI within 12 hours of onset were enrolled in and randomly divided into r-Sak group(3mg of total 15mg r-Sak for intravenous injection, another 12mg for intravenous infusion within 30 minutes n=104) and rt-PA group(8mg of total 50mg rt-PA for intravenous injection and 42 mg rt-PA for intravenous infusion within 90 minutes n=106) All patients received aspirin and intravenous heparin, and underwent angiography to determine infarct related artery(IRA) patency in 90 minutes after the drug therapy Rescue percutaneous coronary intervention(PCI)was performed for patients with TIMI grade 0～2. The effect of AMI therapy with r-Sak was observed for coronary artery revascularization, clinical function and safety, the results showed in Table3-1-3. There was no other drug-related severe adverse events and allergy reaction in the observation.

Table 3-1-3 Primary Endpoints and Secondary Endpoints

The Final Points	r-Sak Group (N=104)(%)	rt-PA Group (N=106)(%)	P-value
Primary Endpoints			
IRA Patency			
TIMI Grade 2 or 3	77.8	63.6	0.0277
TIMI Grade 3	57.6	48.5	0.1929
Death Within one Month of Post-therapy	8.7	5.7	0.3997
Non-fatal Re-MI	2.9	3.8	1.0000
Recurrent Myocardial Ischemia	8.7	16.0	0.1043
Complex Clinical End-points	18.3	21.7	0.5345
Secondary Endpoints			
Hemorrhage	28.8	27.4	0.8105
Severe or Life-threatening Hemorrhage	1.9	3.8	
Hemorhagic Stroke	0.96	3.85	

Sources: A grant-maintained project from the National Tenth Five-Year Key Projects. The number of project:2001BA703B10. Chin J Cardiol,2007; 35(8): 691～696.

This study demonstrates that the r-Sak is a safe and effective thrombolytic agent, its therapeutic effect for AMI is at lest similar to therapy with 50mg of rt-PA.

3.1.4 Coronary Secondary Prevention Study

3.1.4.1 Effect of Xuezhikang on Cardiovascular Events and Mortality in Elderly Patients with History of Myocardial Infarction: a Subgroup Analysis of China Coronary Secondary Prevention Study (CCSPS) for Elderly Patients

Between November 1, 1996 and December 31, 2000, a multi-center, randomized, double blind, placebo-controlled clinical trial [the China Coronary Secondary Prevention Study (CCSPS)] was conducted among 66 hospitals nationwide. Total of 4 780 patients with MI history were enrolled in CCSPS. This subgroup analysis was only for 1 445 select elderly patients aged 65 to 75. Those participants were randomly divided into Xuezhikang group (0.6g of Xuezhikang, bid, n=735) and placebo controlled group (n=710). There were well-matched baseline characteristics, an average 4-year follow-up and observations for coronary artery events, all-cause death rate and other clinical events in both groups. The results of subgroup analysis showed in Table3-1-4(1).

Table 3-1-4(1) Clinical Events

Clinical Events	Xuezhikang Group (n=735) n (%)	Placebo Group (n=710) n (%)	Intergroup Difference	P-value
Total CHD Events	69(9.4)	106(14.9)	-36.9	0.001
Non-fatal AMI	18(2.4)	35(4.9)	-51.0	0.01
Fatal AMI	13(1.38)	11(1.55)	12.3	0.74
Sudden Death	24(3.3)	31(4.4)	-25.0	0.27
Other CHD Death	14(1.9)	29(4.1)	-53.6	0.02
Total CHD Death	51(6.9)	71(10.0)	-31.0	0.04
Total Death	68(9.2)	96(13.5)	-31.9	0.01
Total Stroke	24(3.3)	42(5.9)	-44.1	0.04
Stroke Survival	17(2.3)	39(5.5)	-58.2	0.006
Stroke Death	7(0.9)	3(0.4)	125.0	0.22
PCI/CABG	14(1.9)	26(3.7)	-48.6	0.07
Cancer	13(1.8)	26(3.7)	-51.4	0.03
Cancer Survival	7(0.9)	9(1.2)	-25.0	0.57
Cancer Death	6(0.8)	17(2.4)	-66.7	0.02

Sources: Ye Ping, Lu Zong-Liang, Du Bao-min, et al. *J Am Geriatr Soc 55:1015～1022, 2007.*

This study demonstrates that treatment with Xuezhikang capsules is safe and effective for the secondary prevention of the Chinese elderly people with CHD.

3.1.4.2 Xuezhikang (an Extract of Cholestin) Reduces Incidence of Cardiovascular Events among Patients Co-existing Type 2 Diabetes and CHD: a Subgroup Analysis of China Coronary Secondary Prevention Study (CCSPS) for Patients with Type 2 Diabetes

Between November 1996 and December 2000, a randomized, double-blind, placebo-controlled clinical trial [China Coronary Secondary Prevention Study (CCSPS)] was conducted in 66 hospitals in 19 provinces & cities across China, and total of 4870 patients with MI history were enrolled in the clinical study. In the subgroup analysis of CCSPS, 591 patients with type2 diabetes were selected from 4 870 registry cases and divided into groups of xuezhikang (0.6g of Xuezhikang, bid, n = 306) and placebo control (n = 285). There were well-matched baseline characteristics, an average 4-year follow-up and observations for coronary artery events, all-cause death rate and other clinical events in both groups. The results of subgroup analysis showed in Table3-1-4(2).

Table3-1-4(2) Clinical Events

Clinical Events	Xuezhikang Group (n = 306) n (%)	Placebo Group (n = 285) n (%)	Intergroup Difference	P-value
Non-fatal AMI	7(2.3)	18(6.3)	−63.8	0.015
Fatal AMI	4(1.3)	9(3.2)	−58.5	0.125
Sudden Death	11(3.6)	14(4.9)	−26.9	0.426
Other CHD Death	6(1.9)	12(4.2)	−53.4	0.112
Total CHD Death	21(6.9)	35(12.3)	−44.1	0.025
Total CHD Events	28(9.2)	53(18.6)	−50.8	0.001
Stroke Survival	11(3.6)	13(4.6)	−21.3	0.625
Stroke Death	3(0.9)	6(2.1)	−53.6	0.273
Total Stroke	14(4.6)	19(6.7)	−31.3	0.335
PCI/CABG	14(4.6)	12(4.2)	8.8	0.836
Total Death	27(8.8)	45(15.8)	−44.1	0.009

Sources: Zhao Shui-ping, Lu Zong-liang, Du Bao-min, et al. *J Cardiovasc Pharmacol 2007;49:81～84.*

This investigation demonstrates that the therapy with xuezhikang can effectively reduce cardiovascular events of patients coexisting diabetic and CHD, as well as it is safe and reliable.

3.2 Stroke

3.2.1 Epidemic Trend of Stroke

Effect of Population-based Intervention on Incidence of Stroke in Three Cities of China [6]

In 1991, two well-matched communities, about 50 000 people for each, were selected as intervention group or control group in the urban areas of Beijing, Shanghai and Changsha. Between 1991 and 2000, regular health education and health promotion activities were carried out in the intervention group, but no special action was taken in the control group. Through 10-year intervention, the onset risks of all-cause stroke, ischemic stroke and hemorrhagic stroke in intervention group decreased by 11.4%, 13.2% and 7.2% respectively, compared with control group (Table 3-2-1).

Table 3-2-1 Average Annual Change Rate (%) of Initial Stroke (All-cause, Ischemic or Hemorrhagic Stroke) in Intervention Group Versus the Control Group in 3 Cities of China, 1991～2000

Communities	All-cause Stroke Trends	Ischemic Stroke Trends	Hemorrhagic Stroke Trends
Beijing			
Intervention	–6.1	–3.6	- 9.1
Control	–0.8	4.0	- 11.7
Shanghai			
Intervention	- 5.6	- 0.6	- 9.0

Continue

Communities	All-cause Stroke Trends	Ischemic Stroke Trends	Hemorrhagic Stroke Trends
Control	0.2	7.7	- 4.5
Changsha			
Intervention	- 11.1	- 11.1	- 10.1
Control	- 6.5	- 4.6	- 7.7
3 Cities (Total)			
Intervention	- 7.9	- 5.1	- 9.6
Control	- 2.9	2.2	- 8.0

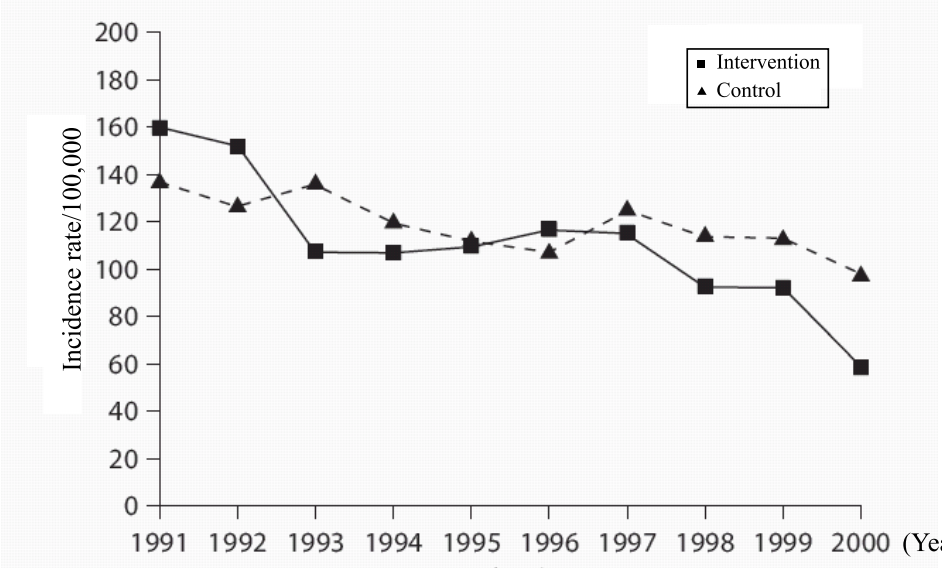

Figure 3-2-1 Age-adjusted Incidence of Initial Stroke in Total Study Group.

Difference of Mortality and Its Trends in Stroke Between Urban and Rural Populations in China from 1987 to 2001 [7]

The age-adjusted mortality of stroke was higher in urban population than in rural population until the end of 1990s. The ratio of urban areas to rural areas was 1:16 for men and 1:21 for women in 1987, and in 2001, the ratio dropped to 0.77 and 0.79,respectively, i due to a remarkable decrease in stroke mortality in urban areas (-2.0% for men and -2.5% for women annually), while, there was a less reduction of the mortality in rural women (0.7%) over the period. The decrease mainly occurred in the elderly. For population aged 35 to 54, the mortality increased in all areas and gender groups except for urban women.

RecurrenceRate of Ischemic Stroke in Chinese Patients [8]

First-year recurrence rate was 11.2% in the registered patients. Hypertension, atrial fibrillation (AF) and smoking were associated with increased risk of recurrence. Hypertension and AF control halved the recurrent risk. The hazard ratio of recurrence reduced from 1.71 to 1.39 for more than 1-year cessation of smoking. There was no significant change of recurrent risk in diabetics with well-controlled blood-sugar level. The recurrence rate of ischemic stroke was higher in Chinese patients compared with the reported data in western population.

3.2.2 Risk Factors of Stroke

Family History

A study, regarding correlation between parents with history of hypertension and their offsprings incidence of cardiovascular disease in Chinese population [9], showed that the risk of cardiovascular diseases onset was higher for individuals whose either parent had hypertension history, especially for people with hypertension history of both parents. A total of 15 131 individuals were enrolled and followed up for 10.8 years. There were 82 CHD events and 370 stroke events in the study .

Table 3-2-2(1) Incidence of Cardiovascular Events in the Cohort(1/10 000 Person Year)

	Hypertension History of Parents	Cardiovascular Events					
		Population Aged ⩽50		Population Aged≥50		All Populations	
		Case	Incidence	Case	Incidence	Case	Incidence
Male	Without History of Hypertension	61	17.7	124	61.0	181	33.5
	With Hypertension History of Either Parent	34	25.4	33	64.9	67	36.3
	With Hypertension History of Both Parents	10	45.1#	10	121.1*	20	65.8#
Female	Without History of Hypertension	28	6.7	87	37.2	115	17.7
	With Hypertension History of Either Parent	24	17.2#	28	48.7	52	26.4*
	With Hypertension History of Both Parents	7	30.3#	6	52.9	13	37.8#

Compared with those without parental history of hypertension, *P<0.05; #P<0.01.

Abnormal Blood Lipids

A study revealed that TC/HDL-C ratio was an independent predictor for the incidence of ischemic stroke in Chinese middle-age population, and its effectiveness of prediction might be better than TC or LDL-C value alone. The prospective cohort study was conducted based on the PRC-USA Collaborative Study on Cardiovascular and Cardiopulmonary Epidemiology. A total of 10 121 subjects(4 921 men and 5 200 women), aged 35～59, with complete study data, and without history of MI and stroke were selected from 4 cohort populations (including workers and peasants in Beijing and Guangzhou cities). The average period of follow-up was 15.9 years [10]. During the follow-up , 277 cases of ischemic stroke and 125 of hemorrhagic stroke were diagnosed. The age-adjusted incidence of ischemic stroke, which was calculated in the ratio of TC/HDL-C < 3.0,

3.0~, 3.5~, 4.0~, and 4.5 respectively, rose with the increase of the ratio, especially in the group with4.0~ and 4.5 of TC /HDL-C ratio(1/100 000-year). Cox regression analyses indicated that adjusted for the variables of age, gender, region, diastolic blood pressure, blood glucose, cigarette smoking and alcohol intake, the relative risk of ischemic stroke incidence was significantly higher in groups with 4.0 and 4.5 of TC/HDL-C ratio, as compared to the control group (TC/HDL-C < 3.0) Table 3-2-2(2). TC/HDL-C ratio, TC and LDL-C were independent predictors for ischemic stroke, and the relative risk of ischemic stroke was linearly related to the Quintile of TC/HDL-C ratio, but no significant correlation was observed between the Quintile of TC/HDL-C ratio and hemorrhagic stroke.

Table 3-2-2(2) Correlation Between Serum TC/HDL-C Ratio and Age-adjusted Incidence and its Relative Risk of Ischemic and Hemorrhagic Stroke

TC/HDL-C Ratio	Ischemic Stroke					Hemorrhagic Stroke				
	Case of Onset	Person Year	Incidence (1/100 000)	RR*	*P* Value	Case of Onset	Person Year	Incidence (1/100 000)	RR*	*P* Value
<3.0	78	55 117.6	144.1	1.0		45	55 373.8	89.4	1.0	
3.0~	57	34 702.6	169.4	1.33	0.123	26	34 929.0	75.5	0.96	0.865
3.5~	43	25 885.2	166.7	1.37	0.117	24	26 45.2	91.7	1.21	0.472
4.0~	39	15 740.3	226.9	1.59	0.024	18	15 869.8	110.2	1.34	0.322
≥4.5	60	20 251.8	282.2	1.87	0.001	12	20 509.1	57.2	0.65	0.205

* Control of variables includes age, gender, region, diastolic blood pressure, blood glucose, cigarette smoking and alcohol intake.

Features of Stroke in Chinese Diabetics [11]

The characteristics of demographic, risk factors, stroke subtypes and its outcomes were compared among total of 2 532 initial-stroke in-patients with and without diabetes . As compared to the patients without diabetes, the incidence risk of ischaemic stroke in diabetics (471 cases, accounting for 18.6%) was significantly higher (92.1% versus 71.3%), especially for the patients with lacuna infarction (41.2% vs. 35.2%) , while, less cerebral haemorrhage occurred in diabetics (4.2% vs. 18.1%). In-hospital mortality of ischaemic stroke was similar in both groups (18.2% in diabetics and 16.9% in non-diabetics). The factors of prediction for in-hospital diabetes mortality included consciousness disturbance, congestive heart failure and atrial fibrillation. In conclusion, there was a difference of stroke between diabetics and non-diabetic patients: a less incidence of cerebral hemorrhage and a higher incidence of lacuna infarct syndrome occurred in diabetics, but in-hospital mortality from ischaemic stroke was not increased. The definite clinical factors of stroke onset markedly

influenced on in-hospital mortality and may help physicians provide a more accurate prognosis.

Table 3-2-2(3) Pathological Types of Stroke in Diabetic and Non-diabetic Patients

Stroke Subtypes	Diabetic (N = 471)	Non-diabetic (N = 2061)	P-value
Cerebral Haemorrhage	4.2%	18.1%	0.000
Subarachnoid Haemorrhage	0.2%	1.6%	0.018
Unclassifiable	3.5%	9.0%	0.000
Cerebral Infarction (Ischaemic Stroke)	92.1%	71.3%	0.000
Ischaemic Stroke Subtypes	(n=434)	(n=1470)	
Total Anterior Circulation Infarct	23.3%	25.3%	NS
Partial Anterior Circulation Infarct	25.4%	30.2%	0.050
Posterior Circulation Infarct	10.1%	9.2%	NS
Lacunar Infarct	41.2%	35.2%	0.026

3.2.3 Primary and Secondary Prevention of Stroke

Hypertension Control

Long-term treatment of hypertension is an important measure for secondary prevention of stroke. It may reduce the risk of stroke recurrence . The results of study, regarding the influence of long-term hypertension control on stroke recurrence in patients with cerebrovascular diseases were reported in 2007[12]. A total of 1 399 patients with cerebrovascular diseases were randomly divided into a group of ACEI plus indapamide (702 cases) or a group of well-matched placebo control (697 cases). A 4-year double-blind treatment and a 2-year open-label treatment were taken in the study. Allsubjects were followed up for 6 years. As compared with the control group, the 4-year double-blind treatment reduced a 12.5/5.3 mmHg of blood pressure(BP), and also the 2-year open-label treatment declined a 9.2/4.7 mmHg of BP. During the 6-year follow-up, there was a 10.5/5.0 mmHg of net decline in blood pressure. The risk of stroke recurrence reduced by 53% (9.5% vs. 20.2%)($p<0.01$) in group of 4-year double-blind treatment, and it declined by 25% in group of 2-year open-label treatment ($p = 0.19$). The risk of stroke recurrence totally reduced by 46% ($p<0.01$) over the 6-year follow-up. It demonstrated that long-term BP control was beneficial for the patients with cerebrovascular diseases, and might lower the risk of stroke recurrence.

Antithrombotic Therapy

Antithrombotic therapy can reduce the incidence of major cardiovascular events, including myocardial infarction and stroke, in patients with peripheral arterial disease. However, there was very limited data regarding the efficacy and safety of oral anticoagulation with or without antiplatelet therapy. The trial of Warfarin Antiplatelet Vascular Evaluation (WAVE) published in the *New England Journal of Medicine* in 2007[13], provided evidence for the secondary prevention of cardiovascular diseases. The randomized, open-labeled clinical trial was conducted in 80 centers of Canada, Poland, Hungary, Ukraine, China, the Netherlands, Australia, etc. A total of 2 161 patients with peripheral arterial disease (including transient ischemic attack (TIA) and stroke) were randomly divided into a group of combined therapy (an antiplatelet agent plus an oral anticoagulant) and antiplatelet therapy alone. The mean follow-up period was 35 months. The outcomes of study

showed that there was no statistical differences in incidence of myocardial infarction (MI), cardiac deaths and stroke (3.5% vs. 3.5%; relative risk 1.01) between the group of combined therapy and the group of antiplatelet therapy alone. But, the incidence of both life-threatening hemorrhage and moderate hemorrhage were increased in the combined therapy group as compared with the antiplatelet-therapy group. Life-threatening hemorrhage in both groups: there were 14 cases of hemorrhagic stroke (1.3%) in the combined therapy group and none in the antiplatelet-therapy group [RR=15.2; 95%CI (2.0～115.6; P = 0.001)]. In conclusion, for patients with peripheral arterial disease, the combined therapy of oral anticoagulant plus antiplatelet therapy was not more effective than antiplatelet therapy alone for prevention of severe complications, and even may cause an increase in the risk of life-threatening hemorrhage.

In a prospective, randomized, multi-center clinical trial in China, the efficiency and safety of warfarin and aspirin were compared for prevention of thromboembolism in patients with nonvalvular atrial fibrillation (AF) [14]. A total of 704 patients were randomly divided into aspirin therapy group (369 patients) or warfarin therapy group (335 patients). The mean follow-up period was 19 months (2～24months). As compared with aspirin therapy, the relative risk of ischemic stroke was reduced by 62% by therapy of adjusted-dose warfarin (Table3-2-3). The incidence of minor and major hemorrhage was higher in warfarin therapy group, compared to aspirin therapy group (P < 0.05). The outcomes of study demonstrated that anticoagulant therapy with dose-adjusted warfarin can cause a reduction of 56% in relative risk of both ischemic stroke and death of nonvalvular AF, the relative risk of ischemic stroke and all thromboembolism event were decreased by 62% and by 52%, respectively, compared with therapy of aspirin in Chinese population. In comparison of aspirin therapy (150～160 mg), the dose-adjusted warfarin (INR 2. 0～3. 0) can effectively reduce deaths and the end-point events of ischemic stroke .

Table 3-2-3 Comparison between Therapeutic End-points of Aspirin Group(n=369)and Warfarin Group(n=335)

Therapeutic End-points	Aspirin Group Cases (%)	Warfarin Group Cases (%)	*P* Value	OR (95% CIs)
Primary End-point Events	24(6.0)	10(2.7)	0.03	0.44(0.198～0.960)
Ischemic Stroke	17(4.6)	6(1.8)	0.04	0.38(0.147～0.977)
Death	8(2.2)	4(1.2)	0.33	0.54(0.163～1.830)
Secondary End-point Events	26(7.0)	19(5.7)	0.46	0.79(0.431～1.461)
Thromboembolism Events	39(10.6)	19(5.7)	0.01	0.48(0.269～0.858)
Combined End-point Events	48(13.0)	28(8.4)	0.047	0.61(0.373～0.997)

3.3 Hypertension

Refer to *The Report on Cardiovascular Diseases in China(2007)* of Chapter 2.1 Hypertension(Page11～24)

3.4 Chronic Kidney Disease

3.4.1 Epidemiology of Chronic Kidney Disease (CKD)

3.4.1.1 Estimation of Renal function in Patients with CKD

In accordance with the principle of early monitoring and prevention of CKD, clinical physician need to make an accurate estimation for the glomerular filtration rate (GFR) of patients with CKD. The applicability of estimated GFR (eGFR) equation, developed for CKD patients by the Chinese eGFR Investigation Collaboration, was greatly improved in GFR estimation of Chinese CKD patients. But underestimation of real GFR value still existed in the patients with a higher GFR . Therefore, the collaborating group made a further development for a new equation of eGFR, which combined serum creatinine (Pcr) with cystatin C (cysC). eGFR=169×Pcr-0.608×cysC-0.63×Age-0.157(Female×0.83)

By comparing the reference GFR from standard dual plasma sampling 99mTc-DTPA clearance, the equation can well match estimation of renal function at all stages of CKD, and it can make a better evaluation for the people with normal renal function, as compared with the early equation[15].

3.4.1.2 Survey on Prevalence of CKD in High-risk Population

The known risk factors of CKD include aging, hypertension, diabetes, uricemia, dyslipidemia and infection, etc. Therefore, the corresponding population with the risk factors mentioned above belongs to the high-risk population. The investigational reports on prevalence of CKD in high-risk population showed in Table 3-4-1(1).

Table 3-4-1(1) Epidemiological Study of CKD in Part Areas of China

Area	Study Subject	Subject Source	Study Case	Diagnostic Criteria of CKD	CKD Prevalence (%)
Seven Cities[16]*	CHD	Multi-centers Inpatients	3513	eGFR <60 ml/min/1.73 m2and/or proteinuria and/or hematuria and/or noninfective leukocyturia	24.8%
Hong Kong[17]	HIV-infected Patients	Single Center Follow-up Patients	322	eGFR <60 ml/min/1.73 m2 and /or protein-to-creatinine ratio (P/Cr)> 0.3	16.8%

*The seven cities include Beijing, Tianjin, Shanghai, Nanjing, Hangzhou, Guangzhou and Wuhan.

A cross-sectional randomized sampling survey was conducted in a total of 15 160 adults aged 35～74. The outcomes of survey demonstrated that if CKD was defined as e-GFR <60 ml/min/1.73 m^2, the odds ratios of CKD prevalence and 95% confidence interval (CI) were 1.64 (1.16, 2.32) in CKD patients with metabolic syndrome (MS), as compared to that in CKD patients without MS. CKD was defined as an estimated glomerular filtration rate and If take serum creatinine 1.14 mg/dl for men and 0.97 mg/dl for women as the criteria of high serum creatinine diagnosis, the odds ratios of high serum creatinine and 95% CI were 1.36 (1.07, 1.73). In comparison of patients without any indicators of MS, the odds ratios of CKD and high serum creatinine rose with increase in indicators of MS abnormalities (Table 3-4-1(2)). The findings of study suggested that MS was

an important risk factor of CKD in Chinese adults [18].

Table 3-4-1(2) Correlation between MS and the Odds Ratio and 95% CI of CKD or High-level Serum Creatinine

Indicators of MS Abnormalities	CKD		Elevated Serum Creatinine (Male≥1.14 mg/dl;Female≥0.97 mg/dl)	
	OR	95%CI	OR	95%CI
1 Item	1.51	(1.02，2.23)	1.11	(0.88，1.40)
2 Items	1.5	(0.97，2.32)	1.39	(1.07，2.04)
3 Items	2.13	(1.30，3.50)	1.47	(1.06，2.04)
4/5 Items	2.72	(1.50，4.93)	2	(1.32，3.03)

Similar results were reported in a population survey of total 2 310 participants (40 years of age) in Beijing. Participants with MS had a higher prevalence of CKD (15.4% vs. 8.3%, p<0.001) compared with those without MS. The prevalence of CKD rose following the increase in items of MS abnormalities [19].

3.4.2 Evaluation for Risk Factors of Cardiovascular Diseases in Patients with CKD

There is a correlation between CKD and cardiovascular diseases (CVD). The patient with CKD is easy to coexist CVD, so CKD is a high-risk factor; contrarily, CVD is an important influent factor of CKD prognosis.

3.4.2.1 Investigation of Carotid artery Intima-media Thickness in CKD Patients

Increased carotid artery intima-media thickness (IMT) can predict the possibility of future vascular events in general population. The monitoring study of carotid IMT function in CKD patients has been conducted .

A cross-sectional study was carried out in total 1 046 residents (40 years of age) in a district of Beijing. It showed that compared with subjects with normal eGFR value, carotid IMT increased with the reduction of eGFR value; the IMT value was greater than the mean IMT value in subjects with albuminuria. For the early CKD patients, increased carotid IMT may be related to the high risk of CVD [20]. The outcomes of a cohort study for total of 203 patients with stage 3 and stage 4 of CKD, conducted in a single center of Hong Kong, showed that base-line IMT was associated with some factors, such as patients age, serum LDL level, Charlson's co-morbidity score, and serum C-reactive protein. In patients coexisting CKD and diabetes, carotid IMT was significantly higher than that in patients without diabetes. In the period of a mean 48-month follow-up study, the analysis of IMT quartiles presented that the survival rate in patients without cardiovascular events successively was 94.4% for score I, 89.8% for II, 77.7% forⅢ, and 65.9% forⅣ(log rank test, P = 0.006). By adjusting multivariate with the Cox proportional hazard model, the onset risk of cardiovascular events increased by 41.6% for each higher quartile of IMT. There

was no statistical difference of actual survival rate among the grades of IMT quartiles at the 48th month. Carotid IMT did not correlate with the decline of patients renal function . Therefore, carotid IMT is a strong predictor of CVD complications in predialysis patients and it may apply to risk stratification of the patients[21].

3.4.2.2 Correlation between CKD and CAHD in Type-Ⅱ Diabetics

A mean 39.4-month follow-up study (20.3～55months) for total 4 421 type-Ⅱ diabetics in Hong Kong demonstrated that all-cause mortality increased from 1.2% of stage-1 CKD (95% CI 0.8～1.7) to 18.3% of stage-4 CKD (9.1～27.5) (P for trend <0.001). Incidence of new cardiovascular endpoints increased from 2.6% (2.0～3.3) to 25.3% (15.0～35.7) (P for trend <0.001). After adjusting multi-variates, such as age, sex, albuminuria, use of RAAS inhibitors, lipids, BP and glycemic control, all-cause hazard ratio (HR) at different levels of eGFR value (90, 60～89, 30～59, and 15～29 ml/min per1.73m^2) was 1.00, 1.27, 2.34, and 9.82, respectively (P for trend <0.001); HR of cardiovascular endpoints was 1.00, 1.04, 1.05, and 3.23 (P for trend <0.001); as well as the HR of renal endpoints was 1.00, 1.36, 3.34, and 27.3, respectively (P for trend <0.001). Thus, the reduction of eGFR value was a high-risk factor for incidence of cardiovascular endpoint events and all-cause deaths in type-Ⅱ diabetics [22].

A prospective cohort study for total 7 067 type-Ⅱ diabetics in Hong Kong showed that risk factors of CHD include age, male gender, duration of diabetes, ratio of spot urinary albumin to creatinine, eGFR, total cholesterol (TC), high density lipoprotein cholesterol (HDL-C) and cigarette smoking. Linear association between TC and CHD was observed only in patients with albuminuria. Although in general population, increased HDL-C was associated with decreased risk of CHD, full-range HDL-C was associated with CHD in an A-shaped manner with a zenith at 1.1 mmol/L. Albuminuria and CKD were the main contributors for the paradoxically positive association between HDL-C and CHD risk for HDL-C values less than 1.1 mmol/L. Therefore, in type-Ⅱ diabetics, both albuminuria and CKD can influence the function of other risk factors on CHD, and albuminuria plays a linking role between conventional risk factors and CHD. The CKD onset changes the correlation between conventional lipids and risk of CHD[23].

3.4.2.3 Hypertension and Renal Function Declination

A representative cohort follow-up study with 158 365 populations over 40 years of age was conducted in China nationwide. A standard protocol was applied to BP measurement and collection of related variables information in 1991; and a follow-up evaluation was conducted between 1999 and 2000. During the follow-up study with 1 236 422 person-years, a total of 380 subjects initiated renal replacement therapy or died from renal failure (30.7/100 000 person-years). Compared with normal-BP subjects , the adjusted hazard ratio (95%CI) of ESRD for groups of high-normal BP, stage 1, and stage 2 hypertension was1.30 (0.98～1.74), 1.47 (1.06～2.06), and 2.60 (1.89～3.57), respectively (P for trend < 0.001). Correspondingly, the hazard ratio (95%CI) of glomerulonephritis-related ESRD for groups of high-normal BP, stage-1 and stage-2 hypertension was 1.32 (0.82～2.11), 1.48 (0.83～2.61), and 3.40 (2.02～ 5.74), respectively (P for trend <0.001). Systolic BP was a stronger predictor of ESRD than diastolic BP or pulse pressure. This study provided the correlation between BP and ESRD onset; and also found that BP level was significantly associated with glomerulonephritis-related

ESRD. Therefore, prevention of ESRD should combine with prevention, treatment and control of BP [24] .

3.4.3 Progress of Treatment for Patients with CKD

Both angiotensin-converting enzyme inhibitor (ACEI) and angiotensin receptor blocker (ARB) are important drugs for treatment of CKD patients, reduction of proteinuria, and delay of renal function development. In a study for patients with non-diabetes nephropathy, proteinuria and chronic renal insufficiency, the patients (n=360) received a combined therapy with benazepril or losartan (intravenous drip) to reach individual maximized tolerated dosages of proteinuria reduction. The outcomes of study presented that over the mean 3.7 years of follow-up, the primary combined endpoint events (doubled serum creatinine, ESRD, and the time of death), and secondary endpoint events (level of proteinuria and speed of renal-disease progression) in group of intravenous drip with both benazepril and losartan (benazepril: 20mg/d of mean dose, the range of 10～40mg/d; losartan: 100mg/d of mean dose, the range of 50 to 200mg/d) decreased by 51 and 53%, respectively (P = 0.028 and 0.022, respectively). Under the same control of BP levels, the group with combined therapy of benazepril and losartan presented a further reduction of proteinuria level and a slow-speed progression of renal hypofunction, compared with group with regular-dose therapy. There was no significant difference of adverse events between two therapeutic groups with intravenous drip or regular dose. It was concluded that drug therapy with benazepril or losartan, at a dosage of individual tolerated and maximum reduction of proteinuria, can obtain a better renal protection for patients without diabetes but with proteinuria and renal insufficiency[25].

3.5 Cardiovascular Surgery

3.5.1 Number of Cardiac Surgical Procedures in China

The number of cardiac surgical procedures has been annually increasing by 14% in the recent four years in mainland China, specifically 90 812 cases in 2004, 104 656 cases in 2005, 118 627 cases in 2006 and 136 015 cases in 2007(Table 3-5-1).

Table 3-5-1 Number of Cardiac Surgical Procedures, and Cardiac & Cardiopulmonary Transplantaion in Mainland China

Area	Province	2006		2007		Number of Transplant in 2007	
		Total	CPB	Total	CPB	Cardiac Transplant	Cardiopilmonary Transplant
North	Beijing	15 500	10 799	16 543	11 885	45	0
	Tianjin	3 445	2 654	4 068	3 140	8	0
	Inner Mongolia	472	388	626	521	0	0
	Shanxi	1 734	1 355	1 770	1 433	0	0
	Hebei	3 980	3 247	4 931	4 041	0	0
North East	Liaonin	3 079	2 405	3 125	2 467	2	0
	Helongjiang	2 105	1 805	3 102	2 245	1	0
	Jilin	1 821	1 463	1 744	1 430	1	0

Continue

Area	Province	2006		2007		Number of Transplant in 2007	
		Total	CPB	Total	CPB	Cardiac Transplant	Cardiopilmonary Transplant
East	Shanghai	8 754	7 414	10 227	8 618	31	0
	Jiangsu	7 712	6 700	7 671	6 818	0	0
	Zhejiang	3 508	3 037	4 045	3 300	0	0
	Shandong	8 876	7 595	10 340	8 520	0	0
Middle	Henan	9 411	8 138	9 792	8 651	0	0
	Hubei	6 209	5 582	7 164	6 503	1	
	Jiangxi	1 748	1 594	2 220	2 044	0	0
	Anhui	1 456	1 456	3 159	2 942	11	1
	Hunan	4 576	4 163	5 356	4 804	2	1
South	Guangdong	7 523	6 623	9 042	7 773	0	1
	Hainan	485	426	505	435	0	0
	Gunagxi	2 398	1 980	2 977	2 536	8	0
	Fujian	3 471	3 024	4 117	3 305	14	0
North West	Shanxi	6 565	4 916	7 190	5 659	3	0
	Gansu	1 807	1 532	1 789	1 474	0	0
	Qinghai	752	504	682	423	0	0
	Ningxia	762	444	838	465	0	0
	Xijiang	1 668	1 382	2 417	2 174	0	0
South West	Chongqing	2 340	2 147	3 046	2 801	0	0
	Sichuan	4 139	3 923	4 543	4 199	2	1
	Yunnan	1 422	1 340	1 739	1 737	1	0
	Guizhou	909	786	1 174	1 066	0	0
	Tibet			73	56	0	0
Nationwide	Total	118 627	98 804	136 015	113 465	130	4

Note: Data from Extracorporeal Circulation Branch of Chinese Society of Biomedical Engineering

3.5.2 Surgical Treatment of Cardiovascular Diseases

3.5.2.1 Surgical Treatment of Coronary Artery Disease

Outcomes of Chinese Coronary Artery by Pass graft (CABG) Registry Study between 2004～2005

The registry study of CABG in China was implemented in total of 32 large-middle hospitals in China nationwide. The data analysis for all CABG cases was completed in the collaborating hospitals From January 1,2004 to December 31,2005. The number of surgical procedures in the collaborating hospitals reached 9 247,

accounting for 2/3 of total CABG cases during the period of study in China nationwide.

The outcomes of the study between 2004～2005 presented a correlation between the mortality of CABG operation and some para such as age, gender and BMI (Figure 3-5-2(1)～Figure 3-5-2(3)).

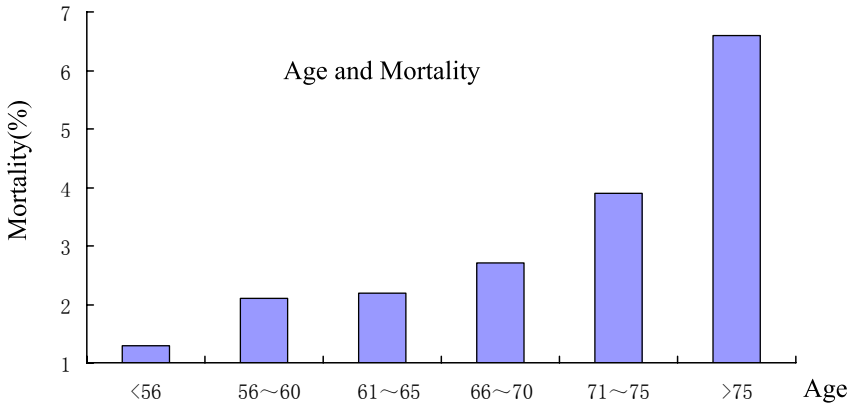

Figure 3-5-2(1) Correlation Between Age and Mortality of CABG

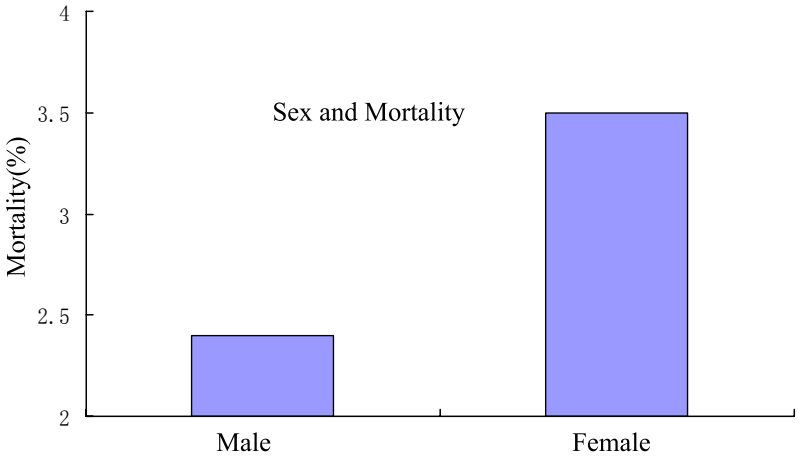

Figure 3-5-2(2) Correlation Between Gender and Mortality of CABG

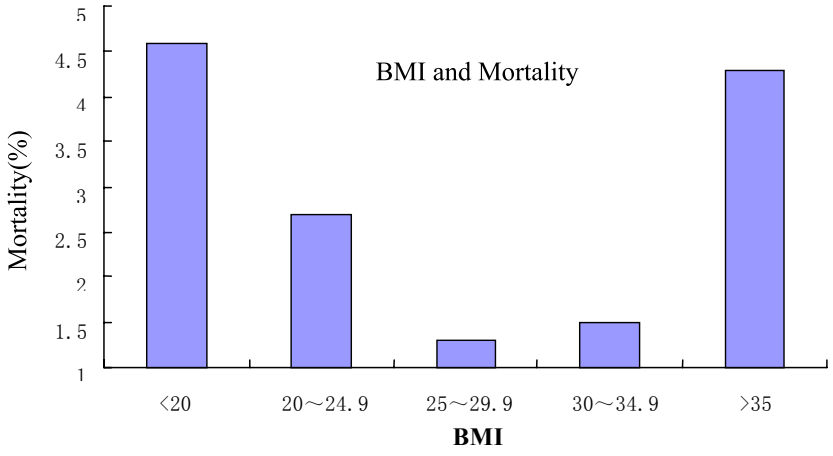

Figure 3-5-2(3) Correlation Between BMI and Mortality of CABG

Compared with the data of EuroScore (Europe) and STS (U.S.A), the results of registry study of CABG in China demonstrated that there was a higher incidence of coexisting diseases among the Chinese patients during pre-operation, such as hypertension, diabetes, stroke; or unstable angina, pulmonary hypertension; or multiple coronary-vessel diseases or left main-stem disease . However, there was a lower proportion of coexisting diseases for women; in addition, the lower proportion of coexisting diseases, such as COPD, periphery vascular diseases, renal dysfunction and active endocarditis, occurred in younger patients, and also in patients with cardiovascular surgical history or with dysfunction of left ventricle. There were different characteristics among Chinese, European and American people. The emphasis of risk factors was much different, which was associated with baseline characteristics, such as nationalities, races, economic and social situation, geographical position, life custom.

3.5.2.2 Surgical Treatment of Heart Valve Disease

In Mainland China, there were three reports on heart-valve-disease operations with larger amount of cases in 2007. One of them focused on mid- and long-term effect of surgical treatment for triple heart valve disease. The other two reports focused on perioperative data analysis of the heart valvular operations (Table 3-5-2 (1)～Table 3-5-2(5)).

Table 3-5-2(1) Comparison of Cardiovalvular Surgical Situation in Mainland China in 2007

Group	Duration of Cases	Case	Female	Age	Early Mortality of Post-operation
Group A[26]	1993～2004	5 066	47. 2%	45. 3	4. 6%
Group B[27]	1997～2005	1 003	56. 4%	53. 4±13. 2	2. 8%
Group C[28]	1985～2005	1 137	56. 4%	46. 0±3. 2	8. 6%

Table 3-5-2(2) Comparison of Cardiovalvular Surgical Types in Mainland China in 2007

Group	Surgical Procedures					
	MVR(%)	AVR(%)	TVP/TVR(%)	BVR(%)	BVR+TVP(%)	BVR+TVR(%)
Group A[29]	51. 7	15. 8	1. 9	30. 3		
Group B[30]	55. 3	13. 9	2. 6	27. 2		0. 99
Group C[31]					98. 2	1. 8

Note: MVR mitral valve replacement, AVR aortic valve replacement, TVP tricuspid valve plastic operation, TVR tricuspid valve replacement, BVR, artic and mitral valve replacement

Table 3-5-2(3) Comparison of Cardiovalvular Operation Complications in Mainland China in 2007

Group	Complication of Operation (%)	Low Cardiac-output Syndrome(%)	Re-thoractomy for Bleeding(%)	Renal Failure(%)	Refractory Arrhythmia(%)	Cerebral Infarction (%)	Hydropericardium (%)
Group A[32]	18. 2	4	3. 9	2. 2	1. 6		
Group B[33]	7. 3	0. 5	2. 3	0. 4	0. 9	0. 9	1. 2

Table 3-5-2(4) Long-term Survival Rate of Cardiovalvular Operation in Mainland China in 2007

Group	Long-term Follow-up Rate	Average Follow-up Duration (Year)	Total Follow-up Case (Patient•Year)	Cumulative Survival Rate of Post-operation (%)		
				5 Year	10 Year	15 Year
Group C[34]	93.2%	4.15	3678	89.2±1.5	83.9±3.1	65.3±5.1

Table 3-5-2(5) Embolism and Hemorrhage of Cardiovalvular Postoperation in Mainland China in 2007

Group	Without thromboembolism of post-operation (%)			Without Anticoagulation-related Hemorrhage of Post-operation (%)		
	5 Year	10 Year	15 Year	5 Year	10 Year	15 Year
Group C[35]	97.1±1.7	91.8±3.1	88.1±4.8	95.9±2.5	89.9±3.7	82.0±5.0

Among which, the correlation between left ventricle ejection fraction (EF value) and peri-operative mortality of valvular replacement was analyzed in group A of valvular operation(Table 3-5-2(6)[36]).

Table 3-5-2(6) Influence of EF Value on Per-operative Mortality of Valvular Replacement

Type of Valvular Disease	EF value			
	< 0.40 (%)	0.40～0.50(%)	0.50～0.60(%)	≥0.60(%)
Aortic Stenosis	12.5	0	0	3.4
Aortic Regurgitation		9.3	2.8	1.6
Mitral Stenosis	6.9	6.7	4.0	4.4
Mitral Regurgitation	22.2	9.9	4.7	1.8
Total	8.6	7.8	4.1	3.9

The outcomes of study showed that preoperative EF value is an important effective factor of peri-operative mortality of valvular surgery. Generally speaking, the lower the EF value, the higher the mortality is. Nevertheless, EF value has different predictive effects on various valve diseases. It is most significant for EF value to evaluate the operative risk of patients with mitral insufficiency; secondly in patients with aortic insufficiency; and the lowest significance of EF value for operative risk evaluation existed in patients with mitral stenosis and aortic stenosis.

3.6 Peripheral Arterial Disease

Peripheral arterial disease (PAD) is a common manifestation of systemic atherosclerosis excluding the coronary and intracranial arteries. This report is only involved in lower extremity arteriosclerosis disease (LEAD).

3.6.1. Prevalence Rate of LEAD

LEAD is a common clinical syndrome in elderly people. Many epidemiological studies were implemented for prevalence rate of LEAD, which applied some non-invasive diagnostic methods, such as Rose Claudication Questionnaire, ankle-brachial index (ABI) and pulse wave velocity (PWV) et al. The outcomes of studies demonstrated that LEAD morbidity was associated with subjects age, risk factors and

basal diseases. Table 3-6-1 showed the outcome of LEAD epidemiological studies in China. the diagnostic method of LEAD in the table was ABI＜0.90.

Table 3-6-1 Epidemiological Findings of LEAD Prevalence Rate in China

Group	Cases	Age	Prevalence Rate (%,Male / Female)
Fisher in Zhoushan Area, Zhejiang [37]	2668	≥35	2.1 (3/1.2)
Group of MUCA[38]	18140	＞35	6.0 (5.4/9.3)
The Elderly in Wanshoulu Area, Beijing [39][40][41]	2124	60~95	16.4 (12.7/18.1)
Diabetes [42]	1347	＞50	19.4 (18.3/20.4)
Metabolic Syndrome [43]	2115	32~91	22.5 (21.7/23.4)

MUCA:Multiple unit collaborating analysis of cardiovascular disease epidemiology in China.

The findings of studies showed that prevalence rate of LEAD were different for different study population. For example, the prevalence rate of LEAD was 2.1% for fishers in Zhou shan area, 6.0% and 16.4% for people aged over 35 and people aged over 60 in Beijing, respectively; and 19.4% for diabetics and 22.5% for patients with metabolic syndrome. However, there were some similar characteristics in those study population, for example, the prevalence rate of LEAD rose with the increase of age, and it was higher for women than for men.

3.6.2. Risk Factors of LEAD

The outcomes of epidemiological studies presented that the prevalence rate rose with the increase in age and risk factors of atherosclerosis. The major cause of LEAD was atherosclerosis. The atherosclerosis-related risk factors, such as cigarette smoking, diabetes, hyperlipemia, hypertension and hyperhomocysteinaemia, all can cause an increase in prevalence rate of LEAD. Multiple logistic regression in Beijing area revealed a positive correlation of LEAD incidence and its serious degree with age, smoking, duration of diabetes , stability of blood glucose, high systolic pressure, hypercholesterolemia and high LDL-C[44]. LEAD coexisted in 30% patients with cerebrovascular diseases and in 25% patients with ischemic heart disease[45][46]. Therefore, LEAD is an important window of the systemic arteriosclerosis, and also is very important for early detection and therapy of systemic arteriosclerosis.

3.7 Arrhythmia

3.7.1 Pacemakers and ICD

The first case of artificial cardiac pacemaker was implanted in Shanghai, China in 1962. Since then the annual number of pacemaker implantations has been growing consistently, of which, physiological pacemakers account for more and more percentage. As shown in Figure 3-7-1(1), there has been a steady growth of pacemaker implantation number since 2002. As an example in 2005, there were 460 hospitals nationwide capable of pacemaker implantation with a total amount of 18 090 pacemakers implanted(per CSPE survey

of pacemaker application). Among them, the male patients accounted for 55.5% of the total, and the patients aged lower 60 years were 23.6%. In 2006, a total of 20 000 pacemakers were implanted, and more than 35 000 estimates in 2007.

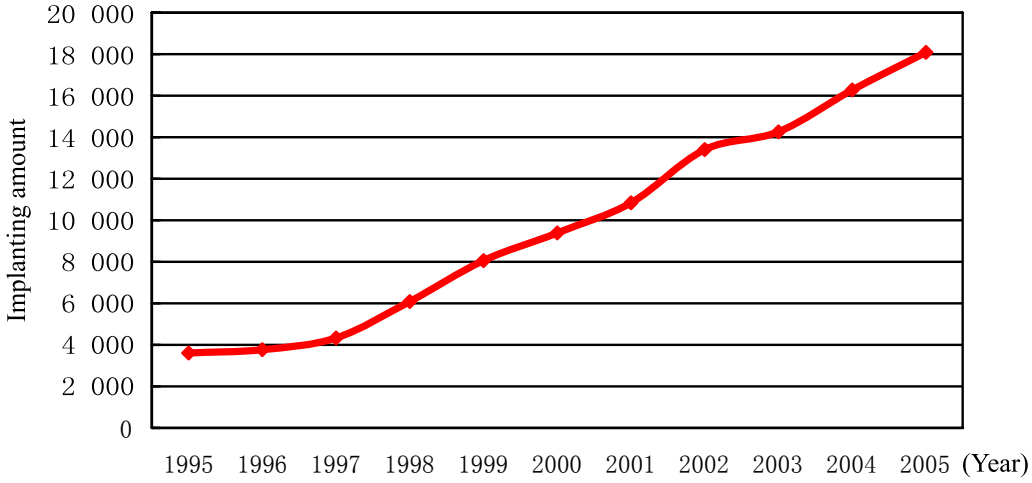

Figure 3-7-1(1) Annual Amount of Pacemaker Implantation in China (2002～2005)

Pacemaker categories: The statistic data in 2005 showed that dual chamber pacemakers accounted for 51.5% of the total amount, and the proportion of physiological pacemakers reached 52.9% if AAI/R mode pacemakers were included in the calculation, which exceeded the percentage of non-physiological pacemakers. The indication of pacemaker implantation was mostly sick sinus syndrome (SSS), which accounted for 50.1%, followed by atrio-ventricular block (AVB) accounting for 39.4%; and other indications with 10.5% (Figure 3-7-1(2)). The etiological constitution of pacemaker implantation: 35.9% of recipients were patients with coronary artery disease (CAD), 10.4% were the patients with cardiomyopathy, and other etiologies and non-organic heart disease accounted for 53.7% of the total pacemaker patients.

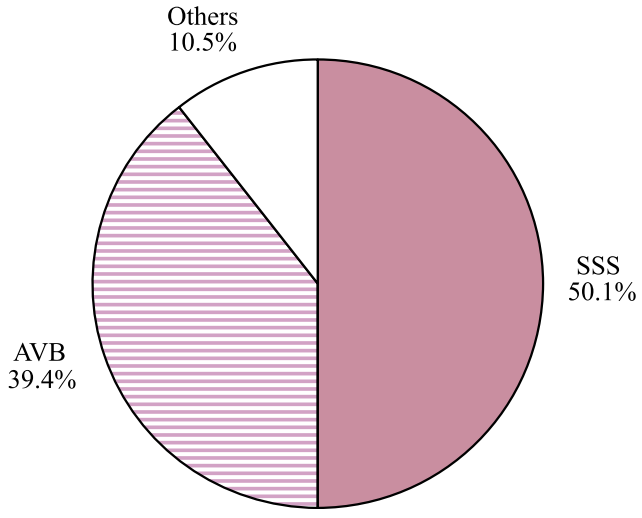

Figure 3-7-1(2) Indications of Pacemaker Implantation Nationwide in 2005

The first case of ICD implantation in China occurred in 1996 via intravenous approach, and a total of 285 ICDs were implanted nationwide prior to year 2001. There were 186 cases of ICD and 340 cases of CRT implantation nationwide in 2005, and the implanting amount of ICD and CRT presented a trend of steady increase between 2002～2005 Figure 3-7-1(3). It is estimated that there were more than 500 cases of ICD implantation in 2007.

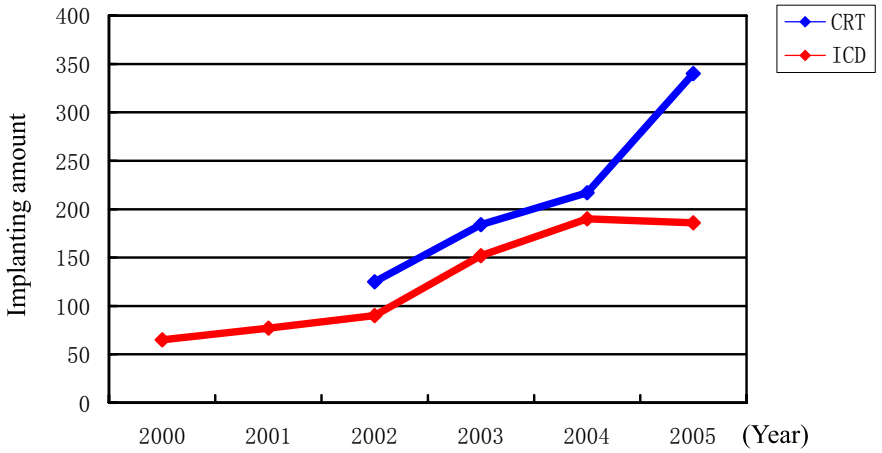

Figure 3-7-1(3) Annual Implanting Amount of ICD and CRT in China (2002～2005)

3.7.2 Catheter Ablation

The first clinical radio-frequency cardiac arrhythmia (RFCA) in China was reported in 1991 The amount of RFCA cases increased rapidly in the late 1990s. The survey data in year 2000 showed the total amount of RFCA at 10 811 cases (Figure 3-7-2(1)) that were performed in 136 hospitals. The total amount of RFCA reached 20 000 cases in 2006.

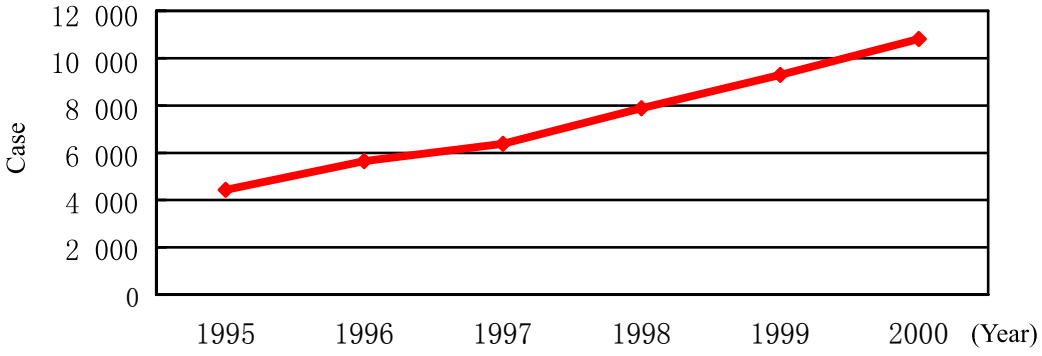

Figure 3-7-2(1) Annual Amount of RFCA Case in China (1995～2000)

In 2000, among the patients receiving RFCA treatment, the percentage of AVNRT was 56.3%, followed by AVRT at 31.7%, and others include ventricular arrhythmia and atrial arrhythmia, etc (Figure 3-7-2(2)).

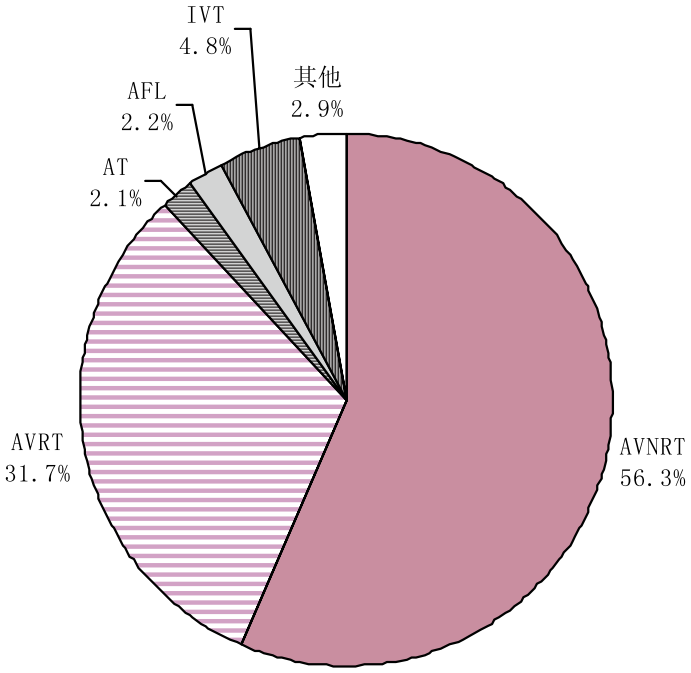

Figure 3-7-2(2) Disease Constitution of RFCA in China in 2000

RFCA for Af in China: RFCA for AF increases dramatically in recent years as shown in Figure 3-7-2 (3). There were a total of 3 196 cumulative cases of FRCA for AF by the end of 2005 nationwide, with 1 427 cases in 2005 alone[51]. According to the initial statistics, the number of FRCA for AF was 2 160 in 2006 alone.

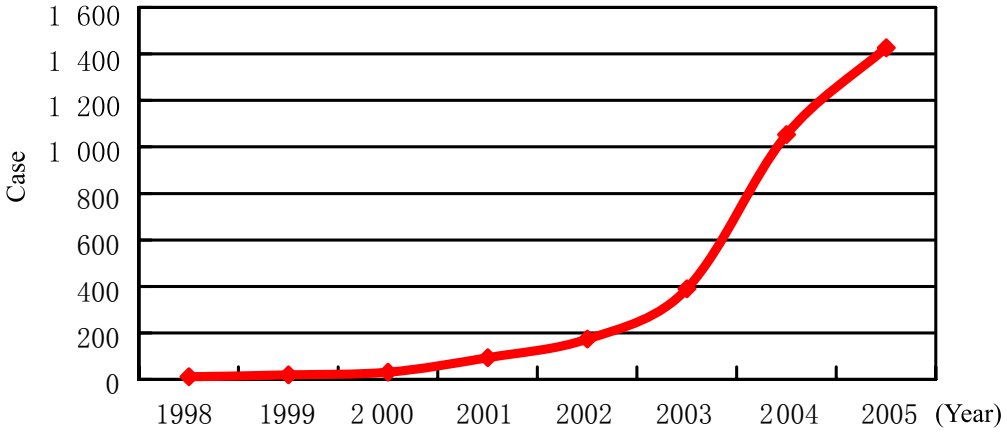

Figure 3-7-2(3) Annual Cases of RFCA for AF in China (Between 1998～2005)

3.7.3 Atrial Fibrillation

The prevalence rate of AF was 0.77% in population aged over 30 years in China; and the rate of AF was 0.61% when the population was standardized in 1990. The prevalence rate was higher for men than for women (0.9vs.0.7%). The proportion of the valvular, non-valvular and lone AF among all AF patients was 12.9 %, 65.2% and 21.9 %, respectively. Ischemic stroke accounted mainly for the AF-related stroke, and the incidence of stroke was significantly higher in AF patients than in non-AF patients.

In a domestic study for anti-coagulative efficacy and safety of Warfarin, a total of 988 non-valvular AF patients with risk of thromboembolism were randomly divided into normal-dose Warfarin group (target INR: 2.1～2.5), low-dose Warfarin group (target INR: 1.6～2.0) and aspirin group (200mg/d). During a mean period of 15-month follow-up, the annual incidence of thromboembolism was 2.3%,2.6% and 6.4% for three groups above, respectively. The incidence of thromboembolism was significant lower in normal-dose and low-dose Warfarin groups than in aspirin group (P＝0.018 and P＝0.044, respectively). There was no significant difference of the thromboembolism risk between the Warfarin groups with normal-does or low-does. The incidence of severe hemorrhage was 2.9%, 2.8% and 1.0% respectively, without significant difference among three groups (P＝0.101). The therapy with low-dose INR=1.6～2.0 Warfarin had the same efficacy as the therapy with normal-dose warfarin INR=2.1～2.5.

3.7.4 Sudden Cardiac Death

A 1-year follow-up study for total of 678 718 subjects was conducted in year 2006. Of the total, there were 2 896 cases of deaths during the study, among which the deaths of sudden cardiac death (SCD) accounted for 9.5%(284 patients), the incidence of SCD was 41.8/100 000, and higher for man than for woman (44.6/100 000vs.39.0/100 000). There was a higher incidence of SCD in patients aged over 25 years, 61.7/100 000 for man and 53.3/100 000 for woman. Based on this study, it is estimated to be 544 000 deaths of SCD annually in China.

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Chapter 4
Community-based Prevention and Treatment on CVD

4.1 Case 1: Community-based Comprehensive Intervention on Stroke in Three Cities in China[1][2][3]

The outcomes of epidemiological sampling survey demonstrated that in urban- and rural areas of China, the annual incidence, mortality and prevalence rate of stroke was 200/100 000,130/100 000 and 400/100 000~700/100 000, respectively. It is estimated that new patients with stroke are over 2 million annually, more than 1.5-million individuals die of cerebrovascular diseases every year, and the survivals of stoke remain 6~7 million. Both high mortality and high disabled rate caused harm to our country and citizens. Thus, an effective approach of prevention, especially an effective intervention for community population, will be an attractive research field in the distant future in China.

A study of comprehensive interventional measures for community-based population with cerebrovascular diseases, being one of the 8th and the 9th Five-Year National Key Projects, was carried out between 1991~2000. With the leadership of National Office for Prevention and Treatment on Cerebrovascular Disease, three research agencies, including Beijing Institute of Neurosurgery, Institute of Neurology Affiliated to Fudan University, and Institute of Neurology and Xiangya Hospital Affiliated to Central South University, involved in the study. This project was started in three cities with high incidence of stroke, such as Beijing, Shanghai and Changsha in 1991. Two separate and comparable communities were selected from three cities, respectively, of which one community for intervention and the other one for control, and 50 000 participants in every community. The total sample size of all cities was about 300 000 of population. This project includes 2 phases. In the 1st stage from 1991 to 1995, the research target was focused on screening, management and intervention for patients with hypertension; and in the 2nd stage between 1996 and 2000, it emphasized intervention and management for both diabetes and cigarette smoking, in addition to take a continuing intervention for patients with hypertension. The specific measure and its effects are summarized as follows:

4.1.1 Comprehensive Interventions for Community-based Population

1. Medical staff of all-level hospitals in the communities received professional training with necessary knowledge and skills, and also made them qualified for screening and managing the individuals at high risk of stroke.

2. With BP measurement and questionnaire, healthcare practitioners in the basic level hospitals screened most patients with hypertension from the population aged 35 years, and take a period of 2-3month follow-up for monitoring their BP level, in addition, provided them with advise of treatment. The patients were informed how to measure their BP regularly and take appropriate medications of anti-hypertension. It was suggested for the patients to consult physician at necessary, and to adopt proper therapeutic measures.

3. From 1999 to 2000, with a large-scale detection of urinary glucose and plasma glucose, the diabetics were screened from the populationaged over 55 years, and provided them with therapeutic guidance at regular intervals. The measures should be taken to control blood-glucose level, including dietary restriction, enhanced regular exercise and drug therapy.

4. From 1996 to 2000, health education was advocated for cigarette smokers in the interventional community, and a small-scale intensive intervention was performed among smokers with nicotine gum or cigarette substitute.

5. Health education and promotion activities with various forms were carried out in the whole community

population. The brochures and handbooks of stroke prevention were distributed to the houses in 2-3 months; using blackboard to regularly spread the theme; . The 3 ~ 4 lectures of disease-related knowledge and related risk factors, such as hypertension, CHD and diabetes, were provided for the chief of residents' committee, community residents and patients with hypertension every year. The residents were encouraged to take healthy lifestyles, such as restriction of salt intake, regular physical exercises, body weight control, smoking cessation and moderate alcohol consumption.

6. A strict quality control was applied for monitoring of incidence and all-cause deaths of stroke, in order to scientifically evaluate the effects of prevention.

4.1.2 Effects of Comprehensive Interventions

1. From 1991 to 1995, 38% of patients with hypertension had their BP level control at below 160/95mmHg at least 6 months in one year, and the percentage of BP control increased to 46% from 1996 to 2000.

2. A total of 2 273 and 3 015 cases of stroke occurred in intervention community and control community, respectively, between years of 1991 and 2000. As compared with that in control community, a 9-year intervention caused a 11.4% reduction of onset risk of stroke in the intervention community [RR=0.8959; 95% CI (0.8483~0.9460; $p < 0.0001$)], of which, the onset risks of ischemic stroke and hemorrhagic stroke decreased by 13.2% [RR=0.8676; 95%CI (0.8054, 0.9345; p=0.0002)] and 7.2% [RR=0.9283; 95%CI (0.8517, 1.0117; P=0.0899)], respectively. The findings of the study in 3 cities demonstrated that based on the present healthy conditions of Chinese people, it was effective to reduce the incidence of stroke for taking the intervention measures, such as development of intensive health education, health promotion, selective screening, and active intervention in high-risk population of stroke, including patients with hypertension and diabetes. the incidence of stroke could be cut down dramatically with the conduction of Health Education and Promotion Project as well as screening and on the mellitus of population with. The community-based comprehensive interventions were practicable and effective, the mode of intervention can be popularized in more populations of communities in China.

4.2 Case 2: Experiences of Community-based Comprehensive Intervention in CVD in Capital Steel Corporation[4]

The practice of prevention and treatment on CVD in Capital Steel Corporation is a successful model of the functional community of CVD prevention in China. The well-known Capital Steel Corporation Mode of prevention and treatment on CVD was started in 1969, and total about 130 000 residents were covered. The key target was to establish a comprehensive prevention-treatment network with three different levels , which consisted of health-care service of working area and community outpatient of residential area in the factory, special clinics of CVD, and cardiac wards; as well as a comprehensive management network with three different levels, which included healthcare department of hospitals, institute of CVD prevention, and prevention department.

4.2.1 Key Contents of Experience in Capital Steel Corporation

Establish a comprehensive prevention-treatment network with three different levels, which consisted of health-care service of working area and community outpatient department of residential area in the factory, special clinic of CVD, and cardiac wards; as well as a comprehensive management network with three different levels, which included healthcare department, institute of CVD prevention, and prevention department.

Established the medical records of patients with hypertension, which was based on the data from screening, physical examination, as well as detection and diagnosis of hypertension in outpatient department. A classified management was carried out for all patients with hypertension. Defined retest timetable for hypertensive patients with different severity, according to the plan of hypertension management; adjusted therapeutic plan on the basis of BP retest result, until a preferable BP was observed. The patients with unstable or severe hypertension were referred to the special clinic. For the disable patients, community physicians dropped by their home and interviewed them. The referral of patients with hypertension managed by the health-care service of factory would be taken after their retirement; the professionals in institute of CVD prevention documented the cases of deaths. .

Routine interventions were performed in the whole population, including health promotion and education on lifestyle improvement. Intensive interventions were put into practice for high-risk population, including improvement of dietary structure with emphasis on restriction of salt intake, initiation of educational campaigns against smoking, and reduction of body weight.

4.2.2 Characteristics of Prevention Experience in Capital Steel Corporation

1. Developed a management system of CVD, which was based on the residential area and factory, and focused on community. Established a prevention-treatment network with three different levels and had multiple functions in screening, prevention, treatment, management, and research of CVD.

2. There was a stable processional team of CVD prevention in the pilot project. The team included cardiovascular specialists and healthcare practitioners; and it was necessary for the team to ensure a further development of CVD prevention. Through the team, prevention of CVD was popularized in factory, community and family; and also the corresponding plan of prevention was and implemented according to the reality of population.

3. There was a guidance and collaboration of scientific research units in the project. With the guidance and collaboration of scientific research units, such as Beijing Fuwai Hospital, Anzhen Hospital and Beijing University etc., the Establishment and development of prevention and treatment network of CVD was successful with a high start point and a scientific management, in accordance with the realistic conditions of Capital Steel Corporation.

4. Explored a realized approach of CVD management. A management network was established from factory to community and from working site to residential area in behalf of the patients. No matter whether the patient was at working post of factory or retired at home, they would be managed by medical professionals until the end of his/her lifespan.

5. Prevention and treatment of CVD is a long-term systematic project. Since 35 years, intervention of healthy behavior has been implemented persistently for the whole population. The patients with CVD were monitored closely and followed up periodically. A reasonable measure of prevention and treatment was laid out according to the various monitoring parameters.

6. The prime policy of CVD control is to focus on prevention and to combine prevention with treatment. CVD results from the interaction of multiple factors. The incidence of CVD will be reduced by initiation of prevention, popularization of healthcare knowledge, as well as change of improper lifestyle. The patients with CVD have a high percentage of management and an excellent adherence to intervention. The retest rate of CVD is 80% ~ 90%, and BP control rate is 60% ~ 70%. Both incidence and mortality of CVD have decreased progressively, which suggests that the measures of intervention are quite effective.

4.2.3 Evaluation on Effects of Management

4.2.3.1. Evaluation on Effects of 20-year Comprehensive Management in Total of 2 736 Patients with Hypertension from 1974 to 1995

In the beginning of the 1970s, a mass screening of hypertension was implemented in the employees of Capital Steel Corporation, by Institute of CVD Prevention and Treatment of Capital Steel Corporation Hospital. The prevalence of hypertension in the screening was 8% ~ 12%. All detected patients with hypertension were managed uniformly and treated systematically in the year 1974. By the year 1995, the cumulated cases of management for hypertension patients reached 2 736 in 20 years.

Over the management of hypertension, the classified management was used for the patients according to their BP levels. For the patients with 95-104mmHg of diastolic BP (DBP), BP was measured monthly; for those with 105~114mmHg of DBP checked BP in every half a month; if DBP 115mmHg, did weekly. Over the period of management, electrocardiogram (ECG), ocular fundus, and routine urine, etc should be checked regularly. The two approaches of intervention, including drug and non-drug therapies, should be taken. With the persistent efforts of 20 years, the BP levels of 2 736 hypertensives declined annually with the increase of management duration (Figure4-2-3(1)).

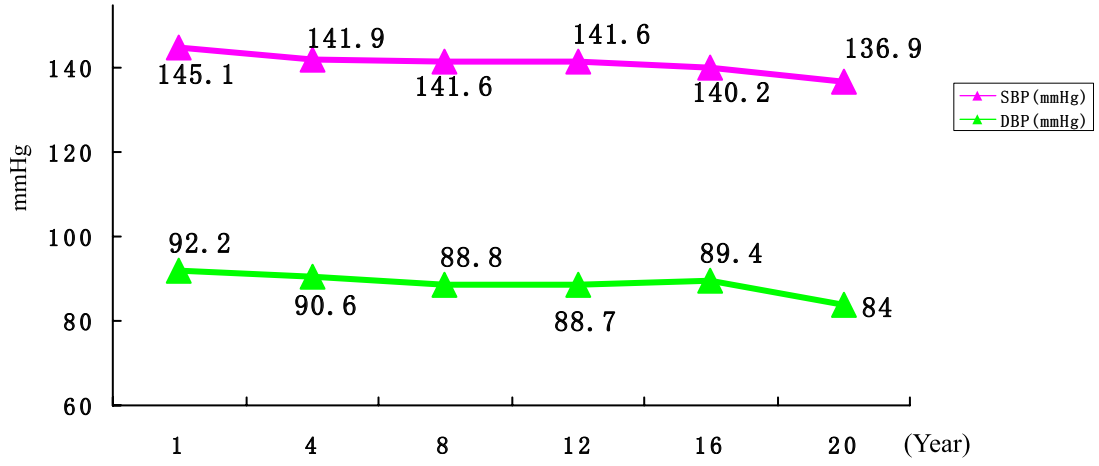

Figure 4-2-3(1) Correlation between BP Levels and the Length of Time among (Male) Hypertensives in Capital Steel Corporation Different Years of Management.

4.2.3.2 Evaluation on Effects of 28-year Surveillance of CVD in the Community of Capital Steel Corporation from 1974 to 2001

The registry of populations with cardiocerebrovascular diseases was started in 1975 in Capital Steel Corporation Hospital, according to the international standards, and made a retrospective investigation on incidence and deaths of cardiocerebrovascular diseases in 1974.

Health Education Project in the community of Capital Steel Corporation was launched in the 1980s, and 1.81 million individuals were enrolled for management in the last 28 years. The incidence of cerebrovascular diseases declined significantly, which was shown in Figure4-2-3(2). The incidence dropped from 138/100 000 to 64/100 000, and at the same time, the mortality decreased from 52/100 000 to 18/100 000. Since 1990s, the incidence and mortality of cerebrovascular diseases inclined stable, but those of myocardial infarction ascended slowly.

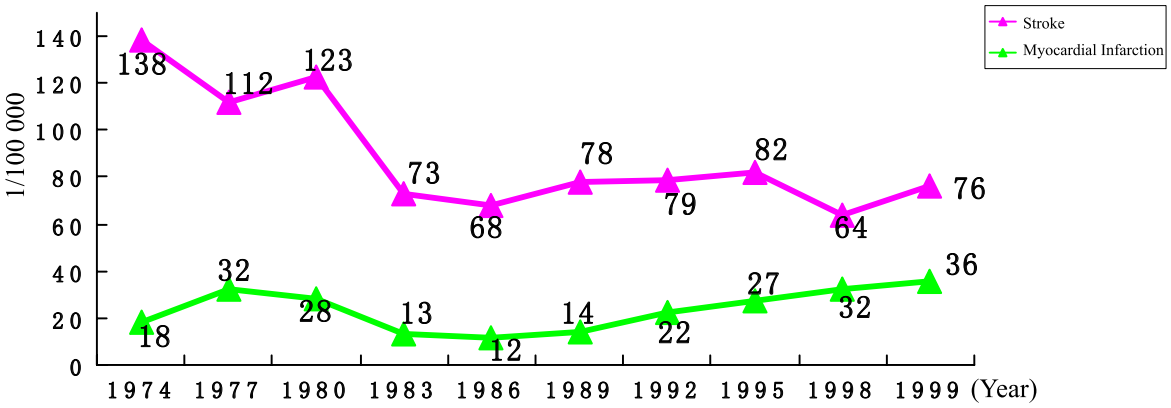

Figure4-2-3(2) Standardized Incidence of Cardiocerebrovascular Diseases in Capital Steel Corporation

The accumulated evidence from so many years of practice demonstrate that the long-term comprehensive interventions can effectively control the BP levels and curtail the incidence and mortality of stroke substantially. The experience from Capital Steel Corporation suggests that the CVD should be preventable.

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Chapter 5
Medical Expenditure of Cardiovascular Diseases

5.1 Burden of Disease of Cardiovascular Diseases in China

In World Banks World Development Report: Investing in Health published in 1993, a new indicator of Burden of Disease (BOD) was formally proposed as the disability-adjusted life years (DALYs)[1]. Since then, there has emerged a global trend of focusing on the research results concerning BOD, and by using DALYs as the indicator of BOD to identify major local health issues existing in different regions.

DALYs is a summary measure for years of life lost (YLL) due to premature death and disability years lost to disability, YLD of a given population (in a particular country or region), namely, it is not only applied to estimate YLL due to premature death, it also evaluates lost years of healthy life owing to disability. One DALY is equivalent to one lost year of healthy life and represents a gap between the current health status and an ideal situation.

In recent years, WHO has been constantly improving the calculation methods of DALYs by adopting in sequence two types of commonly used formulas (details in Notes) to measure BOD in different countries and regions (including China), however, the core content of both formulas remains the same as potential healthy life year loss due to premature death and disability. On the basis of these two types of formulas, this chapter calculates the DALYs of diabetes, coronary heart disease and stroke in China, as well as of coronary heart disease and stroke in Beijing. Meanwhile, the chapter also collects relevant data from WHO and domestic sources concerning these measurements.

5.1.1 BODs of Diabetes, Coronary Heart Disease and Stroke in Chinese Population

Table 5-1-1 lists the losses of DALYs caused by diabetes, coronary heart disease CHD and stroke in the 1980s, the 1990s and the year 2002. It can be observed that the BODs of the three diseases have increased yearly, of which, the BOD of stroke ranks the top.

Table 5-1-1 BODs of Diabetes, CHD and Stroke in Chinese Population DALYs/1 000 Persons

Year	Formula A			Formula B		
	Diabetes	CHD	Stroke	Diabetes	CHD	Stroke
1980	0.71(1980)	—	6.56(1986)	0.90(1980)	—	8.12(1986)
1990	1.23（1994）	1.77（1993）	9.23（1993）	1.59（1994）	2.30（1993）	11.93（1993）
2002	1.97	—	—	2.57	—	—
WHO Data	—	3.74*(1990)	11.21*(1990)	1.61#(2002)	3.94#(2002)	11.18#(2002)

Notes: The concrete years of DALY calculation are showed in parentheses.

* 1990 WHO data come from *World Development Report 1993*: Investing in Health [M]. Beijing: China Financial & Economic Publishing House, 1993.

2002 WHO data come from Death and DALY estimates for 2002 by cause for WHO Member States. http://www.who.int/healthinfo/bod/en/

In addition, Wang Jiansheng et al. calculated the YPLL caused by hypertension and diabetes, according to the results of year 2002 survey on nutrition and health of Chinese residents. The results of YPLL revealed a total 2.54-million years of life lost owing to premature death of hypertension (1.98/1 000 persons), and the premature death of diabetes caused a total 1.3-million years of life lost(1.01/1 000 persons).

5.1.2 BODs of Coronary Heart Disease and Stroke in Beijing

Table 5-1-2 lists the losses from DALYs caused by coronary heart disease and stroke in the 1980s, the 1990s and the year 2002 in Beijing. It can be observed that BODs of both diseases have increased yearly, among which, BOD of stroke greatly exceeded that of CHD.

Table 5-1-2 BODs of Coronary Heart Disease and Stroke in Beijing DALYs/1 000 Persons

Year	Formula A		Formula B	
	CHD	Stroke	CHD	Stroke
1984	0.89	6.95	0.79	8.59
1993	4.72	13.28	6.57	16.43
2000	7.99	17.28	11.27	22.29

Notes: DALYs of coronary heart disease in 1984 are calculated on the basis of incidence and specific death rate of AMI.

The 2000 DALYs of Stroke reflect the average BOD of both year 1998 and 1999.

In addition, the DALYs of Coronary Heart Disease and Stroke in Beijing in year 2002 was calculated by BJCDC, the value was 8.13/1 000 and 15.77/1 000 persons, respectively (Formula A)[2].

5.1.3 Parameter Selection and Data Sources for DALYs Calculation

In calculation of DALYs, the selection of various parameters was based on the unified standards of WHO global BODs, as listed in Table 5-1-3; the gender- and age-specific mortality, prevalence and incidence of diabetes, CHD and stroke, as well as the literature sources of population data in Beijing and in China nationwide totally showed in Table 5-1-4.

Table 5-1-3 Parameter Selection of DALYs Calculation (WHO)

Parameter	Value
D	Diabetes: 0.0605, Coronary Heart Disease: Male, 0.317, Female, 0.297 Stroke: 0.27
r	0.03
K	1
β	0.04
C	0.1658

Note: On the basis of 2001 WHO-published value, Parameter D for Diabetes and Coronary Heart Disease is adjusted and calculated according to the proportion[3] of diabetic complications and proportion[4] of AMI amongst Acute Coronary Heart Disease .

Table 5-1-4 Literature Sources of DALYs Calculation

	Indicator	Year	Literature Source
Diabetes	Gender and Age-specific Prevalence	2002	Wang Longde et al. ed. Survey Report of Nutrition and Health Status of Chinese Residents: 2002 Comprehensive Report[M]. Beijing: People's Medical Publishing House, 2005: 59.
	Gender and Age-specific Death Rate	1987, 1994, 2003	1. Ministry of Health, P. R. China. National Health Statistical Yearbook, 1987 and 1994. 2. Ministry of Health, P. R. China. National Health Statistical Yearbook, 2004[M]. Beijing: Peking Union Medical College Press, 2004.
Coronary Heart Disease	Gender and Age-specific Incidence and Specific Death Rate	Data from 16 Chinese Provinces and Municipalities in 1993 as well as Beijing in 2000	China Monica Research Project Led by Beijing Heart Lung & Blood Vessel Disease Institute
		Data from Beijing in 1984 and 1993	1. Wu Zhaosu, Hong Zhaoguang, Yao Chonghua, et al. SIno-monica-Beijing Study: Report of the Results between 1983～1985 [J]. Chinese Medical Journal, 1987; 100(8):611～620 2. Wang Wei, Wu Zhaosu, Zhao Dong et al. A Discussion of the Developing Trends and Influencing Factors of Mortality Rates from Acute Coronary Heart Disease in Beijing, 1984～1993 [J]. Journal of Cardiovascular and Pulmonary Diseases, 1997,16 (2):99～102
Stroke	Gender and Age-specific Incidence and Specific Death Rate	Data from Beijing and 16 Chinese Provinces and Municipalities in 1993	China Monica Research Project Led by Beijing Heart Lung & Blood Vessel Disease Institute
		Nationwide Data in 1986 and Beijing Data in 1984, 1998～1999	1. Xue Guangbo, Yu Bingxue, Wang Xiaozhong et al. Epidemiological Studies of Cerebrovascular Diseases in Rural and Urban China[J]. Academic Journal of Second Military Medical University, 1991, 12 (2): 207 2. Wu Zhaosu, Hong Zhaoguang, Yao Chonghua, et al. Sino-monica-Beijing Study: Report of the Results between 1983～1985 [J]. Chinese Medical Journal, 1987; 100(8):611～620 3. Wang Wenhua, Zhao Dong, Wu Guixian et al. An Analysis on the Developing Trends of Stroke Prevalence in Beijing, 1984～1999[J]. Chinese Journal of Epidemiology, 2001, 22 (4): 269～272
All Three Diseases	Data Sources of Gender and Age-specific Population and Death Rate	1982	1. Census Office of State Council and Division of Population Statistics, National Statistics Bureau. China 1982 Population Census Data[M]. Beijing: China Statistics Press, 1984. 2. Beijing Municipal Census Office. Third Beijing Population Census Data Collection[M]. Beijing: China Statistics Press, 1984.
		1990	1. Census Office of State Council and Division of Population Statistics, National Statistics Bureau. China 1990 Population Census Data (Volume II and IV)[M]. Beijing: China Statistics Press, 1993. 2. Beijing Municipal Census Office. Beijing 1990 Population Census Data (Volume I and II)[M]. Beijing: China Statistics Press, 1993.
		2000	1. Census Office of State Council and Division of Population Statistics, National Statistics Bureau. China 2000 Population Census Data [M]. Beijing: China Statistics Press, 2002. 2. Beijing Municipal Census Office. Beijing 2000 Population Census Data[M]. Beijing: China Statistics Press, 2002.

5.2 Sales of Cardiovascular Disease Medicine

In 2007, the total amount of medicine purchase in hospitals with 100 beds was calculated at 151.5-billion RMB; amongst which the total purchase of cardiovascular medicine was 17.98-billion RMB. The top five types of medicine were Cereb. + Periphe.Vasotherap, All Other Cardiac Preps, Calcium Antagonists Plain, Cholest &Trigly Regulator and Angiotens-II Antag. (Table 5-2-1)

Table 5-2-1 Top 15 Cardiovascular Medicine in 2007 (RMB 10 Million)

Types of Medicine	**2007**
Cardiovascular Medicine Total	179.80
Cereb. + Periphe.Vasotherap*	56.55
All Other Cardiac Preps	26.22
Calcium Antagonists, Plain	19.47
Cholest &Trigly. Regulator	11.71
Angiotens-II Antag., Plain	10.42
Coronary Therapy (Not Including Calcium Antagonists Plain and Nitrites)	8.84
ACE Inhibitors, Plain	8.22
Nitrites & Nitrates	8.15
Systemic Vasoprotectives	5.21
Beta Blocking Agent Plain	4.68
Antiadrenergic and Central Antihypertensives	1.85
Diuretics	1.78
Angiotens-II Antag., Comb.	1.19
Positive Inotropic Agents	1.04
Antiarrhythmics	0.92
Others	13.55

Note: Cereb. + Periphe.Vasotherap includes Herba Erierontis, Deproteinized Calf Blood Extractives Injection, Ginkgo Leaf Extract and Dipyridamole Injection, Ginatol, Ginkgo Biloba Extract, Egb, Interactions of Ginkgo biloba extract, Duxil, Flunarizine Hydrochloride Capsules, Mailuoning and Deproteinized Calf Blood Extractives Injection, etc..

Source: data collected by Market Research Consulting (Shanghai) Co., Ltd. Beijing Branch from over 1000 hospitals in more than 170 Chinese cities, including Chemicals and Chinese Traditional Patent Medicines that have proven curative effects and follow western formulation processes, such as Salvia Miltior. Co, Ginkgo Leaf formulation and Herba Erierontis, etc.

5.3 An Explanation on the Content and Data Quoted in this Report

The medical expenditure of cardiovascular disease in 2007: In view of the 4th National Health Service Survey, being carried out by the Center for Health Statistics Information attached to Ministry of Health in 2008, the medical expenditure of cardiovascular disease(CVD) in 2007 wont be calculated in this annual report. Instead of calculation, we described BODs and its tendency of development in the major cardiovascular diseases (coronary heart disease and stroke) and diabetes.

- DALYs Calculation:

Formula A[5] :

$$DALYs = \int_{a}^{a+l} D[KC_{xe}^{\beta x} + (1 - K)]e^{r(x-a)}d_x$$

$$= \frac{KDC_e^{\beta}}{(\beta + r)^2}\{e^{-(\beta+r)l}[1 + (\beta + r)(L + a)] - [1 + (\beta + r)a]\} + \frac{D(1-K)}{r}(1 - e^{-rl})$$

Formula B[6]:

$$DALYs = YLL + YLD$$

$$YLL = N \times L$$

$$YLD = I \times DW \times L$$

WHO announced Formula A in the year 1993 and Formula B in the year 2001. Though the core contents of both formulas all includes YLL and YLD, formula A gives a comprehensive consideration to various parameters such as disability weight, discount rate, age-weight adjusting factors, etc.; while formula B preserves merely the disability weight parameter. Therefore, in this report, we adopt the same original data in both formulas, and obtain different results. Besides, there still exist quite a few controversies concerning the DALYs calculations, such as disability weight, age-weight adjusting factors, etc..

The selected parameters (disability weight, discount rate, etc.) used for the calculation of BODs can be found on WHO official website; the data regarding the incidence and mortality of diabetes come mainly from the relevant literatures and National Health Statistics Yearbook; the gender- and age-specific mortality, incidence and prevalence rate of coronary heart disease and stroke are mainly drawn from MONICA China Monitoring Project organized by Beijing Anzhen Hospital; the data of gender- and age-specific population and mortality are provided by the national population census statistics in the years 1982, 1990 and 2000. In calculating DALYs, this report has not adopted the standard international life expectancy data recommended by WHO, instead, life expectancies in China and Beijing are calculated on the basis of the national population census statistics in 1982, 1990, 2000.

In calculation of DALYs, we used DISMOD, mainly for the following purposes:

(1) Transfer the indicator values in original data (such as age-specific prevalence, incidence and mortality without use for all-age groups) into indicator values with use for all-age groups.

(2) Due to the inconsistency at various levels existing among the prevalence rate, incidence and mortality in the original data, this report applied DisMod software to performe an internal consistency testing for those indicators, such as incidence, prevalence rate, and mortality. During the test, we also made certain adjustments to the tested indicator values , based on relevant research reports (the level of proved evidence is consistent with the requirements of the annual report) and expert consultations.

(3) By the application of DisMod, we calculated the related unknown indicators in DALYs calculation, for example, prevalence and course of disease, on the basis of those known indicators amongst the 7 indicators, such as prevalence rate, incidence, remission rate, mortality , RR value, course of disease and average age of onset.

[1]. *World Bank. 1993 World Development Report ¨C Investing in Health*[M]. Beijing: China Financial & Economic Publishing House, 1993, 25

[2]. Liu Xiuying, Wei Zaihua, Lei Haichao et al. *Studies on the BODs of 17 Diseases including Diabetes in Beijing[J]. China Health Economics, 2005, 24(12): 15～16*

[3]. Chronic Complications Investigation Group of Institute of Diabetes, Chinese Medical Association. *Retrospective Analysis on Chronic Complications and Macro-vascular Disease of Diabetes Inpatients, 1991-2000[J]. Acta Academiae Medicinae Sinicae,2002, 24(5): 447～451*

[4]. Wu Yingkai, Yao Chonghua, Wu Zhaosu, et al. *Interim Report of Sino-monica-Beijing for the Years 1985-1989[J]. Chinese Medical Sciences Journal, 1992; 7(3): 125～129*

[5]. Christopher J. L. Murray, Aian D. Lopez. Global Health Statistics: *A Compendium of Incidence, prevalence and Mortality Estimates for Over 200 Conditions. Geneva, World Health Organization, 1996*

[6]. Alan D. Lopez, Colin D. Mathers, Majid Ezzati, etal. *Global Burden of Disease and Risk Factors. Geneva, World Health Organization, 2006*