Past, Present and Future of Cardiovascular Epidemiology and Prevention

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The history of epidemiology and progress in the prevention of cardiovascular diseases (CVD) in various parts of the world were described in presentations by six speakers. In the area of research, emphasis was placed upon the need for more extensive studies including the study of CVD in women as well as examination of not only the three major risk factors of elevated cholesterol, elevated blood pressure and cigarette smoking but also of obesity, diabetes, hematostatic factors, psychosocial factors, physical inactivity, genetic factors, gene-environment interactions, etc.

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On a global basis, the picture of cardiovascular diseases (CVD) associated with life-style differ among nations, tending to decrease in some countries but contrarily showing a tendency to increase in others.

It was because of this situation that this symposium had been organized to review the accomplishments and improved understanding that have been achieved in cardiovascular epidemiology and prevention during the past 30 to 40 years, and to discuss possible future developments and future directions in this area.

In making plans for this symposium, it was decided to concentrate upon coronary heart diseases (CHD) and stroke with the intent to sharpen the focus of discussions. Six speakers were selected from various countries: Dr. Takeo Nakayama was asked to review the CVD trends in different countries; Dr. Takashi Shimamoto was requested to present the declining rate of stroke in Japan along with a review of the history and efficiency of prevention programs responsible for this improvement; Dr. J. David Curb was requested to describe the association of changes in life-style to the pattern of CVD including the experience in the NI-HON-SAN study; Dr. Millicent Higgins was asked to report on the reduction in CVD in the United States and on the history of intervention programs which had succeeded in achieving this result as well as on the role played by epidemiology; Dr. Annette Dobson was requested to speak on the experience in Australia; and finally Dr. Michael Marmot was asked to present the present status of the increased rate of CVD in Eastern Europe and the background factors involved.

Because of the concern over the possible future increase of CVD in the developing countries, consideration had been given to selecting speakers from such areas, but unfortunately this was not possible at the present meeting in view of the limited time of only two hours available for this symposium and because of the paucity of epidemiologic data in such regions.

This symposium was held on the morning of August 29, 1996 with the participation of a large epidemiology-oriented audience. This was a very significant meeting with much active discussions.

A brief outline of the presentations by each speaker and discussions will be given.

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SUMMARY OF EACH PRESENTATION

1. "Secular Trends in Death Rates from Ischemic Heart Diseases and Cerebrovascular Diseases in Selected Countries" by Dr. Takeo Nakayama

Dr. Nakayama used the World Health Statistics Annual of WHO as the source of data to compare age-adjusted death rates for CHD and stroke in various countries and to describe recent trends in some of these nations.

The data for 1994 showed the death rate for CHD of males to be the highest, in decreasing order, in Hungary, former Czechoslovakia, United Kingdom, Ireland and Finland. Countries with the highest death rate for stroke of males, in decreasing order, were Bulgaria, Hungary, Portugal, former Czechoslovakia and Poland. Conversely, the lowest death rates for CHD were noted in Japan, France, Spain, Portugal and Italy, and the countries with the lowest death rate for stroke were Switzerland, Canada, United States of America, France and Australia.

In addition to an international comparison of the present status, an examination also was made of secular trends between 1970 to 1994. The age-adjusted death rates for CHD and stroke have tended to decline in the United States of America, Australia, Western and Southern Europe and Japan, while conversely the death rate for these conditions have tended to increase in Eastern European countries.

For the developing countries, the paucity of epidemiologic data on the present status and secular trends of CVD did not permit an examination of the situation in these areas.

CVD is closely associated with life-style, and the present status and secular trends were reported to differ among nations, but the limited time allocated to Dr. Nakayama did not permit mention of the background factors involved, and this discussion was left to the next speakers.

2. "Trends for Cardiovascular Risk Factors and Disease in Japan" by Dr. Takashi Shimamoto

Dr. Shimamoto presented the trends for cardiovascular risk factors and CVD which were determined for a rural community in North-Eastern Japan between the 1960's to the 1990's, and discussed the various factors involved in the decline of CVD in that community. Although the North-Eastern area of Japan is well known as having a high rate of stroke, mortality from stroke in this region has declined remarkably during the past 20 years. The community being followed by Dr. Shimamoto's group has also seen a 75% decrease in the age-adjusted incidence of stroke between the 1960's and the 1990's. Not only the incidence for stroke but the number of severely disabled patients including bed-ridden patients also has been reduced to half.

A population hypertension control program was initiated in this community in the early 1960's, and this has resulted in a steady decline in population blood pressure levels. Underlying this improvement was not only medical treatment for high risk hypertensive individuals but also the decrease in mean salt intake from 20 g to 14 g per day per person, indicating the efficacy of the population strategy. The nutritional status, which is closely associated with the occurrence of stroke, also improved with increased intake of meat, eggs, milk and dairy products. This resulted in improvement of mean serum total cholesterol levels from 152 mg/dl to 185 mg/dl in males during this period. A further change in life-style, however, is not necessarily desirable, since an increase in CHD may be produced as a consequence of an excessive change.

On the other hand, the trends in Japan as a whole, however, have demonstrated an increasing prevalence of stroke, particularly among elderly people, indicating the need to strengthen primary prevention of stroke mainly through hypertension control.

3. "The NI-HON-SAN Study" by Dr. J. David Curb

Dr. Curb described the accomplishments and recent findings of the NI-HON-SAN Study, which is a well known comparative study of CVD in the Japanese living in Japan and in the United States to determine the influence of life-style changes upon the pattern of CVD, and cautioned that the consequence of an excessive change to a Western life-style in developing countries may increase CHD.

The NI-HON-SAN Study was inaugurated in 1965, and is a comparative study of CVD and associated risk factors in Japanese males born between 1900 to 1919 living in Japan, Hawaii, and San Francisco. Early comparisons showed the prevalence of stroke to be the highest in Japan, intermediate in Hawaii, and the lowest in California. The trends for the prevalence of CHD in these three areas on the other hand were found to be completely opposite to those of stroke. Comparisons of risk factors demonstrated no difference in blood pressure levels, whereas the mean serum cholesterol level and body mass index were the lowest in Japan. A major difference in intake of total and saturated fats was noted between these three areas with the lowest values noted in Japan.

Unfortunately, follow-up of the California cohort had been discontinued in the early period, and comparative follow-up studies were conducted only in Japan and Hawaii. Follow-up over 12 years have shown the CHD mortality to be 40% higher in Hawaii. Examinations of risk factors have demonstrated that age, blood pressure, serum cholesterol, serum glucose, cigarette smoking, and alcohol intake (inverse) are all significant predictors of CHD mortality.

A new comparative study called the Nippon Honolulu Mortality Among Japanese International Collaboration (NIHON MAJIC) was recently begun to examine in further depth the pattern of CVD associated with changes in life-style.
The NI-HON-SAN Study demonstrated that a change to a Western life-style had a favorable effect in reducing stroke but conversely resulted in increase of CHD. The message to be noted is that an excessive change to a Western life-style should be avoided in developing countries, where rapid economic growth is taking place.

4. "Past, Present and Future of Cardiovascular Epidemiology and Prevention in the U.S.A." by Dr. Millicent Higgins

Dr. Higgins described the history of CVD epidemiology in the United States of America, and presented the resulting knowledge concerning prevention and their effective application in CVD measures. She further commented on future directions in CVD epidemiology and prevention.

Concern over the increasing CHD death rate in the United States of America and the observed international difference in CHD mortality led to the conduct of a number of early studies (Framingham Heart Study, Seven Countries Study, NI-HON-SAN Study, etc.). Although these studies mainly concentrated on the examination of males, they demonstrated elevated serum cholesterol and blood pressure levels, cigarette smoking and diet to be risk factors. Subsequent intervention trials showed that prevention of CHD was possible by drug treatment and changes in life-style, and CVD preventive programs were initiated. A decline in CHD mortality occurred from the later 1960's, and the wider use of drug treatment and improvements in life-style were probably responsible for this trend.

Recently, an increasing number of epidemiological studies of women have been conducted, and studies of risk factors have been extended to include obesity, diabetes, hematostatic factors, psychosocial factors, physical inactivity, and genetic factors.

The prevention of CVD requires the effective combination of the population strategy, which involves amelioration of confirmed life-style related risk factors such as undertaken in the National Education Program, and the high risk strategy.

Future studies are expected to provide more information on the interaction between genetic and environmental factors, and may even reveal protective factors. Drug treatment and the wider use of preventive measures will lead to the further reduction of CVD occurrence, and the low socio-economic groups and the elderly deserve attention as the target of such efforts.

5. "Past, Present and Future of Cardiovascular Disease in Australia" by Dr. Annette J. Dobson

Dr. Dobson presented the temporal trends and present status of CVD in Australia based on official mortality data of Australia, CHD incidence data from the WHO MONICA project, and national data on coronary procedures and medications.

In Australia, mortality rates for all causes, CHD and stroke have clearly tended to decline, and the occurrence of non-fatal coronary events similarly have decreased. The levels of all three major risk factors of elevated blood cholesterol, high blood pressure, and cigarette smoking also have tended to be reduced.

In spite of this tendency, optimism can not be allowed to prevail since, even though CVD rates has declined, the total medical costs of CVD treatment have increased. The increase of medical and surgical procedures are responsible for this, along with the greater use of expensive drugs. This rise in medical costs occurred after the decline of CVD began, and demonstrates the expensive nature of the high risk approach.

A reappraisal of the population strategy which offers greater benefits at less cost is called for, and more attention should be directed at reduction of cigarette smoking, improvement of diet, and increase of physical activity. The major issue of overweight also deserves attention.

6. "East-West Difference in Coronary Heart Disease and Life Expectancy in Europe" by Dr. Michael Marmot

Dr. Marmot described the trend of increased CVD in Central and Eastern Europe, and discussed why this increase of CVD had occurred in contrast to Western Europe.

Life expectancy did not differ between countries of Central and Eastern Europe and countries of Western Europe during the 1950's and early 1960's. In the later part of the 1960's, however, a major difference developed. Due to a reduction in CHD mortality, improvement in life expectancy occurred in Western Europe, whereas, to the contrary, an increase in CHD mortality occurred in Central and Eastern Europe, resulting in no change or, in some countries, a shortening of life expectancy. The reason for the increased CHD mortality in Central and Eastern Europe is not clear, but the smoking rate and cholesterol level do not differ greatly from that in Western Europe. Psycho-social factors may be playing a major role. For example, a study in Hungary reports that mortality is higher among single, widowed and divorced men in comparison with married men.

The unstable political, economic and social conditions in Central and Eastern Europe possibly may underlie the increase of CHD.

CONCLUSION

The past and present status of CVD epidemiology and prevention in various countries were described in the presentations by the six speakers.

In the area of research, the need for more extensive studies including the study of CVD in women as well as examination of risk factors including not only the three major risk factors of elevated cholesterol, elevated blood pressure and cigarette smoking but also of obesity, diabetes, hematostatic factors, psychosocial factors, physical inactivity, genetic factors, gene-
environment interactions, etc. was recognized. There further is a need to convey to developing countries the message that the possible consequence of an excessive change to a Western life-style may increase CHD.

The population strategy and high-risk strategy were described for CVD prevention, but the cost of the high-risk strategy is relatively high, and the efficacy and usefulness of the more economical population strategy were stressed.