



Atherosclerosis: The 21st Century Epidemic



Gruppo di lavoro 31 maggio - 1 giugno 2010 – The Pontifical Academy of Sciences, whose purpose is to promote the progress of the sciences for the common good of the human person, in its Study Week of 31 May – 1 June 2010 at its headquarters in the Vatican, would like to focus on the wellbeing of the vascular system, taking into account the revolutionary contributions of the last century in relation to the human heart and brain. Vascular Disease accounts for 15 million deaths per year worldwide. This represents 30% of all causes of mortality. Most vascular deaths are secondary to brain and heart infarctions. Stroke (cerebrovascular disease) ranks as 1st, 2nd and 3rd cause of death depending on the country or world region. Public recognition of cerebrovascular disease lags significantly behind identification of coronary artery disease.

Risk factors for Vascular Disease: known and treatable...

Genetic predisposition, hypertension, diabetes, cholesterol, smoking, lack of exercise and obesity are the main risk factors that predispose to the occurrence and progression of atherosclerosis. Increased blood pressure causes heart, brain and kidney disease and accounts for 13% of all deaths worldwide. Hypertension is easily identified and treatable, yet only 2 out of 3 patients are diagnosed and up to 80% of those diagnosed are treated but do not reach target blood pressure goals. Hypertension accounts for 54% of stroke and 47% of coronary heart disease deaths. With 1 billion people affected, the prevalence of hypertension is increasing worldwide. Against deeply rooted medical traditions, recent data has shown that patients older than 80 years also benefit significantly from strict blood pressure management.

Actively screening and treating hypertension, cholesterol and diabetes are justified since more than 50% of vascular deaths are due to few risk factors. Moreover, different studies have shown that coronary heart disease and stroke share the same risk factors. Importantly, the most important vascular risk factor is a previously suffered vascular event. This emphasizes the importance of stringent medical treatment of conventional and other vascular risk factors once a cardiac, cerebral or other vascular event has occurred. Data from the Framingham study has shown that, counter intuitively, most vascular events occur in people with a moderate load of vascular risk factors.

How is Vascular Disease distributed throughout the world?

In low income countries, vascular disease accounts for 80% of all deaths (11 million per year). In these regions, cardiovascular disease occurs 1 to 2 decades earlier compared to developed countries. Sadly, because of a high case fatality rate, prevalence of cardiac and cerebrovascular disease in developing areas is lower compared to the developed world. Epidemiological studies from developing regions are scarce and often of limited reliability. Good epidemiology studies are costly, complex and demanding and resources in developing countries are limited. The details on the distribution and characteristics of Vascular Disease in the developing world are needed to identify the areas in greater need to distribute resources accordingly. Surveillance data helps countries to develop, implement and monitor prevention programs. If Governments do not include health policy changes in their agendas, in the next five years non communicable vascular diseases will overcome

infectious diseases (TB, HIV and malaria) as the number one cause of death in countries such as India and China. In the latter, there are about 300 million smokers, 160 million hypertensive people and 20% obese children between 7 and 17 years of age, something unknown to this region in the past.

Cognitive decline: a major health burden caused by Vascular Disease

Dementia poses a large burden of disease worldwide. Cerebral vascular injury causes cognitive impairment and dementia with a frequency similar to degenerative dementia. For a given load of neuropathology findings of Alzheimer's disease, the presence of cerebrovascular disease correlates with earlier clinical manifestations. Some authors have speculated and provided data to support that hypertension results in decreased cerebral blood flow in brain structures commonly affected by Alzheimer's disease predisposing a vulnerable state for the development of degenerative dementia. Increased blood pressure and cholesterol in the 4th and 5th decades of life correlate with dementia onset in the 7th decade.

There is a major 'implementation' problem by which the known measures and medications to prevent vascular disease are largely under-used

Prevention is the first step in the cure for Vascular Disease. Yet, there is a major gap between knowledge and the implementation of measures for primary as well as secondary vascular disease prevention. Effective treatments for the acute and chronic phases of coronary and cerebrovascular disease are largely underused. The scientific community and Governments through their Ministries of Health are responsible for the effective implementation of policies that achieve lower smoking rates, increased physical activity, healthy eating habits, and high detection rates for hypertension, diabetes, abnormal lipids and other vascular risk factors. Stroke Units, proven effective by scientific evidence, should be available in most clinics/hospitals with Coronary Units. There is no doubt that significantly more interest is devoted to acute and invasive techniques compared to prevention. And it is paradoxical that patients have artificial heart valves inserted with endovascular techniques and cerebral clots removed with cork-screw like devices, among other novel techniques, but various studies have shown that patients are frequently discharged from hospitals following a vascular event without the adequate dose of anti-thrombotic, anti-hypertensive or cholesterol lowering medications. However, a measure as simple as counseling during hospitalization has been proven to increase adherence to treatment after discharge from the Hospital. The general public and physicians need to be educated on the importance of vascular disease prevention. This teaching takes time but it is most effective when it starts as early as childhood. Healthy young adults must understand that a vast majority have vascular risk factors that justify treatment in the asymptomatic stage.

The Challenge: Effective Prevention of Vascular Disease

The knowledge on vascular disease that has accumulated over the last decade is greater than that gained in the entire previous century. Commitment with vascular disease prevention has resulted in a 70% death reduction in the USA, Canada, Australia and the UK.

Primary prevention provides an invaluable opportunity for early intervention. Unfortunately, data shows that the people at highest risk have the lowest knowledge about vascular disease. In one study following an education campaign in the year 2000, respondents could only name one warning sign of stroke. In one survey in India, close to 50% of respondents did not know that the brain is the affected organ in stroke. In countries from Africa and Latin America, up to 50% of patients go to alternate medical healers before consulting in a Hospital. As an example, only 50% of people diagnosed with atrial fibrillation receive anticoagulants and just 1% of patients are treated among those who are candidates to receive thrombolytic therapy in the first few hours after occlusion of a cerebral vessel. The pharmaceutical industry is a major player in the vascular disease battle. Many subsets of the world's population could benefit from a 'polypill' simultaneously targeting various vascular risk factors. Among the important achievements to be expected in this sector is the production of affordable medications through the conduction of affordable trials. Large amounts of money are invested by the pharmaceutical industry and biotechnology companies in research and development of new therapeutic molecules. The scientific community should increase the interaction with the industry and influence the research lines likely to have a novel and higher therapeutic yield.

Conclusions

If the vascular disease burden could be reduced 2% per year, 36 million untimely deaths could be avoided by the year 2015. The World Health Organization has provided data showing that 80% of cardiac events and strokes could be reduced with diet, physical activity and smoking cessation. There is also data proving that 80% of stroke risk would be reduced with adherence to practice guidelines. A wealth of studies has proven the effectiveness of cardiac and stroke units. Yet, with the exception of a few developed countries heading in this direction, results in most world regions drift far from these projections.

In summary, preventive measures that should begin during childhood are needed to educate individuals on how to avoid the most common risks of vascular disease. In addition to the former, disease specific information should be provided to the population as a whole. Behavioral changes at the community level could be expected following effective education and information programs. Active Government participation and commitment with the appropriate health policies are a sine-qua-non to achieve these goals. The Health System, Unions, and other health players should understand the social and financial benefits of vascular disease screening and prevention programs. Vascular Disease is the field of interest for Cardiologists, Vascular Neurologists, Diabetes, Lipid, Genetics and Nutrition experts, Epidemiologists, Vascular Surgeons, and Endovascular specialists. They all have an increasingly larger number of specialty meetings and seldom participate in strongly integrated conferences. Pulling the rope in the same direction will surely increase the yield in the battle against Vascular Disease. A closer cooperation among the different vascular specialties should be encouraged and the integrated meeting of most vascular disciplines at the Pontifical Academy of Sciences, is a significant contribution to this endeavor. The moral imperative of our meeting is to make people and private and public institutions, at the national and international level, aware, as was done in the case of alcoholism, drug addiction and smoking, that most risk factors are either under treated or simply not treated, and convince them to adopt adequate precautions in order to avoid premature death or survival with physical and/or mental impairments.

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