Introduction
A worldwide aging population raises concerns about the social and economic resources required to manage the growing number of elderly patients with cardiovascular disease. Coronary heart disease is a major cause of death in both elderly men and women and hypertension (either systolic/diastolic or isolated systolic) is considered a major risk factor for this condition. In the past, the prevailing medical opinion was to ignore elevated blood pressure in the elderly since the belief was that anti-hypertensive drugs could not improve the outcome in these cases. However, it is now accepted that effective treatment of Isolated Systolic Hypertension (ISH) or systolic/diastolic hypertension can reduce the morbidity and mortality of coronary heart disease in the elderly. Data from the Framingham Heart Study and other sources show that SBP is a better predictor of cardiovascular disease risk than DBP, especially for those over 60 years of age.

Background
Hypertension is a common problem in elderly patients (aged more than 65 years) reaching a prevalence as high as 60 to 80 percent. In particular, Isolated Systolic Hypertension (ISH) increases in frequency with age and in the past was generally defined as a systolic blood pressure (BP) above 160 mmHg, with a diastolic BP below 90 mmHg; however a systolic pressure of 140 mmHg is now regarded as the upper limit of normal at all ages. In the elderly, systolic blood pressure is more strongly related with cardiovascular complications — especially stroke, ischaemic heart disease, heart failure, end-stage renal disease, and all-cause mortality. Treatment of isolated systolic hypertension or systolic/diastolic hypertension in elderly patients is associated with a reduction in adverse coronary outcomes.

ISH is thought to arise primarily from stiffening of the large arteries, with a resultant reduction in distensibility and elasticity. It should be noted that although the elevation in pulse pressure in patients with ISH is primarily due to diminished arterial compliance, ISH may also result from an increase in cardiac output due to anaemia, hyperthyroidism, aortic insufficiency, arteriovenous fistula or Paget’s disease of bone.

Pathophysiology
Hypertension in the elderly is composed mostly of essential hypertension, but the pathophysiology of essential hypertension in the elderly differs in many respects from that of essential hypertension in the young or middle-aged. Isolated systolic hypertension is divided into two types, the so-called “burned-out” and “de novo” types. The former generally develops in middle age as essential hypertension, and becomes systolic hypertension as the diastolic blood pressure is reduced due to the aging process, while the latter develops in old age due to reduced vascular compliance in the large arteries. In addition, there are some cases with secondary hypertension due to identifiable causes such as renovascular hypertension.

The development of ISH with increasing age is explained by a deterioration of arterial compliance, in particular that of the large conduit arteries. Such increasing arterial stiffness is caused by structural and functional changes in the vascular wall, affecting collagen, extracellular protein matrix, and elastin. The proliferation of connective tissue results in intimal thickening and fibrosis. The increasing vascular stiffness causes a reduction in arterial compliance and the decrease of the ‘Windkessel function’ of the large arteries. Accordingly, pulse pressure and pulse wave velocity increase, associated with an earlier and enhanced reflection of pressure waves from the periphery thus causing a dispropr-
tionate increase in systolic blood pressure. Diastolic blood pressure, however, does not increase and may even be lowered as a result of increased arterial stiffness.

In the elderly, it has been reported that systolic blood pressure is more strongly related with cardiovascular complications – especially stroke, ischaemic heart disease, heart failure, end-stage renal disease, and all-cause mortality – than is diastolic blood pressure. Furthermore, it has been demonstrated that increased pulse pressure (the difference between systolic blood pressure and diastolic blood pressure) is correlated with an increased risk of such complications.

**Treatment**

Hypertension in the elderly can be characterised by any of the following:
- increased total peripheral vascular resistance
- decreased compliance of large and middle arteries
- a decrease in cardiac output and circulating blood volume
- increased lability of blood pressure due to age-related decrease in baroreceptor function
- dysfunction of autoregulation in important target-organs such as the brain, heart, and kidney

Therefore, hypertension in the elderly must be treated with special caution, taking the above-mentioned pathophysiological characteristics into consideration. In addition, as with other diseases in the elderly, it is necessary for the physician to pay close attention to the activities of daily living (ADL), quality of life (QOL) and drug compliance of the patient.

**Approach to therapy**

In general, a small dosage of a diuretic is chosen as initial therapy for most elderly patients with hypertension. It is important to remember that compared with younger patients, the elderly require smaller dosages, such as 12.5 mg to a maximum of 25 mg per day of hydrochlorothiazide or its equivalent. A combination of a thiazide and a potassium-sparing agent may be indicated, although hypokalaemia is not usually a major problem with low dose diuretic therapy.

Figure 1 illustrates how the specific therapy may be guided by the presence of other disease. For example, patients with angina may be treated with a beta blocker or, in some situations, a calcium channel blocker; patients with diabetes mellitus should probably receive an ACE inhibitor or A-II receptor blocker (plus a diuretic), and patients with heart failure should probably receive an ACE inhibitor or A-II receptor blocker (plus a diuretic and digitalis).
In patients with isolated systolic hypertension (ISH) a long-acting dihydropyridine calcium channel blocker may be an alternative therapy, particularly if they cannot take a diuretic or respond poorly to diuretic therapy.

Combination therapy may also be effective in elderly patients, for example a diuretic may be given with an ACE inhibitor or an A-II receptor blocker. Alternatively an ACE inhibitor and a calcium channel blocker may be useful in some patients. When a drug other than a diuretic, including a combination therapy is used as initial therapy, a diuretic should be added if the response is inadequate.

In general, elderly patients adhere to antihypertensive drug therapy at least as well as younger patients, and they tolerate medication if it is administered properly. Postural hypertension may be a problem and standing blood pressure should be used to guide therapy.

In a Swedish trial, therapy with three beta-blockers was compared to therapy using a diuretic with a potassium sparing component and showed that systolic blood pressures were reduced to a greater degree with the diuretic than with the beta blockers. Diastolic blood pressures were reduced to the same degree with all agents. The same findings have been noted in other studies.

The superior blood pressure lowering response to diuretics may explain some of the outcome differences in trials conducted in elderly patients with hypertension. For example, the British MRC trial conducted in 1992 showed a reduction in events associated with coronary heart disease and stroke on diuretic therapy whereas beta blocker therapy did not produce a statistically significant reduction in these events.

**Conclusion**

Antihypertensive drug therapy can reduce blood pressure to below 140/90mmHg in up to 70 percent of elderly patients with hypertension. This percentage is lower than the control rates in younger patients with hypertension, yet even a decrease in systolic pressure of 15 to 20mmHg may be useful in reducing events related to coronary heart disease in the elderly.

**References:**