Hypertension is increasingly prevalent in Canada and around the world. Within an aging society such as ours, hypertension plays a leading role in the development of cardiovascular disease. A recent population-based survey estimated the prevalence of hypertension to be 21.1% among Canadians aged 18 to 74 years. In the U.S., approximately 25% of American adults (50 million) have hypertension. The prevalence of hypertension is higher in older persons, with at least 50% of Canadians over the age of 65 having this condition.
Hypertension is a risk factor for myocardial infarction, congestive heart failure, stroke, renal failure and dementia. Elderly women and black patients are at particularly high risk of complications related to hypertension. In recent years, it has been recognized that systolic blood pressure is a stronger predictor of cardiovascular disease than diastolic pressure. Isolated systolic hypertension, commonly diagnosed in older patients, is a particularly hazardous condition. The relationship between blood pressure and cardiovascular disease risk is continuous, and is dependent upon the several other disease risk factors, and is modified by the presence or absence of co-existing cardiovascular disease risk factors. The majority of hypertensive adults have at least one co-existing cardiovascular risk factor. Appropriate treatment of hypertension lowers the risk of cardiovascular morbidity and mortality, including the risk of myocardial infarction, stroke and heart failure.

Despite significant advances in the understanding, diagnosis and treatment of hypertension, there remains a large care gap in Canada in the management of hypertension. A recent study by Joffres demonstrated that 43% of Canadians with hypertension were unaware of their condition and were thus untreated. Of the remaining 57% of people with hypertension, 22% were untreated, 21% treated but uncontrolled, and only 13% were treated and controlled. The National Health and Nutrition Examination Surveys (NHANES) have shown that awareness of hypertension has improved in the U.S. over the past 25 years, as has the treatment of hypertension (from 10% to over 27%; see Table 1). However, despite increasing awareness and treatment options, the majority of North Americans with hypertension still remain untreated. Similar observations exist in many Western European countries.

Multiple, randomized, controlled, clinical trials have proven that treatment of hypertension reduces the risk of cardiovascular events. Over the past three decades, multiple new classes of effective antihypertensive agents have become available and have been shown to have comparable efficacy in lowering blood pressure. Significant reductions in morbidity and mortality attributable to hypertension have been noted during the same period. Age-adjusted death rates from stroke have declined by 60%, and coronary heart disease deaths have fallen by 53%. However, the rate of reduction in cardiovascular mortality and morbidity has slowed since the early 1990s, and since then, the prevalence of congestive heart failure and the incidence of end-stage renal disease have increased substantially. Table 1 also demonstrates a relative slowing between 1988 and 1994 in the growth of awareness, treatment and control of hypertension. It has also been noted that there are socioeconomic, regional and ethnic variations in the prevalence of hypertension. Thus, considerable gains remain to be realized at a population level through more effective detection and management of hypertension.

**PERSPECTIVE**

Hypertension is defined as systolic blood pressure (SBP) of 140 mmHg or greater, diastolic blood pressure (DBP) of 90 mmHg or greater, or the need for antihypertensive medication. The Sixth Report of the Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure (JNC-VI), has proposed a classification of blood pressure that has been widely adopted in many countries, including Canada (see Table 2). Although the relationship between blood pressure and risk is continuous, arbitrary cut-offs between normal and abnormal blood pressure allow clinicians to focus on those at highest risk. A new category of “high normal blood pressure” has been added to reflect the continuous relationship between blood pressure and cardiovascular risk. It is imperative to diagnose hypertension appropriately, since such a diagnosis usually involves long-term therapy. Thus, accurate measurement technique and verification of elevated blood pressure on multiple occasions over time are important.

Blood pressure should be measured with the patient seated in a chair with his or her back supported, arm supported at heart level, and following five minutes of rest. Smoking and ingestion of caffeine should not have occurred within 30 minutes prior to having blood pressure measured. An appropriate-sized cuff should be used, with the bladder encircling at least 80% of the arm. A large cuff should be available when needed. A mercury sphygmomanometer is recommended for measurement, although a validated electronic device may be used. The first appearance of sound should be recorded as SBP, and the disappearance of sound as the DBP. At least two readings, separated by at least two minutes, should be recorded and averaged. In the absence of indications for immediate or urgent treatment of hypertension, blood pressure should be measured at several visits prior to establishing a diagnosis of hypertension. Verification of elevated blood pressure in the contralateral arm should be made and recorded on at least one occasion. Self-measurement of blood pressure may provide valuable information in establishing the diagnosis of hypertension and in determining the response to treatment. White-coat hypertension, in which clinic blood pressure is often higher than ambulatory blood pressure, may be present in up to 53% of patients with hypertension. White-coat hypertension is associated with a lower cardiovascular risk than is sustained hypertension; still, it may be a precursor of sustained hypertension and requires ongoing surveillance. Validated electronic blood pressure measurement devices are appropriate for self-measurement, but they should be periodically compared to recordings taken with a mercury device. Finger monitors have significant potential for inaccuracy and should be avoided.

Ambulatory blood pressure measurement over a 24-hour period can also provide useful information in the treatment and risk-stratification of hypertensive subjects. Considerable evidence suggests that ambulatory blood pressure tends to be lower than...
Clinic blood pressure and correlates better with markers of target organ damage such as left ventricular hypertrophy. Although evidence is lacking regarding the benefit of treatment decisions made on the basis of ambulatory blood pressure recordings alone, it does appear that patients with normal ambulatory measurements, despite elevated clinic blood pressure, may be a lower-risk group of patients with hypertension. Normal ambulatory blood pressure values are below 135/85 mmHg during waking hours and below 120/75 mmHg during sleep.

The evaluation of the patient with hypertension has three main objectives: to exclude secondary causes of hypertension, to determine the presence or absence of target organ damage or cardiovascular disease, and to diagnose and treat co-existing cardiovascular risk factors. Thus, hypertensive patients should undergo a thorough medical history and examination, which should include measurement of height, weight and waist circumference. Fundoscopic examination and evaluation of all palpable pulses are critical components of an organized approach for the detection of target organ damage. In addition, certain investigations are routinely indicated in patients with hypertension. These include complete blood count, urinalysis, electrolytes, fasting glucose, urea, creatinine, 12-lead electrocardiogram, and a fasting lipid profile including triglycerides and low-density lipoprotein (LDL-C) and high-density lipoprotein (HDL-C). Essential hypertension is the diagnosis in over 90% of cases. In patients with severe or refractory hypertension, or with significant clinical or laboratory abnormalities, secondary causes such as renal disease, adrenal hypertension (Cushing’s), pheochromocytoma and renovascular hypertension should be excluded. Most of these conditions can be suspected by a careful history and physical examination (for example, renal brut in renovascular hypertension, or intermittent hypertension with diaphoresis and headache in pheochromocytoma).

In some patients, additional tests may provide useful information, particularly for risk stratification but occasionally for decisions regarding treatment. These tests include uric acid, urine microalbumin, creatinine clearance, serum calcium, thyroid-stimulating hormone (TSH) and glycosylated hemoglobin. In patients with a fourth heart sound (S4), or with electrocardiographic suspicion of left ventricular hypertrophy (LVH), echocardiography may be warranted to confirm the presence or absence of LVH, a powerful predictor of risk in hypertension.

The risk of cardiovascular disease in people with hypertension is further influenced by the presence or absence of target organ damage and concomitant risk factors or conditions. Thus, each patient with hypertension should undergo risk stratification during routine evaluation, which may then allow for appropriate timing and selection of antihypertensive therapy (see Table 3, page 5).

**TREATMENT**

The primary objective of treating hypertension is to prevent cardiovascular disease and death. This is best achieved by lowering SBP to below 140 mmHg and DBP to below 90 mmHg, and by parallel control of other modifiable risk factors. In certain patient populations, additional benefit may be realized by lowering blood pressure even lower, such as in patients with advanced renal disease, diabetes and congestive heart failure. The benefit of lowering blood pressure on reducing morbidity and mortality has been demonstrated in mild, moderate and severe hypertension, as well as in malignant hypertension. As risk rises with higher blood pressure and additional risk factors, a more aggressive treatment strategy is warranted, with a resultant greater absolute reduction in risk.

All patients with hypertension should initially be counselled regarding the importance of lifestyle modifications to lower blood pressure and prevent complications. This topic should be periodically revisited in future health encounters to promote compliance with lifestyle measures, which can be difficult to implement and maintain. Such modifications can prevent hypertension, lower blood

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**Perspective**

As primary care practitioners, we are on the front lines of hypertension treatment. To a large extent, the future well-being of our patients depends upon our ability to identify and effectively treat this common condition. While the prevalence of hypertension in the general population is 21%, the incidence of hypertension in the population we see in the office is actually much higher due to the increased burden of disease and comorbidities. We know that almost half (43%) of patients with hypertension are undiagnosed. One of the biggest contributions that family physicians can make to society is to identify this population.

**Diagnosis**

Blood pressure should be measured and recorded for virtually every adult patient at every visit. Any patient with a blood pressure at three consecutive readings greater than 140/90 mmHg should be treated aggressively, with treatment adjusted until blood pressure is below this level. In patients with diabetes, the target level is less than 130/80 mmHg.
pressure, minimize the number of required antihypertensive agents, and have a positive influence upon co-existing risk factors, such as diabetes and hyperlipidemia. A successful lifestyle program requires a systematic team approach incorporating various health-care professionals, community resources and family members. Table 4 on page 7 highlights the main recommended lifestyle modifications for all patients with hypertension as taken from JNC-VI. The need for weight loss is best determined by calculation of body mass index (BMI) rather than by measurement of weight alone and may be further refined by inclusion of waist circumference. Elevated BMI (≥ 27) and increased waist circumference (≥ 90 cm) are both closely correlated with elevated blood pressure and with increased cardiovascular mortality. Of note, increased waist circumference is also closely correlated with the metabolic syndrome, a condition that includes atherosclerosis and pulmonary hypertension.

Limited alcohol and dietary sodium intake may apply to subsets of patients with hypertension but may have general health benefits as well. Sodium restriction may be particularly beneficial in elderly patients, in whom salt sensitivity is common. Moderately intense physical activity on an almost daily basis can have considerable health benefits beyond lowering of blood pressure and can be accomplished by most patients in a safe and inexpensive manner. Smoking cessation is a necessary part of any lifestyle modification program that is initiated to reduce global risk of cardiovascular disease. The effects of lifestyle interventions on major cardiovascular outcomes in hypertension remain unproven, since most clinical trials in this area were underpowered or of insufficient duration to detect a clinically relevant effect. Furthermore, the sustainability of such interventions remains in doubt, at least based upon the same clinical trials. However, such behavioural changes should be encouraged since they are inexpensive, safe and likely to be associated with benefit.

In patients with milder degrees of hypertension without associated target organ damage or established cardiovascular disease, a trial of lifestyle modification for six to 12 months may be appropriate before initiating pharmacologic therapy. However, in patients with more severe hypertension, or those with clear evidence of target organ damage or established CVD, lifestyle and pharmacologic intervention should be instituted in parallel and without delay (see Figure 1, page 6).

In recent years, numerous clinical trials have been completed in the area of hypertension therapy. As a result, treatment targets have been lowered and refined based upon additional markers of risk, such as the presence of co-existing diabetes, nephropathy and congestive heart failure. The Hypertension Optimal Treatment (HOT) trial demonstrated that optimal outcomes were associated with a diastolic blood pressure of approximately 83 mmHg, in people with diabetes, the optimal DBP was even lower. In the HOT study, lowering DBP below the optimal level was not associated with any additional risk. The United Kingdom Prospective Diabetes Study (UKPDS) trial in patients with diabetes revealed that

Although many ARBs are metabolized via the CYP450 pathway, eprosartan is not, and is therefore an attractive option for patients susceptible to drug interactions, such as people with diabetes with nephropathy, or elderly patients who are taking a number of different medications.

There is so much literature and conflicting studies about this subject that it is necessary for family practitioners to use established and respected evidence-based guidelines for the effective treatment of hypertension. A treatment algorithm will help us to treat most of our patients. For those special cases with which we have questions or difficulty, early referral to a specialist is essential.

Treatment should begin whenever blood pressure is greater than 140/90 mmHg and continues aggressively until it is consistently below 140/90 mmHg (130/80 mmHg in patients with diabetes). Most treatments have the potential of lowering blood pressure by about 10/5 mmHg, so multiple treatments may be needed.

Do not forget to advise patients about lifestyle modification, which can be just as effective as medication. Weight loss of 4.5 kg (10 lbs.) can significantly lower blood pressure and have favourable effects on glucose tolerance and lipid levels. Anorectic agents may raise blood pressure and can be associated with valvular abnormalities and pulmonary hypertension. These agents therefore should be used with caution and only in patients with significant obesity in whom the risk-benefit ratio of using such drugs has been thoroughly evaluated.

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blood pressure lowering in this group of high-risk patients has a greater effect on macrovascular complications (such as cardiovascular disease) than does tight control of blood glucose.

Concomitant with the more aggressive lowering of blood pressure and global risk stratification has come the observation that most patients with hypertension require multiple drugs to achieve target blood pressure. In general, monotherapy is effective in fewer than 50% of patients with hypertension—in even fewer with more advanced hypertension. Most antihypertensive drugs lower blood pressure by 10% to 15%; thus even patients with mild hypertension will often require more than one agent. The importance of treating isolated systolic hypertension was most emphasized by the findings in the Systolic Hypertension in the Elderly Program (SHEP) in 1991, in which lowering systolic pressure to below 160 mmHg in subjects over the age of 65 reduced cardiovascular events.

Few clinical trials have been adequately powered to demonstrate a benefit of one drug over another in preventing cardiovascular complications of hypertension. The choice of treatment in an individual patient therefore must be individualized, based upon age, ethnicity, prior side-effects and co-existing conditions. Since hypertension is largely a silent disease, patient compliance with antihypertensive drugs remains a major challenge, particularly when multiple agents are necessary. Thus, selecting the most effective and best-tolerated drugs becomes paramount in the management of this common condition.

Most classes of drugs that lower blood pressure have proven benefits on cardiovascular outcome relative to placebo in the treatment of hypertension. Compared to placebo, diuretics and beta-blockers have been shown to lower the risk of coronary heart disease, stroke and cardiovascular mortality in relatively low-risk subjects with hypertension. Compared to placebo, calcium-channel antagonists reduce the risk of stroke and cardiovascular death but have no significant effect upon the risk of coronary heart disease or heart failure. Angiotensin-converting-enzyme (ACE)-inhibitors reduce the risk of a variety of cardiovascular conditions as compared to placebo, most notably in the Heart Outcomes Prevention Evaluation (HOPE) study, which included high-risk patients over the age of 55. It is important to note, however, that not all patients in the HOPE study had hypertension. The newest class of agents, the angiotensin receptor antagonists (ARBs), have been shown to be very efficacious in reducing blood pressure and are well tolerated. They have demonstrated a significant advantage over placebo in patients with diabetes and various stages of nephropathy in preventing progression to end-stage renal failure. The efficacy of ARBs in reducing cardiovascular events in hypertension remains to be determined.

A more difficult question is whether antihypertensive agents differ in their ability to reduce cardiovascular events, a topic that has been the focus of considerable attention in the past several years. Several clinical trials have compared calcium channel blockers (CCBs) and/or ACE-inhibitors to diuretics or beta-blockers as the reference therapy. While none of these trials has shown convincing benefit of one class over another, either for lowering of blood pressure or for prevention of cardiovascular morbidity or mortality, they have hinted at differential benefits. For example, a meta-analysis of these trials suggests that ACE-inhibitors may be superior to CCBs in reducing the risk of congestive heart failure, whereas a CCB may be superior in reducing the risk of stroke. Compared to diuretics and beta-blockers, CCBs may not provide similar protection against coronary heart disease. The recent Losartan Intervention For Endpoint Reduction in Hypertension (LIFE) study was a randomized comparison of the ARB losartan (Cozaar) with atenolol in hypertensive patients aged 55 or greater, all of whom had electrocardiographic evidence of left ventricular hypertrophy, placing them at increased risk of cardiovascular disease events. This study showed that despite identical reductions in systolic and diastolic blood pressure with losartan and atenolol, losartan was associated with a lower composite primary outcome of MI, stroke or cardiovascular death. The majority of this effect was driven by a 25% reduction in the risk of stroke with losartan. Even extremely large trials of antihypertensive therapy have failed to clarify whether newer classes of drugs are clearly superior. The Antihypertensive and Lipid-Lowering

| TABLE 3 |
| Components of Cardiovascular Risk Stratification in Patients with Hypertension |

<table>
<thead>
<tr>
<th>Major risk factors</th>
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<tbody>
<tr>
<td>Smoking</td>
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<tr>
<td>Dyslipidemia</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
</tr>
<tr>
<td>Age &gt;60 years</td>
</tr>
<tr>
<td>Sex (men and postmenopausal women)</td>
</tr>
<tr>
<td>Family history of cardiovascular disease: women &lt;65 years-of-age, men &lt;55 years-of-age</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Target organ damage/ Clinical cardiovascular disease</th>
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</thead>
<tbody>
<tr>
<td>Heart diseases</td>
</tr>
<tr>
<td>- left ventricular hypertrophy</td>
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<tr>
<td>- angina/prior myocardial infarction</td>
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<tr>
<td>- prior coronary revascularization</td>
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<tr>
<td>- heart failure</td>
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<tr>
<td>- Stroke or transient ischemic attack</td>
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<tr>
<td>- Nephropathy</td>
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<tr>
<td>- Peripheral arterial disease</td>
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<tr>
<td>- Retinopathy</td>
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**Prognosis**

Only 13% of hypertensive patients in this country are treated to goal levels, despite the fact that we are well aware that blood pressure level is a continuous risk factor for heart disease, stroke, renal failure and dementia. By effectively treating hypertension, we can reduce mortality by 20%, cardiovascular mortality by 33%, and heart attacks by 16%.

As family physicians, we have many tools in our “medical” toolbox to treat this common condition. If we cannot achieve adequate blood pressure control, the patient should be referred to a specialist.

**Clinical Focus:** Issues in the Management of Hypertension

Supported by an educational grant from Solvay Pharma Inc.
Treatment to Prevent Heart Attack Trial (ALLHAT) was the largest randomized trial in hypertension to date. In this study, over 40,000 patients older than 55 years with hypertension and one other cardiovascular risk factor were randomized to either the diuretic chlorthalidone as the reference arm, or to an alpha-blocker (doxazosin), dihydropyridine CCB (amlodipine), or ACE-inhibitor (lisinopril). The doxa-

zoin arm was terminated prematurely due to poorer blood pressure control and an excess of cardiovascular events. In the final analysis, the diuretic, CCB and ACE-inhibitor were equivalent on the primary outcome of fatal coronary heart disease and non-fatal MI. Diuretic-based therapy was slightly more effective in preventing the secondary endpoints of stroke and heart failure than the ACE-inhibitor, although the ACE-inhibitor was slightly less effective at lowering blood pressure. A very recent study of more than 6,000 older patients with hypertension, randomized in an open-label manner to an ACE-inhibitor or a diuretic, showed a small but significant 11% reduction in cardiovascular events or death with the ACE-inhibitor despite identical effects upon lowering of blood pressure. In this study, there was no difference in the number of strokes in either group, and the benefit of ACE-inhibitors over diuretic was evident only in men. Most importantly, trials such as HOT and ALLHAT have confirmed the concept that multiple agents are required to achieve current target blood pressures. In these studies, an average of three drugs were required.

The current evidence points towards diuretics, beta-blockers, CCBs, ACE-inhibitors and ARBs as appropriate first-line agents in the management of hypertension. Combination therapy is increasingly the norm in the effective management of hypertension. Based upon the ALLHAT data, it would be reasonable to include a diuretic in the regimen of most patients with hypertension, which may also poten-
tiate the effects of other drugs. In those patients with diabetes and renal disease, ACE-inhibitors or ARBs are appropriate initial therapy, as are ACE-
inhibitors in patients with coronary heart disease, congestive heart failure or prior myocardial infarction. ARBs are preferred initial drugs in patients with diabetes with early nephropathy. Where CCBs are used, only long-acting formulations should be employed, as these have been demonstrated to be safe and effective. The risk of side-effects also needs to be carefully considered when selecting antihypertensive agents, particularly for monotherapy or initial treatment (see Figure 2). Although many ARBs are metabolized via the CYP450 pathway, eprosartan is not, and is therefore an attractive option for patients susceptible to drug inter-
actions, such as people with diabetes with nephropathy, or elderly patients who are taking a number of different medications.

**Prognosis**

Hypertension is increasingly prev-

Hypertension is increasingly prevalent in our society and is often associated with co-existing cardiovascular risk factors. A comprehensive risk-stratification and treatment strategy is required to optimally manage patients with this condition. Lifestyle interventions, though diffic-
tult to initiate and maintain, can have considerable benefits on lowering blood pressure and controlling other risk factors. To reduce cardiovascular morbidity and mortality, pharma-
cologic treatment is usually required, often with multiple agents to achieve target blood pressures, which may differ between patients based upon co-existing conditions. Current
evidence suggests that targeted combination therapy, often incorporating low-dose diuretic therapy, can improve cardiovascular outcomes in the majority of patients.

REFERENCES:


TABLE 4 Lifestyle Modifications for Hypertension Prevention and Management

- Lose weight if overweight.
- Limit alcohol intake: no more than 1 oz. (30 mL) ethanol (e.g. 24 oz. [720 mL] beer, 10 oz. [300 mL] wine, or 2 oz. [60 mL] 100-proof whiskey) per day or 0.5 oz. (15 mL) ethanol per day for women and lighter-weight people.
- Increase aerobic physical activity (30–45 minutes most days of the week).
- Reduce sodium intake to no more than 100 mmol per day (2.4 g sodium or 6 g sodium chloride).
- Maintain adequate intake of dietary calcium and magnesium for general health.
- Stop smoking and reduce intake of dietary saturated fat and cholesterol for overall cardiovascular health.

This man is married and runs a printing company. He was diagnosed with type 2 diabetes about eight years ago. He is a lifetime non-smoker and he says he was told by his former family physician that his cholesterol was "okay". In the past year, he has had high blood pressure, which has been attributed to the stresses of running his own business.

**PATIENT HISTORY**

This patient’s family history is unremarkable. He has osteoarthritis, which causes mild discomfort in his knees and also suffers from heartburn. He drinks two to three alcoholic beverages per day. He denies any history of exertional chest pain, but he does admit to mild dyspnea with usual activities. His current medications include metformin 500 mg twice per day, ibuprofen 600 mg four times per day, and omeprazole 20 mg once per day.

**EXAMINATION**

On examination, he appears mildly overweight. His body mass index is 29. Blood pressure is 150/100 mmHg bilaterally, measured twice during the visit. Heart rate is regular at 78 bpm. His fundi exhibit early arteriolar narrowing without exudates or hemorrhages. His carotid pulses and JVP are normal. Lungs are clear with an apical fourth heart sound and no murmurs. There are no abdominal masses or bruits. His distal pulses are weakly palpable with no edema.

**ASSESSMENT**

This man has mild-to-moderate hypertension, type 2 diabetes, and is overweight. As such, he is at very high risk for developing atherosclerosis in the form of coronary, cerebrovascular or peripheral vascular disease. Additionally, he has a fourth heart sound and reduced peripheral pulses, with early hypertensive retinopathy. Finally, he complains of exertional dyspnea, which may be due to hypertensive heart disease or myocardial ischemia.

**MANAGEMENT**

This patient warrants aggressive investigation and management of all of his vascular risk factors, including his hypertension. He should be counselled regarding the benefits of moderate alcohol consumption, weight loss and regular aerobic exercise. He should have assessment of electrolytes, diabetic control, renal function, urine microalbumin and a fasting lipid profile. As well, he should have an ECG and an echocardiogram to look for left ventricular hypertrophy and diastolic dysfunction, given his exertional dyspnea and fourth heart sound.

If the patient can tolerate it, his ibuprofen should be reduced or ideally replaced with acetaminophen, since NSAIIDs can exacerbate hypertension and induce renal insufficiency in diabetics. He should be started on antihypertensive therapy, in this case with either a thiazide diuretic or a drug that manipulates the renin-angiotensin system, such as an ACE-inhibitor or an ARB. He should also be told that it is highly likely he will require multiple medications to bring his blood pressure to the recommended target of 130/80 mmHg for someone with diabetes and to 125/75 mmHg if he turns out to have renal disease.

**FOLLOW-UP**

The patient stops the ibuprofen and is started on hydrochlorothiazide 25 mg once per day as well as ECASA 81 mg once per day. He begins lifestyle changes. His ECG is normal, but his echo exhibits mild concentric LVH with mild diastolic dysfunction. His creatinine is 130 mmol/L with an elevated microalbumin level. His fasting LDL cholesterol is 3.8 mmol/L with normal TG and HDL.

At his next visit, his BP is 144/94 mmHg.

**COMMENTARY**

This man has persistent hypertension despite his diuretic and has diabetes with early nephropathy. At this point, an ACE-inhibitor or ARB should be added, along with an HMG CoA-reductase inhibitor (statin) dosed to achieve a fasting LDL of <2.5 mmol/L. If on maximal dose of ACE-inhibitor/ARB his blood pressure remains above 125/75 mmHg, a dihydropyridine CCB should be added.

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This 76-year-old widow who lives alone.

**PATIENT HISTORY**

She has at least a 12-year history of hypertension and is a non-diabetic. She is a non-smoker and non-drinker. She is unaware of her lipid status. Her family history reveals that her mother died at age 74 of a stroke. She has had several minor surgical procedures in the past. Her medications include hydroxyzine 25 mg once per day, paroxetine 20 mg once per day (started after her husband’s death) and atorvastatin 20 mg at bedtime. She generally feels well, though complains of occasional headaches without visual disturbance. She has no exertional chest pain or dyspnea.

**EXAMINATION**

On examination, she looks well and is fairly slim. Blood pressure is 150/90 mmHg measured twice, with no significant difference between arms. Her fundi are difficult to visualize due to early cataracts, but are likely normal. She has no vascular bruits. There is a grade 2/6 early systolic ejection murmur at the base of the heart, with normal heart sounds and no diastolic murmur. The abdomen is benign. Distal pulses are normal with no edema.

**ASSESSMENT**

This is an elderly patient with uncontrolled hypertension despite being on a diuretic. She is asymptomatic and is being treated for hypercholesterolemia as well. As such, she is at moderate risk for cardiovascular disease. Isolated systolic hypertension in the elderly is a particularly strong risk factor for stroke. Her systolic murmur is likely benign and due to aortic valve sclerosis related to her hypertension.

Her target blood pressure should be below 140/90 mmHg. She should have an assessment of electrolytes, renal function and urine microalbumin, a fasting lipid profile and an ECG. She should be counselled regarding the benefits of lifestyle interventions in assisting with the pharmacologic management of her hypertension.

**MANAGEMENT**

At her next visit, this patient’s blood pressure is 162/84 mmHg with no change in her medications. Her ECG shows 1 mm ST depression in the lateral leads, with voltage for LVH. Her creatinine is normal, but her microalbumin level is elevated. Her fasting LDL is 3.4 mmol/L, with normal HDL and TG.

At this stage, the addition of a second antihypertensive agent should be considered, particularly a CCB or an ACE-inhibitor/ARB. Given the presence of LVH on her ECG, it may be prudent to add an ARB, which was shown to be superior to a beta-blocker in the prevention of stroke in subjects with hypertension and LVH in the recent LIFE trial. Since several ARBs are metabolized by the CYP450 enzyme pathway and the patient is already on paroxetine, eprosartan, which is a known inhibitor of this pathway, may be appropriate because it is less likely to be metabolized via CYP450. In addition, she should be started on ECASA 81-325 mg once per day.