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## **The Canadian Hypertension Education Program Recommendations: What's new, what's old but still important in 2004**

### **An Abridged Summary**



**On behalf of the Evidenced-Based Recommendations Task Force of the  
Canadian Hypertension Education Program**

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## **The challenge of hypertension: a worldwide epidemic**

The World Health Organization estimates that high blood pressure is the leading of risk for death in women and the second leading risk in men in countries like Canada. Hypertension is the leading risk for stroke and for congestive heart failure. It is estimated that 50% of cardiovascular disease is attributable to high blood pressure [2150]. There is a high personal risk for developing hypertension even in those who are normotensive in middle age. It is estimated that 90% of people who have normal blood pressure at age 55 will develop hypertension prior to death. Finally, while the complications of hypertension are preventable it is most worrisome that over 40% of those with hypertension are unaware that they have the disease and only 13% are treated to current recommended targets.

As a response to the challenge to control hypertension and hypertension-related cardiovascular disease the Canadian Hypertension Education Program (CHEP) was formed in 1999 an initiative supported by a coalition of health care professional societies with a stake in the management of hypertension, including The Canadian Hypertension Society, The Canadian Coalition for High Blood Pressure Prevention and Control, The College of Family Physicians of Canada, Health Canada and The Heart and Stroke Foundation of Canada. The program's mandate is to annually update evidence-based hypertension management recommendations and to provide tools to assist health care professionals adopt and implement these recommendations. This executive summary is to provide both an overview of the important and the new aspects of the 2004 hypertension management recommendations and advice on implementation of recommendations. Other implementation tools including a health care professional and public education power point slide kit are available through the Canadian Hypertension Society website ([www.chs.md](http://www.chs.md)), as well as through a number of annually revised Continuing Medical Education Programs, and printed forms of the recommendations available in a range of formats ranging from pocket cards to single page summaries to textbooks.

## **What's new for 2004?**

### **I Taking a broader approach to prevent atherosclerotic disease**

There is an increasing appreciation that blood pressure control must be viewed as only one component of a holistic approach to the care of the patient with hypertension. Over 90% of hypertensive Canadians have other cardiovascular risk factors. While reducing blood pressure reduces the relative risk of major cardiovascular complications by 21-30% a comprehensive pharmacological approach to reduce cardiovascular risk is estimated to reduce risk by 80%. There would be additional effects from lifestyle modification. Therefore the 2004 recommendations broaden the vascular protection strategy for patients with hypertension to include the consideration of the prescription of both statins and ASA. Further, for all patients with established atherosclerotic disease, ACE-inhibitors are recommended.

### **II Increasing recognition of the need for lifestyle modification**

Most Canadians have a very high probability of developing hypertension. Further there is an increasing appreciation that single interventions to modify lifestyle are as effective as to a full dose of an antihypertensive medication in appropriately selected patients (Table 1). A critical recommendation to prevent and control hypertension is to advocate lifestyle modifications for normotensive adult Canadians. Lifestyle changes can prevent hypertension, and have substantial blood pressure-lowering effects. Further, lifestyle modifications are important both as initial hypertension management and in conjunction with pharmacological therapy. Different lifestyle interventions can be combined to further reduce blood pressure.

Moderate dynamic physical activity (30-45 minutes, most days of the week) is effective in reducing blood pressure in hypertensive patients and in the general normotensive population. Regular physical exercise has a similar average reduction in blood pressure compared to a standard antihypertensive medication.

Minor elevations in body mass index are recognized to have detrimental effects on blood pressure control and in those who are overweight, blood pressure is reduced by approximately 2/1 mm Hg for each 1 kg of weight loss.

The adverse effects of excess alcohol intake need to be re-emphasized to those who chose to drink alcohol. It is estimated that 8% of hypertension in males is attributable to excess alcohol consumption and reduction in alcohol consumption to less than 2 drinks per day and no more than 14 drinks weekly for males or no more than 9 drinks weekly for females will reduce the blood pressure in both normotensive and hypertensive persons who drink more heavily.

Patients with hypertension and for those in whom prevention of hypertension is a goal, should be instructed on the benefits of a DASH-type diet in blood pressure control. The DASH diet is high in fresh fruit and vegetables, nuts, legumes and low fat dairy products but is low in saturated fat (Table 2). The DASH diet reduces blood pressure to a similar extent as a single antihypertensive medication even in the absence of weight loss. There are additional effects of salt-restriction (in hypertensive and salt-sensitive normotensive patients i.e., Canadians of African descent, age over 45 years and individuals with impaired renal function or diabetes) to the effects of weight reduction and a DASH diet.

It is appreciated that it is difficult to implement lifestyle change (Diet and Exercise) given the factors in our society that discourage physical activity and healthy eating. Notwithstanding, even brief physician intervention increases the probability of a patient adhering to some lifestyle changes. Multidisciplinary comprehensive approaches are most successful. It is useful to involve the family unit in lifestyle change recognizing that any substantive and successful lifestyle change will almost invariably involve and directly affect the family as well as the individual. However, it must be recognized that our environments largely determine lifestyles. Thus health care professional and volunteer organizations, local, provincial and federal governments, communities and the health care and food industries all need to advocate for change in order to develop policies, create infrastructure and provide resources to support healthy lifestyles.

## **What's old but still important in 2004**

### **I Assess blood pressure in all adult patients**

All adult patients should have blood pressure assessed at every appropriate opportunity and be informed of their blood pressure and its significance. Because of the high risk of developing hypertension over time, those with normal readings should still receive lifestyle advice and be counseled to have follow-up blood pressure readings throughout their life. Those with initial hypertensive readings require repeat measurement over 3-5 visits unless there is severe hypertension, a hypertensive urgency or emergency dictating the need for more rapid therapy. Patients with uncomplicated hypertension without target organ damage and blood pressures 140-159/90-99 at visit 3 should have 2 further visits prior to being diagnosed with hypertension. Self-measurement and 24 hour ambulatory measurement continue to be recommended for consideration in assessing office induced blood pressure elevation and the former to improve patient compliance. Only devices meeting international standards should be used. Daytime blood pressures  $\geq 135/85$  mm Hg with ambulatory and self-measurement are consistent with hypertension.

### **II Routine Laboratory Assessments Should be Part of the Hypertensive Workup:**

Routine laboratory assessment should be performed when hypertension is diagnosed and should include blood for electrolytes, creatinine, fasting glucose, complete blood count and lipid profile (total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides), a urinalysis and an electrocardiogram. If secondary forms of hypertension are suspected based on history or initial laboratory assessment more detailed investigations are recommended.

### **III Treatment of hypertension should be based on considerations of global CV risk and a more holistic approach to the hypertensive patient**

Patients with hypertension and 3 or more cardiovascular risks (male, age over 55, smoking, diabetes, total cholesterol to HDL ratio  $\geq 6$ , microalbuminuria or proteinuria, left ventricular hypertrophy, peripheral vascular disease, past cerebrovascular or coronary artery, family history of premature cardiovascular disease) should be treated with a

‘statin’ in addition to their blood pressure lowering therapy. Further, all patients 50 years old and over, with hypertension, should be prescribed aspirin once their blood pressure is controlled unless there are contraindications.. Those with dyslipidemia and diabetes require the more aggressive treatment recommended in the recently updated Canadian lipid and diabetes recommendations. As noted above, all patients with clinically overt atherosclerotic disease should be prescribed an ACE inhibitor.

#### **IV Treat to target**

The treatment and control of blood pressure in Canada is markedly worse than in the United States. Only a small percentage of Canadians who have hypertension are treated to the recommended targets (Table 3). In particular, health care professionals often disregard systolic blood pressure readings above target. Current evidence more strongly associates adverse cardiovascular outcomes with systolic blood pressure than with diastolic blood pressure. The benefits of more aggressive lowering of blood pressure to current targets are particularly strong in those with renal disease and proteinuria or with diabetes. For patients without other compelling indications first line therapy choices include thiazide diuretics, beta-blockers, angiotensin converting enzyme inhibitors and angiotensin receptor blockers. Table 4 provides current recommendations for individualization of antihypertensive therapy based on patient characteristics.

#### **V Using Antihypertensive Therapy Combinations**

It is critical to combine lifestyle and pharmacological treatment. Diuretics are an important option as first line therapy and diuretics should be included in most combination therapies. The average reduction in blood pressure is about 10 mmHg systolic and 5 mmHg diastolic for a single antihypertensive drug and the vast majority of hypertensive patients will require two or more drugs in combination to achieve recommended blood pressure targets. The most effective combinations should be used preferentially (Table 5). Because a substantial proportion will require 3 or more drugs to achieve blood pressure targets, primary health care practitioners need to become comfortable with prescribing three antihypertensive drug regimes. Consider non-adherence, secondary hypertension, interfering drugs or lifestyles and/or office induced increases in blood pressure (white coat effect) in patients who have little response to appropriate therapy.

## **VI Promoting Patient Adherence**

Establishing and maintaining patient adherence/compliance/concordance with their antihypertensive management prescription remains a major issue. Approximately 50% of newly treated hypertensive patients discontinue antihypertensive therapy within 1 to 2 years after initiation. However, attention to some simple approaches can prevent patient non-adherence (Table 6). Because non-adherence to therapy is a common barrier to most diseases, health care professionals should become familiar with approaches to prevent non-adherence, to detect non adherence and to improve adherence in those who have difficulty following the therapeutic regime .

**Table. 1 Impact of Lifestyle Therapies on BP in Hypertensive Adults**

<b>Intervention</b>	<b>Targeted change</b>	<b>Systolic BP/Diastolic BP</b>
Sodium reduction	100 mmol/day	-5.8 / -2.5
Weight loss	4.5 kg	-7.2 / -5.9
Alcohol reduction	2.7 drinks/day	-4.6 / -2.3
Exercise	3 times/week	-10.3 / -7.5
Dietary patterns	DASH diet	-11.4 / -5.5

**Table 2. The Dietary Approaches to Stop Hypertension Diet (DASH)\***

<b>Food Group</b>	<b>Daily servings</b>	<b>Example</b>
Grains	7-8	Whole wheat, oatmeal products
Vegetables	4-5	Tomatoes, potatoes, carrots, beans, peas
Fruits	4-5	Oranges, apples, bananas
Low fat dairy products	2-3	Low fat milk (1%) or yogurt
Meats, poultry, fish	≤ 2	Lean meats, trim away visible fat and skin, avoid frying
Nuts, seeds and dried beans	4-5/week	Almonds, peanuts, lentils
Fats and Oils	2-3	Soft margarine, vegetable oils
Sweets	5/week	Hard candy, sugar

\* for more information use the following website [www.nhlbi.nih.gov/health/public/heart/hbp/dash](http://www.nhlbi.nih.gov/health/public/heart/hbp/dash)

**Table 3. Blood pressure treatment targets**

<b>Situation</b>	<b>Blood pressure target mm Hg</b>	
	<b>Systolic</b>	<b>Diastolic</b>
Without a compelling indication for more intense treatment	< 140	< 90
Isolated Systolic hypertension	< 140	-
Diabetes	< 130	< 80
Renal disease	< 130	< 80
Renal disease with >1 g/24 hours proteinuria	< 125	< 75

**Table 4. Considerations in the individualization of antihypertensive therapy**

	<i>Initial Therapy</i>	<i>Second-line Therapy</i>	<i>Notes and/or Cautions</i>
Uncomplicated hypertension with no other compelling indication	Thiazide diuretics, beta blockers, ACE inhibitors, ARBs, or long-acting dihydropyridine calcium channel blockers	Combinations of first-line drugs (see Table 5)	Alpha-blockers are not recommended as initial therapy. Beta-blockers are not recommended as initial therapy in those over 60 years of age. Hypokalemia should be avoided by using potassium-sparing agents in those who are prescribed diuretics. ACE inhibitors are not recommended in blacks as monotherapy.
Isolated systolic hypertension with no other compelling indication	Thiazide diuretics, ARBs or long-acting dihydropyridine calcium channel blockers	Combinations of first-line drugs	Hypokalemia should be avoided by using potassium-sparing agents in people who are prescribed diuretics
Diabetes mellitus with nephropathy	ACE inhibitors or ARBs	Addition of one or more of thiazide diuretics, cardioselective beta-blockers, long-acting calcium channel blockers or an ARB/ACE inhibitor combination	-
Diabetes mellitus without nephropathy	ACE inhibitors, ARBs or thiazide diuretics	Combination of first-line drugs or addition of cardioselective beta-blockers and/or long-acting calcium channel blockers	If the serum creatinine level is >150µmol/L, a loop diuretic should be used as a replacement for low-dose thiazide diuretics if volume control is required
Diabetes mellitus without nephropathy, with systolic hypertension	1. ACE inhibitor or ARBs 2. thiazide diuretics or long-acting dihydropyridine calcium channel blockers	-	-
Angina	Beta-blockers (consider adding ACE inhibitors)	Long-acting calcium channel blockers	Avoid short-acting nifedipine
Prior myocardial infarction	Beta-blockers and/or ACE inhibitors	Combinations of additional agents	-
Heart Failure	ACE inhibitors (thiazide or loop diuretics, beta-blockers, spironolactone as additive therapy)	ARBs or hydralazine/isosorbide dinitrate	Avoid nondihydropyridine calcium channel blockers (diltiazem, verapamil)
Past cerebrovascular accident or TIA	ACE inhibitor/diuretic combinations	-	Blood pressure reduction reduces recurrent cerebrovascular events
Renal disease	ACE inhibitors (diuretics as additive therapy)	Combinations of additional agents	Avoid ACE inhibitors if bilateral renal artery stenosis
Left ventricular hypertrophy	ACE inhibitors, ARBs, dihydropyridine calcium channel blockers, diuretics, (beta-blockers for patients under 55 years)	-	Avoid hydralazine and minoxidil
Peripheral arterial disease	Same as hypertension with no other compelling indication	Same as hypertension with no other compelling indication	Avoid beta-blockers with severe disease
Dyslipidemia	Same as hypertension with no other compelling indication	Same as hypertension with no other compelling indication	-

\*When using two drugs specifically to lower blood pressure, use Table 5 to maximize the hypotensive effect. Short acting calcium channel blockers are not recommended in the treatment of hypertension. ACE Angiotensin-converting enzyme; TIA transient ischemic attack; ARB angiotensin II receptor blocker

**Table 5. Useful antihypertensive drug combinations**

For additive hypotensive effect in dual therapy, combine an agent from Column 1 with any in Column 2.

Column 1	Column 2
- Thiazide diuretic - Long-acting dihydropyridine calcium channel blocker	- Beta-blocker - ACE Inhibitor - ARB

**Table 6. Recommendations to Improve Adherence to Antihypertensive Prescriptions****Adherence can be improved by a multi-pronged approach**

1. Educate patients and patients' families about hypertension/treatment regimens
2. Engage the family in lifestyle changes
3. Simplify medication regimens to once daily dosing
4. Tailor pill-taking to fit patients' daily habits
5. Encourage greater patient responsibility/autonomy in monitoring their BP and adjusting their prescriptions

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# *The 2004 CHEP Recommendations for the Management of Hypertension*



## *Part 1: Diagnosis And Assessment*

### **I ACCURATE MEASUREMENT OF BLOOD PRESSURE**

- 1) The blood pressure of all adult patients should be assessed at all appropriate visits by health care professionals who have been specifically (re) trained to measure blood pressure accurately (Grade D).
- 2) Use of standardized measurement techniques is recommended when assessing blood pressure (Grade D).

### **II CRITERIA FOR OFFICE OR CLINIC-BASED DIAGNOSIS OF HYPERTENSION AND RECOMMENDATIONS FOR FOLLOW-UP**

- 1) Patients demonstrating features of a hypertensive emergency/urgency should be diagnosed as hypertensive at their first visit and require immediate management (Grade D).
- 2) If the initial blood pressure is high, then in the same session at least 2 readings should be taken according to the recommended procedure for accurate blood pressure determination and the patient should be scheduled for further visits (Grade D).
- 3) Patients with target organ damage can be diagnosed as hypertensive at/after visit 3 (Grade D).
- 4) The search for target organ damage, associated risk factors and potentially modifiable causes of elevated blood pressure should proceed as follows (Grade D).
  - a) On the first visit, the patient should be questioned and the medical record reviewed for evidence of coronary artery disease (myocardial infarction, angina pectoris, and congestive heart failure), cerebrovascular disease (transient ischemic attacks, ischemic or hemorrhagic stroke), peripheral arteriovascular insufficiency (intermittent claudication) or renal insufficiency. Check exogenous factors that can induce/ aggravate hypertension (see Table).
  - b) At visit two, if the blood pressure is still elevated, further history and physical examination should be performed. Diagnostic tests should be arranged before visit three.

# ***The 2004 CHEP Recommendations for the Management of Hypertension***



## ***Part 1: Diagnosis And Assessment***

*Criteria for Office or Clinic-based Diagnosis of Hypertension and Recommendations for Follow-up (cont)*

- 5) In the absence of target organ damage and/or increased cardiovascular risk, if at visit three, systolic blood pressure remains 160 mmHg or higher (Grade D) and/or diastolic blood pressure 100 mmHg or higher (Grade C), this patient can generally be diagnosed as hypertensive since the greatest fall in blood pressure occurs between visit one and visit two. Two to three more visits may be added prior to assigning a diagnosis of hypertension if the trend in blood pressure values is downward (Grade D).

If at visit three, systolic blood pressure is between 140 and 159 mmHg and/or diastolic blood pressure between 90 and 99 mmHg, up to two to three further visits may be required to diagnose hypertension; these measurements can be taken over a total diagnostic assessment period of up to six months (Grade D).

- 6) If at the last diagnostic visit, the blood pressure is <140/90 mmHg. and the patient has no evidence of target organ damage or associated risk factors, the patient should be assessed at yearly intervals if the last blood pressure is in the high normal range (130/85 to 139/89 mmHg) or at two yearly intervals if the last blood pressure is in the normal range (120/80 to 129/84 mmHg) as these patients frequently develop hypertension later on (Grade C).
- 7) Patients receiving lifestyle modification advice (non-pharmacological treatment) should be followed up at three to six month intervals. Shorter intervals (one or two monthly) are needed for patients with higher blood pressures (Grade D).
- 8) Follow-up of patients on antihypertensive drug treatment: Patients should be seen monthly until 2 blood pressure readings are below their target (Grade D). Shorter intervals between visits will be needed for symptomatic patients, those with severe hypertension, intolerance to antihypertensive drugs or those with target organ damage (Grade D). Once target blood pressure has been reached, patients should be seen at 3-6 month intervals (Grade D).

# *The 2004 CHEP Recommendations for the Management of Hypertension*



## *Part 1: Diagnosis And Assessment*

### **III ASSESSMENT OF OVERALL CARDIOVASCULAR RISK IN HYPERTENSIVE PATIENTS**

- 1) Global cardiovascular risk should be assessed. Multifactorial risk assessment models can be used to predict more accurately an individual's global cardiovascular risk (Grade A) and employ antihypertensive therapy more efficiently (Grade D). **In the absence of Canadian data to determine the accuracy of risk calculations, avoid using absolute levels of risk to support treatment decisions at specific risk thresholds (Grade C).**
- 2) **Consider informing patients of their global risk to improve the effectiveness of risk factor modification. (Grade C).**

### **IV ROUTINE AND OPTIONAL LABORATORY TESTS FOR THE INVESTIGATION OF PATIENTS WITH HYPERTENSION**

- 1) Routine laboratory tests for the investigation of all patients with hypertension (all Grade D):
  - a) urinalysis
  - b) complete blood cell count
  - c) blood chemistry (potassium, sodium, and creatinine)
  - d) fasting glucose
  - e) fasting total cholesterol and high density lipoprotein (HDL) cholesterol, low density lipoprotein (LDL) cholesterol, triglycerides
  - f) standard 12-lead ECG
- 2) Laboratory tests for specific patient subgroups (all Grade D):
  - a) for those with diabetes or renal disease: assess urinary protein excretion, since lower blood pressure targets are appropriate if proteinuria is present.
  - b) for those with an increased creatinine, history of renal disease or proteinuria: renal ultrasound to assess kidney size and exclude obstruction.
  - c) for those suspected of possibly having an endocrine cause for the high blood pressure, see Section VI below.

# *The 2004 CHEP Recommendations for the Management of Hypertension*



## *Part 1: Diagnosis And Assessment*

### **V ASSESSMENT FOR RENOVASCULAR HYPERTENSION**

- 1) Patients presenting with two or more of the clinical clues listed below suggesting renovascular hypertension should be investigated (Grade D). These include:
  - a) sudden onset or worsening of hypertension and >age 55 or <age 30
  - b) the presence of an abdominal bruit
  - c) hypertension resistant to  $\geq 3$  drugs
  - d) a rise in creatinine associated with use of an angiotensin converting enzyme inhibitor or angiotensin II receptor blocker
  - e) other atherosclerotic vascular disease, particularly in patients who smoke or have dyslipidemia
  - f) recurrent pulmonary edema associated with hypertensive surges
- 2) The captopril-enhanced radioisotope renal scan is the usual screening test of choice (Grade B).

### **VI ENDOCRINE HYPERTENSION**

#### ***a) Recommendations for Hyperaldosteronism Screening and Diagnosis***

- 1) Screening for hyperaldosteronism should be considered for at least the following patients (Grade D):
  - a) hypertensive patients with spontaneous hypokalemia ( $K^+ < 3.5$  mmol/L)
  - b) hypertensive patients with marked diuretic-induced hypokalemia ( $K^+ < 3.0$  mmol/L)
  - c) patients with hypertension refractory to treatment with three or more drugs
  - d) hypertensive patients found to have an incidental adrenal adenoma
- 2) Screening for hyperaldosteronism should include assessment of a plasma aldosterone and plasma renin activity measured under standardized conditions including the collection of morning samples taken from patients in a sitting position after resting at least 15 minutes (Grade D). Antihypertensive drugs may be continued prior to testing with the exception of aldosterone antagonists, **angiotensin receptor blockers, beta-adrenergic antagonists and clonidine.**

# *The 2004 CHEP Recommendations for the Management of Hypertension*



## *Part 1: Diagnosis And Assessment*

*Endocrine Hypertension: a) Recommendations for Hyperaldosteronism Screening and Diagnosis (cont)*

- 3) For patients with suspected hyperaldosteronism (plasma aldosterone/renin activity ratio  $>550$  pmol/L/ng/ml/hr [**or 140 pmol/L/ng/L when renin is measured as renin mass or concentration**]) a diagnosis of primary hyperaldosteronism should be established by demonstrating inappropriate autonomous hypersecretion of aldosterone using at least one of the following physiological maneuvers:
  - a) saline loading tests (2L over 4 hours with primary hyperaldosteronism defined as failure to suppress plasma aldosterone to  $<280$  pmol/L; or oral sodium 300 mmol/day for 3 days with primary hyperaldosteronism defined as failure to suppress plasma aldosterone to  $<240$  pmol/L) (Grade C)
  - b) fludricortisone suppression test (oral sodium loading plus oral fludricortisone over 2 days) positive for primary hyperaldosteronism: plasma aldosterone  $\geq 140$  pmol/l at 12 noon (upright) and/or 8 am (supine) (Grade D)
  - c) a plasma aldosterone/PRA ratio  $>1400$  with a plasma aldosterone  $>440$  pmol/L/ng/L (Grade C)
  - d) captopril suppression test (primary hyperaldosteronism defined as failure to suppress plasma aldosterone to  $<240$  pmol/L two hours after 25 mg of oral captopril) (Grade C)
- 4) For patients with established primary hyperaldosteronism, attempts to differentiate potential causes should be made and may include the following:
  - a) localization with adrenal CT-scan (standard: 3 mm contiguous cuts) or magnetic resonance imaging (where available) (Grade C)
  - b) assessment of plasma aldosterone before (supine) and after 2-4 hours of upright posture (Grade C)
- 5) For patients with established primary hyperaldosteronism and negative imaging studies, selective adrenal venous sampling should be considered because it may be the only way to reliably differentiate unilateral from bilateral overproduction of aldosterone (Grade D).
- 6) Adrenal venous sampling should be conducted in centres with experience in performing this diagnostic technique (Grade D).

## ***The 2004 CHEP Recommendations for the Management of Hypertension***



### ***Part 1: Diagnosis And Assessment***

*Endocrine Hypertension: a) Recommendations for Hyperaldosteronism Screening and Diagnosis (cont)*

- 7) Treatment of confirmed unilateral aldosterone-producing adenoma is surgical removal by laparoscopic adrenalectomy (Grade C).
- 8) Patients should be treated for 8-10 weeks prior to surgery, to correct metabolic abnormalities and to control blood pressure (Grade D).
- 9) For patients with adrenal hyperplasia, bilateral adenoma, or increased risk of peri-operative complications, treatment is medical (Grade D).
- 10) Medical treatment should be initiated with spironolactone 25-400 mg per day (usual doses are 100-200 mg). For those intolerant to spironolactone, amiloride 10-20 mg per day is an alternative (Grade D). Addition of thiazide diuretics, beta-adrenergic antagonists and or calcium channel antagonists may be useful to control blood pressure (Grade D).
- 11) Because many patients will remain hypertensive following the surgical removal of an adrenal adenoma, these patients should be followed and if necessary treated according to the usual guidelines for non-endocrine hypertension (Grade D).

#### ***b) Pheochromocytoma Screening and Diagnosis***

- 1) If pheochromocytoma is strongly suspected, the patient should be referred to a specialized hypertension center, particularly if biochemistry is already found to be positive (Grade D).
- 2) The following patients should be considered for screening for pheochromocytoma (Grade D):
  - a) patients with paroxysmal and/or severe sustained hypertension refractory to usual antihypertensive therapy
  - b) patients with hypertension and multiple symptoms suggestive of catecholamine excess (e.g., headaches, palpitations, sweating, panic attacks, pallor)
  - c) patients with hypertension triggered by beta-blockers, monoamine oxidase inhibitors, micturition, or changes in abdominal pressure

## ***The 2004 CHEP Recommendations for the Management of Hypertension***



### ***Part 1: Diagnosis And Assessment***

*Endocrine Hypertension: b) Pheochromocytoma Screening and Diagnosis (cont)*

- d) patients with incidentally discovered adrenal mass; patients with hypertension and multiple endocrine neoplasia (MEN) 2A or 2B; von Recklinghausen's neurofibromatosis, or von Hippel-Lindau disease
- 3) To screen for pheochromocytomas, 24-hour urinary total metanephrines (sensitivity 95%) and urinary metanephrine-to-creatinine ratio (sensitivity 100%) should be assessed (Grade C). Plasma catecholamines and, where available, plasma metanephrines may also be considered if clinical suspicion is high, particularly during a hypertensive episode or for those with familial forms (Grade D). Urinary or plasma VMA measurements should not be used as screening tests (Grade C).
- 4) In the presence of borderline biochemical test results (e.g., plasma norepinephrine and epinephrine levels ~500 – 2000 ng/L) or potentially false positive results, repeated testing (Grade D) and/or the clonidine suppression test (Grade C) may be employed.
- 5) For patients with positive biochemical testing, localization of pheochromocytomas should employ magnetic resonance imaging (preferable), computed tomography (if MRI unavailable), and/or iodine I-131 meta-iodobenzylguanidine (MIBG) scintigraphy (Grade C for each modality).
- 6) For patients with known or suspected malignant pheochromocytoma, MIBG scintigraphy may be used to assess for metastatic disease (Grade D).
- 7) For patients with familial pheochromocytoma (associated with von Hippel-Lindau disease or MEN 2A/B), long-term follow-up studies measuring urinary or, where available, plasma metanephrines, should be performed, because recurrence after laparoscopic partial or unilateral adrenalectomy is frequent (Grade D).
- 8) Alpha-blockers (prazosin, doxazosin, and phenoxybenzamine) should be used as first line agents in suspected pheochromocytoma (Grade D). Alpha methyl dopa or clonidine may also be used (Grade D).

## ***The 2004 CHEP Recommendations for the Management of Hypertension***



### ***Part 1: Diagnosis And Assessment***

*Endocrine Hypertension: b) Pheochromocytoma Screening and Diagnosis (cont)*

- 9) Treatment of benign pheochromocytoma should be surgical resection. The following issues should be considered perioperatively:
  - a) until surgery is performed, the use of beta adrenergic antagonists should be avoided, unless there are arrhythmias present and adequate alpha adrenergic blockade has been achieved (Grade D)
  - b) surgical resection should be carefully planned in advance with involvement of a team of surgical, medical, intensivist and anesthesia consultants who have experience in the management of patients with pheochromocytoma (Grade D)
  - c) laparoscopic surgery should be considered before open surgery for resection of pheochromocytoma except for very large tumors (Grade C)
  - d) administration for 10 to 14 days of phenoxybenzamine (10 - 20 mg bid-tid), prazosin (1-3 mg bid-tid) or doxazosin (2-4 mg bid) is indicated for patients with severe paroxysmal or sustained hypertension (Grade D)
  - e) the tyrosine hydroxylase inhibitor metyrosine (0.25-1g four times daily) should also be considered (Grade C)
  - f) immediately prior to surgery, administration of intravenous fluids should be considered to ensure adequate volume expansion in order to avoid shock after tumor removal (Grade D)
  - g) for hypertensive crises before/during surgery, phentolamine hydrochloride should be readily available and if necessary, administered intravenously (Grade D)
  - h) intravenous propranolol should be employed for treatment of arrhythmias (Grade D)
  
- 10) For patients with pheochromocytoma diagnosed during early pregnancy, if a decision is made to terminate the pregnancy, this should be carried out under alpha and beta-adrenergic antagonists (as above), followed immediately by tumor resection. In late pregnancy, alpha and beta-adrenergic antagonists, followed by elective cesarean section and immediate tumor resection are recommended (Grade D).
  
- 11) For patients with inoperable or metastatic malignant pheochromocytoma, blood pressure control and adrenergic symptoms may be controlled with alpha-adrenergic antagonists (phenoxybenzamine, prazosin, doxazosin) plus beta-adrenergic antagonists and/or tyrosine hydroxylase inhibition with metyrosine (Grade D). A combination of cyclophosphamide, vincristine, and dacarbazine may be used for

# *The 2004 CHEP Recommendations for the Management of Hypertension*



## *Part 1: Diagnosis And Assessment*

*Endocrine Hypertension: b) Pheochromocytoma Screening and Diagnosis (cont)*

chemotherapy of metastatic pheochromocytoma (Grade D). Treatment with high dose I<sup>131</sup>-MIBG induces only a moderate response, but may help control of blood pressure (Grade D).

## **VII HOME (SELF) MEASUREMENT OF BLOOD PRESSURE**

- 1) The use of home blood pressure monitoring on a regular basis should be considered for patients suspected to be noncompliant and for diabetic patients (**Grade D** for noncompliant patients; Grade D for diabetic patients).
- 2) **When white coat effect is suggested by self/home monitoring, its presence should be confirmed with 24-hour ambulatory blood pressure monitoring before making treatment decisions. (Grade D).**
- 3) Patients should be advised to purchase and use only home blood pressure monitoring devices that are appropriate for the individual and have met the most recent standards of (i) the Association for the Advancement of Medical Instrumentation, (ii) the British Hypertension Society protocol or (iii) the International Protocol for validation of automated blood pressure measuring devices. Patients should be encouraged to use devices with data recording capabilities or automatic data transmission to increase the reliability of reported home blood pressure values (Grade D).
- 4) Home systolic and diastolic blood pressure values above 136/or/83 mmHg respectively should be considered elevated and associated with an increased overall mortality risk analogous to clinic readings greater than 140/or/90 mmHg (Grade C).
- 5) Health care professionals should ensure that patients who measure their blood pressure at home have adequate training, and if necessary, repeat training in measuring their blood pressure. Patients should be observed to determine that they measure blood pressure correctly and they should be given adequate information about interpreting these readings (Grade D).
- 6) The accuracy of all individual patients' validated blood pressure measurement devices must be regularly checked against a device of known calibration (Grade D).

# *The 2004 CHEP Recommendations for the Management of Hypertension*



## *Part 1: Diagnosis And Assessment*

*Home (Self) Measurement of Blood Pressure (cont)*

- 7) Home blood pressure values for assessing white coat hypertension or sustained hypertension should be based on duplicate measures, morning and evening, for an initial 7-day period. Singular and first day home blood pressure values should not be considered (Grade D).**

## **VIII AMBULATORY BLOOD PRESSURE MEASUREMENT**

- 1) Ambulatory blood pressure monitoring should be considered when an office-induced increase in blood pressure is suspected: a) untreated patients with Grade I to Grade II clinic blood pressure elevations and without target organ damage (Grade B) b) treated patients with **blood pressure which is not below target despite receiving appropriate chronic anti-hypertensive therapy** (Grade C), or symptoms suggestive of hypotension (Grade C) or fluctuating office blood pressure readings (Grade D).
- 2) Physicians should use only ambulatory blood pressure monitoring devices that have been validated independently using established protocols (Grade D).
- 3) A decision to withhold drug therapy, based upon the ambulatory blood pressure, should take into account normal values for systolic and diastolic 24-hour ambulatory blood pressure (<134/78) and daytime blood pressure (<136/ 87 for men; <131/ 86 for women) (Grade C).
- 4) The magnitude of changes in nocturnal blood pressure should be taken into account in any decision to prescribe or withhold drug therapy based upon ambulatory blood pressure (Grade C) because a decrease in nocturnal blood pressure of less than 10% is associated with increased risk of cardiovascular events.

## **IX ROLE OF ECHOCARDIOGRAPHY**

- 1) Routine echocardiographic evaluation of all hypertensive patients is not recommended. (Grade D).
- 2) An echocardiogram for assessment of left ventricular hypertrophy is useful in selected cases to help define the future risk of cardiovascular events (Grade C).

## ***The 2004 CHEP Recommendations for the Management of Hypertension***



### ***Part 1: Diagnosis And Assessment***

#### *Role of Echocardiograph (cont)*

- 3) Echocardiographic assessment of left ventricular mass as well as of systolic and diastolic left ventricular function is recommended for hypertensive patients suspected to have left ventricular dysfunction or coronary artery disease (Grade D).
- 4) Echocardiography should not be used to track therapeutic regression of left ventricular hypertrophy (Grade D).

# *The 2004 CHEP Recommendations for the Management of Hypertension*



## *Part 2: Therapy*

### **I INDICATIONS FOR DRUG THERAPY IN UNCOMPLICATED HYPERTENSION**

- 1) Antihypertensive therapy should be strongly considered if diastolic blood pressure readings average 90 mmHg or more in the presence of hypertensive target organ damage or other independent cardiovascular risk factors such as elevated systolic blood pressure, cigarette smoking, abnormal lipid profile, strong family history of premature cardiovascular disease, truncal obesity, or sedentary lifestyle (Grade A).
- 2) Antihypertensive therapy should be prescribed for average diastolic blood pressures of 100 mmHg or more (Grade A) or average systolic blood pressures of 160 mmHg or more (Grade A) in patients without hypertensive target organ damage or other cardiovascular risk factors.

### **II LIFESTYLE MANAGEMENT**

- 1) **For non-hypertensive individuals, to reduce their possibility of becoming hypertensive, prescribe the accumulation of 30 to 45 minutes of moderate intensity dynamic exercise (such as walking, jogging, cycling or swimming) 3-5 days of the week (Grade B). Higher intensities of exercise are no more effective (Grade B).**
- 2) **For hypertensive patients, to reduce their blood pressure, prescribe the accumulation of 30 to 45 minutes of moderate intensity dynamic exercise (such as walking, jogging, cycling or swimming) on most days of the week. (Grade B) Higher intensities of exercise are no more effective (Grade B).**
- 3) Alcohol consumption should be in accordance with Canadian low-risk drinking guidelines: healthy adults should limit alcohol consumption to < 2 drinks per day, and consumption should not exceed 14 standard drinks per week for men and 9 standard drinks per week for women (Grade B).
- 4) **In hypertensive patients in whom stress may be implicated in contributing to blood pressure elevation, stress management should be considered as an intervention (Grade D). Individualized cognitive behavioral interventions are more likely to be effective when relaxation techniques are employed (grade B).**

## *The 2004 CHEP Recommendations for the Management of Hypertension*



### *Part 2: Therapy*

#### *Lifestyle Management (cont)*

- 5) **In regards to weight reduction in patients with hypertension:**
  - a) **Height and weight should be measured and body mass index (BMI) calculated for all adults (Grade D).**
  - b) **Maintenance of an ideal body weight (BMI 18.5-24.9 kg/m<sup>2</sup>) is recommended for non-hypertensive individuals to prevent hypertension (Grade C).**
  - c) **Maintenance of a healthy BMI (18.5-24.9 kg/m<sup>2</sup>) is recommended for hypertensive patients to reduce blood pressure. All overweight (body mass index > 25 kg/m<sup>2</sup>) hypertensive individuals, should be advised to lose weight (Grade B).**
  - d) **Weight loss strategies should employ a multidisciplinary approach and include dietary education, increased physical activity and behavioural modification (Grade B).**
  
- 6)
  - a) **In normotensive individuals at increased risk of developing hypertension and considered salt-sensitive such as Canadians of African descent, age over 45 years and individuals with impaired renal function or diabetes, salt intake should be restricted to less than 100 mmol/L per day (Grade D).**
  - b) **In hypertensive patients, dietary sodium intake should be limited to 65-100 mmol/day (Grade B).**
  
- 7) **Potassium, calcium and magnesium intake:**
  - a) **Hypertensive patients or normotensive individuals at increased risk of developing hypertension and considered salt-sensitive such as Canadians of African descent, age over 45 years and individuals with impaired renal function or diabetes should ensure an adequate intake of potassium, calcium and magnesium by consuming a diet rich in these micronutrients (Grade D).**
  - b) **Supplementation of potassium, calcium and magnesium is not recommended for the prevention or treatment of hypertension (Grade B).**
  - c) **Individuals who require a diet rich in these cations, but who can not tolerate or afford this diet, should supplement their diet with potassium to obtain a daily intake of more than 80 mmol per day (Grade D).**

# *The 2004 CHEP Recommendations for the Management of Hypertension*



## *Part 2: Therapy*

*Lifestyle Management (cont)*

- 8) It is recommended that hypertensive patients consume a diet that emphasizes fruits, vegetables and low-fat dairy products and that is reduced in fat and cholesterol (DASH diet) (Grade B).

### **III CHOICE OF THERAPY FOR ADULTS WITH HYPERTENSION WITHOUT COMPELLING INDICATIONS FOR SPECIFIC AGENTS**

#### ***a) Global vascular protection therapy for patients with hypertension***

- 1) Statins are recommended in hypertensive patients with 3 or more cardiovascular risk factors (Grade A in patients older than 40) or with established atherosclerotic disease (grade A regardless of age).
- 2) Strong consideration should be given to the addition of low dose ASA in hypertensive patients (Grade A in patients older than 50). Caution should be exercised if blood pressure is not controlled.

#### ***b) Recommendations for individuals with diastolic $\pm$ systolic hypertension***

- 1) Initial therapy should be monotherapy with a thiazide diuretic (Grade A); a beta-adrenergic antagonist (Grade B); an angiotensin-converting enzyme inhibitor (Grade B); a long acting dihydropyridine calcium channel blocker (Grade B); or an angiotensin receptor blocker (Grade B). If there are adverse effects, another drug from this group should be substituted. For patients receiving a thiazide diuretic, hypokalemia should be avoided with the use of potassium sparing agents (Grade C).
- 2) Combination therapy should be used if there is only partial response to **standard dose** monotherapy (**Grade B**). Useful combinations include a thiazide diuretic or calcium channel blocker with either an angiotensin-converting enzyme inhibitor or an angiotensin receptor blocker or a beta-adrenergic antagonist (Grade D). Caution should be exercised in combining a nondihydropyridine calcium channel blocker and a beta-blocker (Grade D).

# *The 2004 CHEP Recommendations for the Management of Hypertension*



## ***Part 2: Therapy***

*Choice of Therapy for Adults with Hypertension without Compelling Indications for Specific Agents*

b) *Recommendations for individuals with diastolic  $\pm$  systolic hypertension (cont)*

- 3) If blood pressure is still not controlled, or there are adverse effects, other classes of antihypertensive drugs (such as alpha adrenergic antagonists, centrally acting agents, or nondihydropyridine calcium channel blocker) may be tried (Grade D).
- 4) Possible reasons for poor response to therapy (see Table) should be considered (Grade D).
- 5) Alpha-adrenergic antagonists are not recommended as first-line agents for uncomplicated hypertension (Grade A); beta-adrenergic antagonists are not recommended as first-line therapy for uncomplicated hypertension in elderly patients (Grade A); angiotensin converting enzyme inhibitors are not recommended as first line therapy for uncomplicated hypertension in blacks. However, these agents may play a role in patients with certain comorbidities or in combination therapy.

c) ***Recommendations for isolated systolic hypertension***

- 1) Initial therapy should be monotherapy with a thiazide diuretic (Grade A), a long acting dihydropyridine calcium channel blocker (Grade A) or an angiotensin receptor blocker (Grade B). If there are adverse effects, other drugs from this group should be substituted. For patients receiving a thiazide diuretic, hypokalemia should be avoided with the use of potassium sparing agents (Grade C).
- 2) If blood pressure is still not controlled or there are adverse effects, other classes of drugs (such as alpha blockers, angiotensin converting enzyme inhibitors, centrally acting agents, or nondihydropyridine calcium channel blockers) may be added/substituted (Grade D).
- 3) Combination therapy should be used if there is only a partial response to **standard dose** monotherapy (**Grade B**). Useful combinations include a thiazide diuretic or dihydropyridine calcium channel blocker with either an angiotensin converting enzyme inhibitor or angiotensin receptor blocker or beta-adrenergic antagonist (Grade D).
- 4) Possible reasons for poor response to therapy (see Table) should be considered (Grade D).

# *The 2004 CHEP Recommendations for the Management of Hypertension*



## ***Part 2: Therapy***

*Choice of Therapy for Adults with Hypertension without Compelling Indications for Specific Agents*

*c) Recommendations for isolated systolic hypertension (cont)*

- 5) Alpha-adrenergic antagonists are not recommended as first-line agents for uncomplicated isolated systolic hypertension (Grade A); beta-adrenergic antagonists are not recommended as first-line therapy for isolated systolic hypertension in elderly patients (Grade A). However, these agents may play a role in patients with certain comorbidities or in combination therapy.

## **IV GOAL OF THERAPY IN UNCOMPLICATED HYPERTENSION**

- 1) The systolic blood pressure treatment goal is a pressure level of less than 140 mmHg (Grade C). The diastolic blood pressure treatment goal is a pressure level of less than 90 mmHg (Grade A).

## **V TREATMENT OF HYPERTENSION IN ASSOCIATION WITH ISCHEMIC HEART DISEASE**

### ***a) Recommendations for patients with stable angina and hypertension***

- 1) Beta-adrenergic antagonists are preferred as initial therapy (Grade B). Long acting calcium channel blockers may also be used (Grade B).
- 2) **An angiotensin-converting enzyme inhibitor is recommended for all patients with documented coronary artery disease, including hypertensive patients (Grade A).**
- 3) Short acting nifedipine should not be used (Grade D).

### ***b) Recommendations for patients with hypertension who have had a recent ST-elevation myocardial infarction or non-ST segment elevation myocardial infarction***

- 1) **Initial therapy should include both a beta-adrenergic antagonist and an angiotensin-converting enzyme inhibitor (Grade A).**

# *The 2004 CHEP Recommendations for the Management of Hypertension*



## ***Part 2: Therapy***

*Treatment of Hypertension in Association with Ischemic Heart Disease*

b) *Recommendations for Patients with Hypertension Who Have Had a Recent St-Elevation Myocardial Infarction or Non-St Segment Elevation Myocardial Infarction (Cont)*

- 2) Long acting calcium channel blockers may be used in post myocardial infarction patients when beta adrenergic antagonists are contraindicated or not effective, but non dihydropyridines should only be used when there is no heart failure as evidenced by pulmonary congestion on examination or radiographically (Grade D).

## **VI TREATMENT OF HYPERTENSION IN ASSOCIATION WITH HEART FAILURE**

- 1) Patients with hypertension and evidence of heart failure should have an objective assessment of left ventricular ejection fraction, either by echocardiogram or nuclear imaging (Grade D).
- 2) **In patients with systolic dysfunction, angiotensin converting enzyme inhibitors (Grade A), and beta-adrenergic antagonists (Grade A) are recommended for initial therapy. Aldosterone antagonists (Grade B) are also recommended for patients with NYHA Class III or IV symptoms or heart failure post-MI. Diuretics are recommended as additional therapy if needed (Grade B for thiazide diuretics for blood pressure control, Grade D for loop diuretics for volume control).**
- 3) **An angiotensin receptor blocker (Grade A) is recommended if angiotensin-converting enzyme inhibitors are not tolerated.**
- 4) **A combination of hydralazine and isosorbide dinitrate is recommended if angiotensin converting enzyme inhibitors and angiotensin receptor blockers are contraindicated or not tolerated (Grade B).**
- 5) **For hypertensive patients with heart failure whose blood pressure is not controlled, an angiotensin receptor blocker may be added to an angiotensin converting enzyme inhibitor and other antihypertensive drug treatment (Grade A). Additional therapies may also include long acting dihydropyridine calcium channel blockers (Grade C).**

# *The 2004 CHEP Recommendations for the Management of Hypertension*



## *Part 2: Therapy*

### **VII TREATMENT OF HYPERTENSION IN ASSOCIATION WITH CEREBROVASCULAR DISEASE**

- 1) Strong consideration should be given to the initiation of antihypertensive therapy after the acute phase of non-disabling stroke or transient ischemic attack (Grade A).
- 2) Caution is indicated in deciding whether to lower blood pressure in the acute stroke situation; pharmacological agents and routes of administration should be chosen to avoid precipitous falls in blood pressure (Grade D).
- 3) Following the acute phase of a stroke, patients should have their blood pressure chronically controlled to a target of less than 140/90 mmHg (Grade C).
- 4) **Treatment with an angiotensin converting enzyme inhibitor/diuretic combination is preferred (Grade B).**

### **VIII TREATMENT OF HYPERTENSION IN ASSOCIATION WITH LEFT VENTRICULAR HYPERTROPHY**

- 1) Hypertensive patients with left ventricular hypertrophy should be treated with antihypertensive therapy to lower the rate of subsequent cardiovascular events (Grade C).
- 2) The choice of initial therapy can be influenced by the presence of left ventricular hypertrophy (Grade D). Initial therapy can be drug treatment using angiotensin converting enzyme-inhibitors, angiotensin receptor blockers, dihydropyridine calcium channel blockers, diuretics, or in those under age 55, beta adrenergic antagonists. Direct arterial vasodilators such as hydralazine or minoxidil should not be used.

# *The 2004 CHEP Recommendations for the Management of Hypertension*



## *Part 2: Therapy*

### **IX TREATMENT OF HYPERTENSION IN ASSOCIATION WITH NON-DIABETIC RENAL DISEASE**

- 1) For patients with non-diabetic renal disease, target blood pressure is  $\leq 130/80$  mm Hg (Grade C).
- 2) For patients with proteinuria  $>1$  g/day, target blood pressure is  $\leq 125/75$  mm Hg (Grade C).
- 3) For patients with hypertension and renal disease, initial therapy should be an angiotensin converting enzyme-inhibitor (Grade A). **If an angiotensin converting enzyme-inhibitor is not tolerated, an angiotensin receptor blocker should be substituted (Grade D).**
- 4) Thiazide diuretics are recommended as additive antihypertensive therapy (Grade D). For patients with renal insufficiency and volume overload, loop diuretics are an alternative (Grade D).
- 5) In most cases, combination therapy with other antihypertensive agents may be needed to reach target blood pressures (Grade D).

### **X TREATMENT OF HYPERTENSION IN ASSOCIATION WITH RENOVASCULAR DISEASE**

- 1) Renovascular hypertension should be treated in the same manner as essential hypertension, except for caution in the use of angiotensin converting enzyme inhibitors or angiotensin receptor blocker due to the risk of acute renal failure in bilateral disease or unilateral disease with a solitary kidney (Grade D).
- 2) Close follow-up and early intervention (angioplasty and stenting or surgery) should be considered for patients with: uncontrolled hypertension despite therapy with three or more drugs, or deteriorating renal function, or bilateral atherosclerotic renal artery lesions (or tight atherosclerotic stenosis in a single kidney), or recurrent episodes of flash pulmonary edema (Grade D).

## *The 2004 CHEP Recommendations for the Management of Hypertension*



### *Part 2: Therapy*

## **XI TREATMENT OF HYPERTENSION IN ASSOCIATION WITH DIABETES MELLITUS**

- 1) Persons with diabetes mellitus should be treated to attain systolic blood pressures of 130 mmHg or less (Grade C) and diastolic blood pressures of 80 mmHg or less (Grade A). (These target blood pressure levels are the same as the blood pressure thresholds).
- 2) For persons with diabetes and albuminuria (urinary albumin excretion rates over 30 mg/day) an angiotensin converting enzyme inhibitor or an angiotensin receptor blocker is recommended as initial therapy (Grade A). If blood pressure remains greater than 130/80 mmHg despite lifestyle interventions and an angiotensin converting enzyme inhibitor or angiotensin receptor blocker, then addition of one or more of a thiazide diuretic, long-acting calcium channel blocker, or use of angiotensin converting enzyme inhibitor and angiotensin receptor blocker in combination can be considered (Grade D). If an angiotensin converting enzyme inhibitor and angiotensin receptor blocker cannot be tolerated, a cardioselective beta-adrenergic blocker (Grade B), long acting calcium channel blocker (Grade C), or thiazide diuretic can be substituted (Grade B).
- 3) For persons with diabetes and normal urinary albumin excretion (less than 30 mg/day) and blood pressure greater than 130/80 mm Hg despite lifestyle interventions, an angiotensin converting enzyme inhibitor (Grade A for persons aged greater than or equal to 55 years, Grade B for persons aged less than 55 years), or an angiotensin receptor blocker (Grade A for persons with left ventricular hypertrophy and age greater than or equal to 55 years, Grade B for persons without left ventricular hypertrophy irrespective of age) or a thiazide diuretic (Grade A for persons with age greater than or equal to 55 years, Grade B for persons aged less than 55 years) is recommended. If these drugs are contraindicated or cannot be tolerated, a cardioselective beta-adrenergic blocker (Grade B) or long acting calcium channel blocker (Grade C) can be substituted. If blood pressure targets cannot be reached despite an angiotensin converting enzyme inhibitor, angiotensin receptor blocker, or thiazide diuretic, then these drugs in combination or addition of one or more of a cardioselective beta-blocker or long acting calcium channel blocker can be considered (Grade D).

# *The 2004 CHEP Recommendations for the Management of Hypertension*



## ***Part 2: Therapy***

*Treatment of hypertension in association with diabetes mellitus (cont)*

- 4) For persons with diabetes and a serum creatinine over 150  $\mu\text{mol/L}$  (or creatinine clearance below 30ml/min or 0.5ml/s), the choice of antihypertensive drugs is the same as above, except that a loop diuretic should be substituted for a thiazide diuretic if control of volume is desired (Grade D).
- 5) For persons with diabetes and a normal urinary albumin excretion rate (less than 30 mg/day) with isolated systolic hypertension, thiazide diuretic (Grade C) or long acting dihydropyridine calcium channel blocker (Grade C) are alternative initial choices to an angiotensin converting enzyme inhibitor or an angiotensin receptor blocker.
- 6) Alpha-blockers are not recommended as first-line agents for the treatment of hypertension in persons with diabetes (Grade A).

## **XII ADHERENCE**

- 1) Adherence to an anti-hypertensive prescription can be improved by a multi pronged approach including:
  - a) simplify medication regimens to once daily dosing (Grade D) and utilizing electronic medication compliance aids (Grade D)
  - b) Tailor pill-taking to fit patients' daily habits (Grade D)
  - c) Encourage greater patient responsibility/autonomy in monitoring their blood pressure and adjusting their prescriptions (Grade C)
  - d) coordinate with a work-site health care givers to improve monitoring of adherence with pharmacological lifestyle modification prescriptions (Grade D)
  - e) educate patients and patients' families about their disease/treatment regimens (Grade C)
  - f) **adherence to pharmacological and nonpharmacological therapy should be assessed at every visit (Grade D)**