SUMMARY. Nondrug measures have proven effective, to some extent, in lowering blood pressure, especially in mild hypertensives, in many well-controlled studies. The proven measures are reduction of a) salt (< 5g/day), b) alcohol (< 30ml/day) intake, and c) obesity, and d) regular physical exercise (30-60 minutes/day) and e) mental relaxation. The reported effectiveness of each of these measures ranges from one third to two thirds in mild hypertensives. Should all these nondrug measures, together with cessation of smoking, be applied in all mild hypertensives, it might help prevent their progression to moderate or even severe hypertension with complications, such as coronary heart disease in particular, thereby solving most of the problems that antihypertensive drugs have left behind.

KEY WORDS. hypertension, non-pharmacologic therapy, salt, alcohol, obesity, exercise, mental relaxation

Anti hypertensive drug therapy has made great progress in the past couple of decades, thanks to the development of new classes of drugs and their proven benefits in preventing cardiovascular complications, especially stroke, in many large-scale clinical trials. However, antihypertensive therapy now seems to stand at a turning point, looking not necessarily for more effective drugs, but for better measures in terms of a) adverse reactions, especially in the case of heart disease; b) quality of life, and c) cost [11]. Coronary heart disease, unlike stroke, has not always been preventable with conventional drugs, as most of the large-scale antihypertensive trials have revealed [2]. This failure may be due to coronary risk factors other than hypertension alone, but there is also a fear that antihypertensive drugs may have promoted certain risk factors. The Framingham Study showed that almost twice as many men who died suddenly were receiving antihypertensive therapy when compared to the population at risk of the same age (34% vs. 18%) [3]. Even though this was not corroborated by the British MRC controlled trial in mild hypertensives [41], nor by the Australian High Blood Pressure Study [5], concern persists. In Japan, the death rate from heart disease is still increasing and became the second leading cause of death, in 1985, whereas death from stroke fell to third place and is still decreasing [6].

Subjective adverse reactions to drugs have also become a big concern. For instance, no physician would have ever thought, until recently revealed by the MRC Study, that thiazides cause sexual disturbances in as many as 20% of patients [4]. The quality of life of patients has thus become a great concern in medical practice [7]. Socioeconomic problems in medical care, including antihypertensive drug therapy, are also emerging worldwide. Hypertension is very common and, if borderline hypertension were included, 45.5% of Japanese over the age of 30 years are hypertensive (21.4% borderline, 23.1% hypertensive), according to Japanese government statistics in 1970 [6]. Less than half of these individuals are believed to be under treatment, and yet the cost of such treatment is already very substantial in terms of overall medical care.

The cost of medical care is increasing, not only in the net amount of money, but also in relation to the gross national product (GNP), as shown in Table 1 [6]. For example, Japan spent 16 trillion yen or 5.1% of its GNP for medical care in 1987, which corresponds to one fourth of the national budget (60 trillion yen). Of the total cost of medical care, cardiovascular treatment consumed 23.3% (hypertension 8.3%, stroke 7.9%, and ischemic heart disease 2.9%), while malignancy, which has been the major cause of death since 1980, consumed only 9.2% in 1985, according to Japanese government statistics of 1988 [6]. Even if we could overcome malignancy completely, it would help decrease the total cost of medical care by only 9.2%. In contrast, should nonpharmacologic measures prevent or treat all cardiovascular diseases, it could save as much as 23.3%. In
hypertension only, the 8.3% that could be saved nearly equals the figure (9.2%) for cancer. Despite the similar costs, it is not feasible to overcome cancer, at least at the present time, whereas treatment of hypertension is feasible to a certain extent.

This paper will review the degree to which such nondrug measures have proven to be efficacious. Studies of the underlying mechanisms of nonpharmacologic treatments is even shedding some light on the etiology, at least in part, of so-called essential hypertension.

Salt and Other Minerals

Kempner first successfully applied severe restriction of salt intake (approximately 0.5 g/day) clinically for lowering blood pressure in severe hypertensives when, unlike today, good antihypertensive drugs were not available [8]. Such severe salt restriction of less than 1 g/day may not be practical, especially for mild-to-moderate hypertensives.

Whether moderate restriction of salt intake to 3–6 g/day can lower high blood pressure has been questioned by many investigators. MacGregor et al. showed, in a double-blind study, a fall of -12/-6 mmHg in blood pressure by changing from a high-salt (162 mM or 0.5 g/day) to a moderately low-salt (86 mM or 5.0 g/day) diet [9]. This amount of salt restriction may be the practical limit in daily life. Even in Japan, where the average salt intake is now 12 g/day, this aim may not be entirely impossible, since Japan has already been successful in halving its salt intake over the past couple of decades.

It should be remembered, however, that both in Kempner’s and MacGregor’s studies of severe and moderate restriction of salt intake, there were some exceptional patients whose blood pressure did not respond. Today, this is thought to have been due to variable salt sensitivity of individual patients [10]. Salt sensitivity may be inherited and may be related to a disturbance of the renal salt excretion mechanism, such as Na-K-ATPase activity, although this is not clear yet. Nevertheless, patients with low-renin essential hypertension and elderly hypertensives tend to respond better to salt restriction [11]. Even if blood pressure is not lowered, salt restriction may help in reducing the dosage of antihypertensive drugs. For example, Freis has shown that 80% of patients on a diet of 37 mM or 2 g/day were able to reduce or even omit their drugs, while only 30% of the control group could reduce their drugs or omit them [12].

Potassium may be involved in the pressor response to sodium. For instance, feeding extra sodium increases potassium excretion in normal humans, resulting in a small decrease in the plasma potassium concentration. On the other hand, supplementary potassium in the diet attenuates the elevation of blood pressure caused by increased dietary sodium, even in normal subjects [13]. In hypertensive subjects, Lever et al. found a positive correlation between total body sodium and blood pressure and a negative correlation between total body potassium and blood pressure [14]. Imura et al. found a 10% lowering of mean blood pressure in hypertensive patients when 96 mM/day of potassium was added to a high-salt (260 mM/day) diet [15]. The mechanism by which potassium lowers blood pressure may, therefore, be via elimination of sodium and its effect. Moreover, a high potassium intake protected against stroke in hypertensive rats, even when blood pressure was adjusted [16].

The value of calcium or magnesium supplements is still being argued and it is necessary to wait until the argument reaches maturity.

Body Weight

A number of epidemiologic and clinical studies have consistently demonstrated a positive association of