Diet therapy for dyslipidemic patients according to the latest Guidelines

Noriaki Kishimoto¹ Kengo Moriyama¹ Chizumi Yamada¹ Emiko Kikuchi¹ Tamae Ogata¹ Nana Urata¹ Tomoki Nakamura² Yutaka Shina¹ Ichiro Sakuma³ Yasuhiro Nishizaki¹

¹Department of Clinical Health Science, Tokai University, School of Medicine ²Department of Surgery, Tokai University, School of Medicine ³Caress Sapporo, Hokko Memorial Clinic

ABSTRACT
The mortality rate caused by coronary artery disease for Japanese has remained extremely low compared with other developed countries, and this may be explained, at least in part, by differences in dietary habits. The Japan Diet, which is also referred as “the traditional Japanese diet,” has been shown to contribute to the prevention of coronary artery disease in several studies. The Japan Atherosclerosis Society revised the guidelines for treatment of dyslipidemia to prevent atherosclerotic cardiovascular diseases in 2013. In the section on diet therapy in the guidelines, three items on how to advance diet therapy were recommended as follows: (1) provide patients with an atmosphere for approaching the diet therapy with a positive attitude; (2) correct issues on diet case by case; and (3) support patients to continue diet therapy comfortably for a long time. Since diet therapy also requires scientific evidence, diet therapy according to the latest guidelines for patients with dyslipidemia should be considered.

Key words Lipid Nutrition, Dyslipidemia, Cholesterol, Dietary Reference Intakes, Japan Atherosclerosis Society Guidelines

Introduction
The primary objective of the treatment of dyslipidemia is to prevent atherosclerotic cardiovascular diseases in the presence or absence of lifestyle modification or drug therapy. In general, dyslipidemia is often detected in health check-ups or blood tests such as those conducted at the time of blood donation. In many cases, patients themselves are not aware of the disease. Some people do not visit a health care facility even if they had been advised to see a doctor for elevated serum lipoprotein levels found in a medical examination years before. Therefore, what is done for patients at their initial visit to a health care facility or in their first nutrition counseling is thought to be very important. The key seems to be that a doctor or registered dietitian, regardless of the profession, should provide new patients with convincing explanations or instructions with respect to the need for and methods of treatment of the health condition the patients themselves have not been worried about. Specifically, guidance discussing fundamental principles from the beginning will not be very effective and not help patients achieve continuous modification of their dietary habits. Thus, guidance and management based on the eating habits of each patient and the issues related to them are essential. For example, let us assume that we have a patient with dyslipidemia, who likes to have fish and seafood rich in n-3 fatty acids and seafood and vegetable oils provide n-3 polyunsaturated fatty acids. To prevent arteriosclerosis, consuming fish and soybeans or soy products more than meat or eggs and the intake of an appropriate amount of fatty acids is recommended. Vegetable oils and soy products are sources of n-6 polyunsaturated fatty acids and seafood and vegetable oils provide n-3 polyunsaturated fatty acids. To prevent arteriosclerosis, consuming fish and soybeans or soy products more than meat or eggs and the intake of an appropriate amount of fatty acids is recommended. In addition, dietary fibers, vitamins, and minerals are taken by eating cereals, barley, rice that is not well-polished, fruits, vegetables, seaweeds, green tea, and so on. However, an unfavorable issue with the Japan Diet is excess sodium intake, and thus reducing salt might be required. It has been reported that the death rate due to coronary artery disease is approximately 20% lower among people who consume a low-sodium Japan Diet than those who consume Western-style meals.
Guidelines for dyslipidemia and diet therapy

Clinical questions (CQs) on diet therapy in the Guidelines for the Diagnosis and Prevention of Atherosclerotic Cardiovascular Diseases

The Japan Atherosclerosis Society established the Guidelines for the Diagnosis and Prevention of Atherosclerotic Cardiovascular Diseases in 2007\(^9\). The Japan Dietetic Association participated in the Guidelines as an observer and stated that lifestyle modification for low-risk patients is of primary importance. In the revised Guidelines in 2012\(^7\), it was emphasized that nutritional counseling for reduction of cardiovascular risk factors should be provided based on the lifestyle of each patient as shown in Table 1. In the 2017 Guidelines\(^8\), dyslipidemia management to evaluate risk factors, absolute risk and targets of lipid management for atherosclerotic disease, CQs based on the MINDS method\(^9\) and systematic reviews to improve lifestyle including diet therapy and medications were provided. For diet therapy, fourteen CQs were created to lead healthcare professionals managing issues on diet more easily and adequately, as follows.

(1) Is maintaining adequate body weight by limiting total energy intake effective for prevention of atherosclerotic cardiovascular diseases?
It has been shown that maintaining proper body weight could improve serum lipid levels, leading to the possibility of preventing atherosclerosis. However, no direct evidence on limiting total energy intake to prevent the disease was shown.

(2) Is limiting energy intake from fats under appropriate total energy intake effective for prevention of atherosclerotic cardiovascular diseases?
It has been shown that limiting energy intake from fats under appropriate total energy intake could improve serum lipid levels, while there is no evidence which showed that limiting energy intake from fats could prevent atherosclerosis.

(3) Is reducing intake of saturated fatty acids or replacing saturated fatty acids with other unsaturated fatty acids valid for prevention of atherosclerotic cardiovascular diseases?
Reducing saturated fatty acids or substituting polyunsaturated fatty acids for saturated fatty acids while maintaining appropriate total energy intake can lower serum lipid levels, resulting in the prevention of coronary artery disease. When saturated fatty acids are replaced by monounsaturated fatty acids, serum lipid profile is expected to improve. However, limiting the consumption of saturated fatty acids to an extreme degree may be associated with the incidence of intra-cerebral hemorrhage.

(4) Does increasing dietary intake of n-3 polyunsaturated fatty acids help in preventing development of atherosclerotic cardiovascular diseases?
Increasing dietary intake of n-3 polyunsaturated fatty acids may lead to lower triglyceride levels and to preventing coronary artery disease development.

(5) Is increasing dietary intake of n-6 polyunsaturated fatty acids effective in prevention of atherosclerotic cardiovascular diseases?
Increasing dietary intake of n-6 polyunsaturated fatty acids can be expected to improve serum lipid profile with appropriate total energy intake. However, whether it is beneficial in preventing atherosclerotic cardiovascular diseases is not clear.

(6) Is increasing intake of monounsaturated fatty acids effective in prevention of atherosclerotic cardiovascular diseases?
Increasing intake of monounsaturated fatty acids with appropriate total energy intake can be expected to improve lipid profile. However, whether it is beneficial in preventing the incidence of atherosclerotic cardiovascular diseases is not clear.

(7) Is reducing consumption of trans-unsaturated fatty acids effective in the prevention of atherosclerotic cardiovascular diseases?
Reducing consumption of trans-unsaturated fatty acids has been reported to prevent coronary artery disease.

(8) Does limiting cholesterol intake prevent atherosclerotic cardiovascular diseases?
In patients with high LDL-C, lowering LDL-C is anticipated by reducing dietary cholesterol intake to less than 200 mg/day. Thus, reducing dietary cholesterol intake could prevent atherosclerotic diseases in patients with high LDL-C.

(9) Is it recommended to increase vegetable intake for prevention of atherosclerotic diseases?
Vegetable intake could lower the risk for coronary artery disease and stroke. Green and yellow vegetable intake could lower the risk for stroke.

(10) Is it recommended to increase seaweed intake for prevention of atherosclerotic diseases?
Seaweed intake may help prevent atherosclerotic diseases.

(11) Is it recommended to increase fruit intake for prevention of atherosclerotic diseases?
Fruit intake could lower the risk for coronary artery disease and stroke. Intake of a proper amount of fruit that contains less sugar is recommended.

(12) Is it recommended to reduce processed foods that contain fructose for prevention of atherosclerotic diseases?
It is recommended to reduce processed foods that contain fructose, because they could increase the risk for athero-

Table 1 Nutrient Recommendations for the Prevention of Cardiovascular Disease

1. Maintain an ideal body weight (height [m]² × 22) in consideration of energy intake and the amount of physical activity.
2. Limit the energy percent derived from fat to 20%–25%, saturated fatty acids to ≤4.5% but <7%, and cholesterol intake to <200 mg/day.
3. Increase the intake of n-3 polyunsaturated fatty acids
4. Limit the energy percent derived from carbohydrates to 50–60%, and increase the dietary fiber intake.
5. Aim to reduce the salt intake to <6 g/day.
6. Limit alcohol consumption to ≤25 g/day.
sclerotic diseases. Lowering TG levels could be achieved by reducing processed foods containing fructose.

(13) Is soybean and soy product intake recommended for prevention of atherosclerotic diseases?
Soybean and soy product intake is recommended because they could lower the risk for coronary artery disease and stroke.

(14) Is the Japan Diet recommended for prevention of atherosclerotic diseases?
The Japan Diet, which use less meat fat and animal fats (beef fat, lard, and butter) and a combination of soybeans, fish, vegetables, seaweeds, mushrooms, fruits, and unrefined grains, with reduced salt is recommended for the prevention of atherosclerotic diseases.

**Dietary Reference Intakes for Japanese**

The Dietary Reference Intakes for Japanese proposed reference values of desirable dietary intakes of energy and nutrients for Japanese people to maintain and promote their health, which is expected to improve public health and prevent lifestyle-related diseases. The Ministry of Health, Labour and Welfare recommends a brief-type self-administered diet history questionnaire (BDHQ) as a tool for the assessment. The basic principle of the Dietary Reference Intakes for Japanese was revised in 2015, aiming to further promote prevention for the development and aggravation of major lifestyle-related diseases, which was referred to in Healthy Japan 21 (Stage 2) starting from the 2013 fiscal year. Table 2 shows dietary reference intakes that are strongly associated with dyslipidemia. Although reduction in dietary cholesterol intake was recommended in the Dietary Reference Intakes until the 2010 version for prevention of atherosclerotic disease, the results from a meta-analysis in 2013 indicated that egg intake did not correlate with morbidity from coronary artery disease or stroke.

It has been reported that egg consumption did not correlate with the death rate from ischemic heart disease or stroke according to the results of NIPPON DATA 80. It has also been reported that mortality in subjects who consume two or more than two eggs a day was not significantly different from that of subjects who consume less than two eggs a day. Similarly, results from the Japan Public Health Center-Based Prospective (JPHC) study revealed that no relationship between egg consumption and morbidity from coronary artery disease was observed.

The results from an observational study of Japanese-Americans between the ages of 45 and 68 living in Hawaii indicated a significant positive correlation between the dietary intake of cholesterol and the rate of death from ischemic heart disease, and mortality from ischemic heart disease appeared to increase in subjects who consume 325 mg/1,000 Kcal or more cholesterol daily. However, it remains possible that consumption of saturated fatty acids might directly affect the death rate from ischemic heart disease in this study, since the amount of saturated fatty acid intake was not considered. In any case, it is considered preferable to control the consumption of cholesterol. Because sufficient scientific evidence required to set a target amount of cholesterol was not produced, no reference intake was estimated.

**Conclusions**

We first perform screening for atherosclerotic findings, and after obtaining individual evaluations, we make patients aware of the importance of treatment for dyslipidemia. Second, we encourage a quantification of the assessment of the patient’s eating habits (including nutrient intakes). Quantification may not be easy to do depending on the method of assessment, but individual issues can be identified by assessing the amount of food intake as accurately as possible. When necessary, the BDHQ is also available as a useful method. Patients use it to get a rough estimate of their intake so they can receive specific instructions with precision. Third, it is important for us to provide explanations or instructions by converting numerical targets indicated in the Guidelines to specific dishes, food ingredients, actual quantities to be used, and so on to the greatest extent possible. With these key points in mind, it seems important to try to start by doing what can certainly be done. However, regarding elderly people, their quality of life in particular should also be considered, and it is essential to be careful about malnutrition due to excessive dietary restrictions. In addition, exercise therapy should be carried out simultaneously for patients who need to lose weight so their muscle mass will not be decreased. Eating is an important part of everyday life as well as being one of life’s pleasures. It is not very effective to simply show patients quantified results. Health care practitioners who engage in physical examinations...
need to identify points to be improved from the assessed contents and present specific suggestions for improvement.

The authors state that they have no Conflict of Interest (COI).

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