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Review Article



# Health Oriented Lifelong Nutrition Controls: Preventing Cardiovascular Diseases Caused by Obesity

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## Abstract

Cardiovascular diseases, especially coronary heart diseases and strokes (cardiovascular accidents or hear attacks), are the leading causes of death in the world.

Obesity and overweight are highly associated with cardiovascular diseases. Therefore, nutrition controls are very important our health. Nutritionists have recommended, the best approach to weight loss is to reduce the Caloric intake by a small amount each day while gradually increasing your amount of physical activity. However, actually, strategically or tactically, it is very difficult for most people to refuse the flavoring lure of the delicious and rich foods. In addition to binge eating, many individuals with obesity report feeling unable to stop eating or to control how much they are eating despite their best intentions. Postmenopausal women, a population in which eating disorders appears common. Additionally, I have not found any publication that reported how external fats of the blood vessels play a role in preventing cardiovascular diseases in biomechanics. Previouslyl proposed health oriented models to lifelong prevent or cure constipation, aging or aged dementias, lymphedema, breast cancers and cerebrovascular accidents (strokes) with nutrition controls and (or) mental and physical activities. In this study, I propose models of health oriented lifelong nutrition controls: preventing cardiovascular diseases caused by obesity. Following the models, actually, strategically or tactically, most people can not only maintain their body weight normal and health, but also enjoy delicious and rich nutrition in banquets. I think the best way to educate people to have the mindfulness of the nutrition controls is to teach people from kindergartens to universities. In this way, we can prevent or (and) cure cardiovascular diseases from childhood throughout whole lives. Meanwhile, I model how external fats of the vessels play a role in preventing cardiovascular diseases in biomechanics and discuss a clinical case study that supported the models.

**Keywords:** Lifelong nutrition controls; Health oriented; Preventing; Cardiovascular diseases; obesity

## Introduction

Cardiovascular diseases, especially coronary heart disease and stroke (cardiovascular accident or hear attack), are the leading causes of death in the world. High body-mass index (BMI) is an important cardiovascular disease risk factor [1].

In a perspective of energy nutrients, a person averagely requires 1500 to 2000 calories for normal daily activity. If you ingest more than that (over nutrition), the remainder is stored for later use. All excess calories that are ingested will be stored as fat in the body. Conversely, if you ingest less than that (undernutrition), the energy stores in your body will be depleted. Eating too much or too little can result in serious medical conditions [2].

Therefore, nutrition controls are very important our health. Over nutrition, unhealthy food choices, and physical inactivity contribute to increasing rates of obesity, and related morbidity and premature death from cardiovascular disease, diabetes, cancer, and other causes in the U.S [3,4].

The prevalence of obesity (40%) and overweight (30%) among US adults is totally about 70%, and continues to rise during recent years [5,6].

About one half of excess fat is stored in adipocytes that accumulate in the subcutaneous tissue under the skin, whereas the rest is stored in adipocytes in other tissues and organs [2].

The obesity associates with thromboembolism that can lead to myocardial infarction, or atherosclerotic plaques (atherosclerosis) [2,7,8].

Myocardial infarction (MI) is the leading cause of death worldwide. It normally results from a lack of blood flow (ischemia) and oxygen (hypoxia) to a region of the heart, resulting in death of the cardiac muscle cells. An MI often occurs when a coronary artery is blocked by the buildup of atherosclerotic plaques (atherosclerosis) consisting of lipids, cholesterol and fatty acids, and white blood cells, primarily macrophages. It can also occur when a portion of an unstable atherosclerotic plaque travels through the coronary arterial system and lodges in one of the smaller vessels [2].

An MI progresses slowly and often begins in children and can be seen as fatty “streaks” in the vessels. It then gradually progresses throughout life [2].

An aneurysm (or aneurism) is a localized dilation or

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ballooning of a blood vessel by more than 50% of the diameter of the vessel and can lead to instant death at any time. Aneurysms most commonly occur in arteries at the base of the brain (the circle of Willis) and in the aorta (the main artery coming out of the heart) - this is an aortic aneurysm [9].

Abdominal aortic aneurysm (AAA), defined as a localized dilatation of the abdominal aorta, is a significant cause of morbidity and mortality in aging populations [10]. Body mass index (BMI) and waist circumference (WC) are with an increased risk of incident abdominal aortic aneurysm (AAA) [11-13].

The treatment of the diseases includes lifestyle changes, such as weight loss, smoking cessation, regular exercise, and adoption of a diet low in sodium and saturated fats [2]. Prescription medicines or angioplasties are treatment methods too, but they have either side effects or risks [14-16].

Nutritionists have recommended, the best approach to weight loss is to reduce the Caloric intake by a small amount each day while gradually increasing your amount of physical activity [9].

However, actually, strategically or tactically, it is very difficult for most people (about 70%) to refuse the flavoring lure of the delicious and rich foods.

In addition to binge eating, many individuals with obesity report feeling unable to stop eating or to control how much they are eating despite their best intentions [17]. Postmenopausal women, a population in which eating disorders appear common [18].

Additionally, I have not found any publication that reported how external fats of the blood vessels play a role in preventing cardiovascular diseases in a perspective of biomechanics.

In our previous studies, based on published data, we proposed health oriented models to lifelong prevent or cure constipation [19], aging or aged dementias [20], lymphedema [21], breast cancers [22] and cerebrovascular accidents (strokes) [23] with nutrition controls and (or) mental and physical activities. In this study, I propose models of health oriented lifelong nutrition controls: preventing cardiovascular diseases caused by obesity. Following the models, actually, strategically or tactically, most people can not only maintain their body weight normal and health, but also enjoy delicious and rich nutrition in banquets. Meanwhile, I model how external fats of the vessels play a role in preventing cardiovascular diseases in a perspective of biomechanics and discuss a clinical case study that supported the models in this article.

## Methods

Physiology, hemodynamics, biomechanics [24-25] and published data [1-18] are applied. Obesity is defined by the body mass index (BMI), which is a measure of an individual's weight-to-height$^2$kg/m$^2$) ratio. The normal, or healthy, BMI range is between 18 and 24.9. Overweight is defined as a BMI of 25 to 29.9, and obesity is considered to be a BMI greater than 30 [2].

## Models

Figure 1 illustrates my models of (myocardial) infarction, or (atherosclerotic) plaques in arteries with external (grooving) fats: (a) a curved artery is partially blocked; (b) an artery is completely blocked.

The plaques consist of lipids, cholesterol and fatty acids, and white blood cells, primarily macrophages. The (atherosclerotic) plaques within the walls of the arteries obstruct the flow of blood and decrease the flexibility or compliance of the vessels [2].

Compliance allows an artery to expand when blood is pumped through it from the heart, and then to recoil after the surge has passed. This helps promote blood flow. In arteriosclerosis, compliance is reduced, and pressure and resistance within the vessel increase. Obesity, poor nutrition, lack of physical activity, and tobacco use all are major risk factors [2].

There are action and reaction forces between the blood vessels and the external fats (Figure 1). The forces limit the compliance, narrow the blood vessels and block the fluid flow too. When blood flows are partially blocked (Figure 1 a) or completely blocked (Figure 1 b), risks of ischemic diseases (e.g., ischemic heart attacks, myocardial infarction) increase.

On the other hands, the smaller the cross section of a blood vessel, the faster the flowing velocity, for the blood (cells) flowing (Figure 1a) based on hemodynamics [24,25]. The raised velocities increase the frictions or impact forces against the vessel walls,

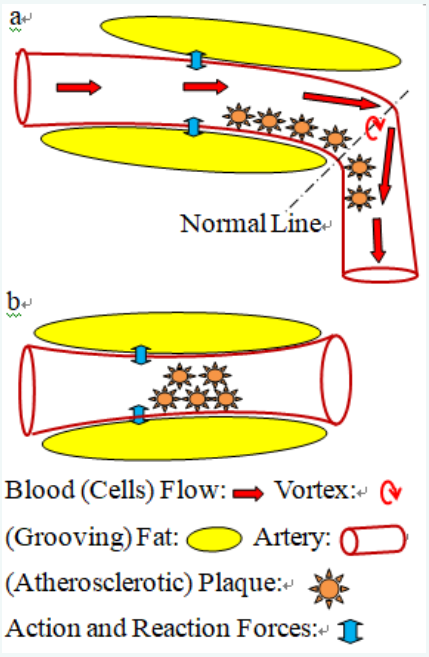


**Figure 1** Models of (myocardial) infarction in the arteries with or (atherosclerotic) plaques and external (grooving) fats; action and reaction forces between the blood vessel walls and the fats; a, a curved artery with a partial tamponade; b, an artery with a complete tamponade. The draw is not to the scale.

especially in bended arteries. Additionally, when blood flows enter curved arteries (e.g., aneurysm), there will be significant pressures against the vessel walls and (spiral) vertexes or turbulent flows [23-27]. The pressures are inversely proportional to the radius of curvature of the streamline according to fluid dynamics. This means, the smaller the radius, the greater the pressure. The frictions, impact and vortex forces increase risks of ruptures of the vessels including aneurysm [28-29], see Figure 1 a. The ruptured vessels may lead to hemorrhage death [9,10].

However, the external fats decrease the risks of the hemorrhages according to my biomechanical model [23] and published data [30].

Therefore, as long as we completely and moderately ingest nutrients daily as well as maintain our mental and physical health (not too slim and nor too fat) [19,20], we can prevent most cardiovascular diseases caused by obesity [23].

Figures 2 and 3 show my models of a typical life cycle of nutrition and weight controls of an American black bear: binge eating and hibernation. The normal weight range is assumed. An American black bear can lose 30% - 40% of the weight after half year hibernation [31-34].

We are human, we cannot do and do not have to do hibernation for months. However, we can use the bear hibernation for reference. Published data suggest losing 1% - 10% weight a year is moderate for overweight or obesity people [5,35]. The criteria

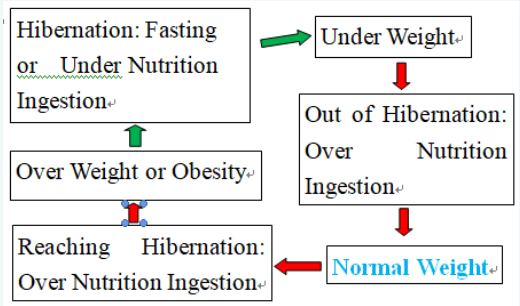


**Figure 2** Block model of a typical life cycle of nutrition and weight controls of an American black bear:binge eating and hibernation.

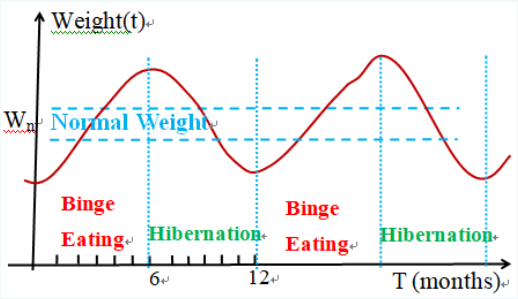


**Figure 3** Wave model of a typical life cycle of nutrition and weight controls of an American black bear: binge eating and hibernation. W: weight; subscript n: normal; t: time. The draw is not to the scale.

of the normal and over weights and obesity are based on body mass index (BMI).

Figures 4 and 5 illustrate my models of human controls of nutrition ingestion and weight. In Figure 4, pathways of the dashed arrows are not recommended. In Figure 5, the green curve (treatment of overweight or obesity) is analog to the descending segment during the bear hibernation; the red curve (treatment of underweight) is analog to the ascending segment after the bear hibernation; and the blue wave within the range of normal nutrition storage (weight) is a time shortened and weight narrowed oscillation of a big rise and fall of the weight life cycle: the binge eating and hibernation of an American black bear, see Figure 3.

Animal fats contain more saturated and Trans fats than plant edible oils; and saturated and Trans fats increase the risk of cardiovascular diseases. Contrarily, plant edible oils contain richer unsaturated fats than animal fats; and unsaturated fats decrease the risk of cardiovascular diseases. Therefore, people are suggested to mostly consume plant cooking oils, such as olive oil, peanut oil, corn oil, sesame oil, canola oil or vegetable oil rather than animal fats [19,36,37]

By my observation, beef, pork and chicken oils become waxy consistency (non-fluids) or quasi solid when their temperatures respectively reach about 25°C, 20°C and 15°C; but most consume plant cooking oils are still oil liquids (fluids) when they reach about 4°C in refrigerators. Our body temperatures can be as low as 24°C in some parts, such as foots [38]. The thrombi can be formed in the veins, transported to the arteries, and they become emboli to block the arteries [7,8].

Therefore, I propose my models of health oriented lifelong nutrition controls: preventing cardiovascular diseases caused by obesity. The modes have compromising tactical rules to balance our nutrition intake and energy expenditure: assuming our BMI are normal, if we ingest more today, we ingest less tomorrow; if we ingest two days of nutrition today, we (quasi) fast next two days, to prevent the overweight or obesity. In this way, we can not only maintain our body weight and healthy, but also enjoy the delicious and rich foods in a banquet.

Our bodies use the metabolism not only to store as well as to expend the adipose tissues (fats), to make our bodies healthy.

For overweight or obesity people, they can follow a similar model to the above to enjoy delicious and rich nutrition in banquets. However, they have to (quasi) fast more days after the banquets, to slim their bodies to normal weights. The fasting procedure (descending green curve in Figure 5) is analog to the descending segment (Figure 3) during the bear hibernation. After their weights are normal, they should maintain their weights within the normal range (blue wave in Figure 5).

For most underweight people, it is usually not difficult for them to flesh up until their weights become normal. The fleshing procedure (ascending red curve in Figure 5) is analog to the ascending segment (Figure 3) after the bear hibernation. After their weights are normal, they should maintain their body weights

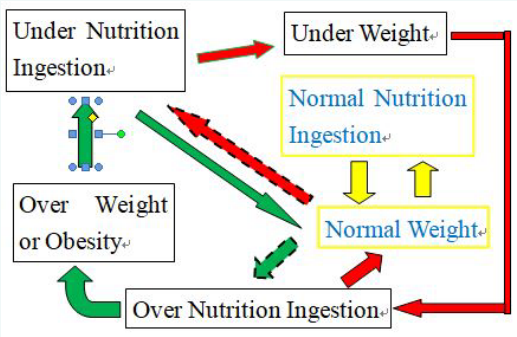


**Figure 4** Block model of human controls of nutrition ingestion and weight.

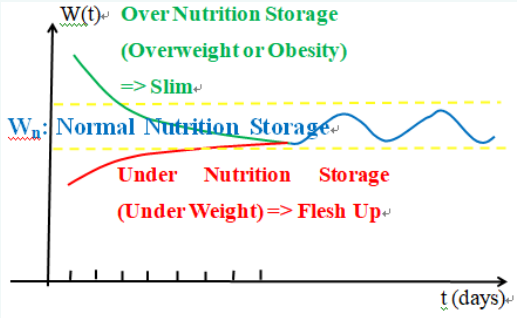


**Figure 5** Wave model of human controls of nutrition ingestion and weight. W: weight; subscript n: normal; t: time. The draw is not to the scale.

within the normal range (blue wave in Figure 5). However, most people cannot control their weights within the normal, they will continue to over ingest nutrients until they become overweight even obesity.

I recommend our BMI is between 20 and 22 usually, to have a safe room to enjoy delicious and rich foods in banquets. Therefore, though ingest we more nutrition occasionally, our weights are still within the normal range.

According to my experience, it is generally optimum for us to eat daily with a 70% to 80% full feeling when we are not fasting, and with a 40% to 50% full feeling when we are fasting.

No matter we increase or decrease our body weights, we have to normally ingest $O_2$, $H_2O$ and sunlight. Generally, theses three nutrition are basic and critic to our lives [19-23]. Moderate mental and physical activities are necessary too, to keep our brains and bodies healthy [9,20-22].

A recent research result indicated "Less binge eating and loss of control over eating are associated with greater levels of mindfulness" [17,18]. I think the best way to educate people to have the mindfulness of the nutrition controls is to teach people from kindergartens to universities [20]. In this way, we can prevent or (and) cure cardiovascular diseases from our childhood throughout our whole lives.

## Discussions

### A clinical case report

A 63 years old man followed the models in this paper to control his nutrition ingest and body weight for 12 years. During the years, he often enjoys rich nutrients in banquets as well as his weight and blood pressures are normal. The results of the clinical case study supported the models in this article.

## General Discussions

Generally, we have to control not only energy nutrients, but also all of the nutrients: not over and not under.

I believe more than 90% of cardiovascular diseases caused by overweight or obesity can be prevented or cured with the models in this paper as long as we have resolution or determination to control our nutrition intakes.

Although my models in this paper focus on preventing cardiovascular diseases caused by obesity, I believe the principles in this study are also helpful to cure the diseases and to prevent or cure other related or similar diseases, such as brain strokes, or cerebrovascular accidents (CVA); venous thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE) [7,8].

## Conclusions

The modes have compromising tactical rules to balance our nutrition intakes and energy expenditures. In this way, we can not only prevent cardiovascular diseases, caused by obesity, but also enjoy the delicious and rich nutrients in banquets.

I recommend our BMI is between 20 and 22 usually, to have a safe room to enjoy delicious and rich foods. Therefore, though ingest we more nutrition occasionally, our weights are still within the normal range.

I think the best way to educate people to have the mindfulness of the nutrition controls is to teach people from kindergartens to universities [20]. In this way, we can prevent or (and) cure cardiovascular diseases from our childhood throughout our whole lives.

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