

 **GREAT-Ocha Symposium 2014** 
(October 18 - 19, 2014, at Ochanomizu University)
Summaries of Presentations

October 18th

The morning session: Biochemistry and Physiology

(1) **Kanako SUMI** (Ochanomizu University)

Title: The Things I Can Contribute to Problem of Thinness

I would like to make a presentation about "thinness" in developed countries. These days many girls try to lose weight even if they are already skinny. Especially in Japan, the situation is worse. They are affected by TV, magazine and social media networks. You will have a lot of health problems if you become skinny. For example, you can easily be anemic, miss a period, begin to burn fat and muscle (produce 'ketone bodies' at the same time) and so on.

However, people tend to pay attention only to obesity but not to thinness. Actually there are a lot of previous researches about lifestyle diseases like obesity but few about thinness. In addition, most researches about thinness are in the field of psychology but few in the field of science. As a student majoring in nutrition and food science, I want to contribute to this problem.

In the near future, I would like to study about metabolism of skinny people. Until now, we know that people begin to burn fat and the liver produces 'ketone bodies' from fatty acids to use as energy instead of glucose if they lack glucose. In the brain, ketone bodies are vital sources of energy during fasting. On the other hand, you will get into ketosis state (the body will become acidic) if the rate of ketone bodies in blood increases. People in ketosis suffer from vomiting, stomachache and loss of appetite. I am interested in this mechanism and would like to research more details. We still do not know well what is happening during the period of low food intake (fasting) or carbohydrate restriction. I think that unidentified biology active substances (Adipocytokine) will be produced if you lack glucose. Moreover ketone bodies influence on gene expression somehow.

It is difficult to research about 'thinness' because there are few previous researches and few professors in this area, but this survey will be significant. I hope that people will take for granted that being too thin is bad for health and dieticians will support skinny people nutritionally in school, hospital and company based on the evidence that I showed.

(2) **Ifeyinwa ONYIUCHE** (The University of Minnesota)

Title: Understanding Oleate Metabolism and its Relationship to Obesity and SIRT1

Obesity is a major health concern that increases the risk of many metabolic diseases such as Type 2 Diabetes, cardiovascular diseases and cancer¹. Many studies have shown specific nutrients can influence the development of obesity or related metabolic diseases. It has been shown that oleate, an omega-9 fatty acid derived from our diets² (e.g. olive oil) has beneficial effects. It is specifically associated with the reduction in LDL oxidation and oxidative damage that causes heart disease and some cancers³.

In addition to deriving oleate from our diets, an enzyme called stearoyl-CoA desaturase 1 (SCD1) is also able to synthesis oleate from the saturated fatty acid stearate. This enzyme specifically acts towards stearate that is produced from de novo synthesis, which is the conversion of excess carbohydrates into fat. When SCD1 is inhibited, it increases fat β -oxidation in mice, which reduces adiposity and makes the mice resistant to obesity¹. The question that arises from this data is why oleate from the diet appears beneficial, but oleate synthesized within our bodies appears to do the opposite.

This research study examines the above question by looking at pathways in oleate metabolism (exogenous and endogenous), in an attempt to try and understand how these different sources of oleate are metabolized to influence its effects on health. Specifically, we hypothesize the oleate is differentially incorporated into and released from lipid droplets, the energy storage organelle of cells, depending upon its origin (exogenous vs. endogenous). The experiments thus far have involved inhibiting SCD1 using two different methods: 1) via a chemical inhibitor and 2) via short-interfering RNA in primary mouse hepatocytes. Simultaneously, we manipulate pathways that promote lipolysis, the breakdown of lipid droplets. We are then measuring changes that occur in pathways that control fat oxidation and energy expenditure (mitochondrial biogenesis). To date, studies have shown that enhancing lipolysis promotes pathways of fat oxidation and mitochondrial biogenesis especially when exogenous oleate is given. However, SCD1 inhibition appears to further enhance the ability of lipolysis to promote these same pathways suggesting that changes in lipid droplets appear to play a major role in the effects of different sources of oleate. We hope these and ongoing studies will allow us to further define how the metabolism of oleate is linked to altered metabolism and overall health.

Reference

1. Dobrzyn, A., and J. M. Ntambi, "*Stearoyl - CoA desaturase as a new drug target for obesity treatment*," in *Obesity Reviews* 6.2 (2005): 169-174.
2. "Oleic acid [MAK Value Documentation, 2002]," in *The MAK Collection for Occupational Health and Safety* (2012): 246–266.
<http://onlinelibrary.wiley.com/doi/10.1002/3527600418.mb11280kske0017/pdf>
3. Fistonić, Ivan, et al., "*Olive oil biophenols and women's health*," *Medicinski Glasnik* 9.1 (2012): 1-9. < <http://ljkzedo.com.ba/medglasnik/vol91/1.pdf>>.

(3) **Yun Jee LEE** (Ewha Womans University)

Title: Regulation of Prohibitin1 Gene Expression by S-Adenosylmethionine in Mouse Livers

It is known that sulfur containing amino acids (SCAAs) and their metabolites such as methionine, S-adenosylmethionone (SAME) and glutathione are important in preventing liver diseases. Methionine adenosyltransferase1A (MAT1A) in livers, which catalyzes the reaction from methionine to SAME, is an essential enzyme for survival as it is responsible for the producing of SAME. Chronic SAME deficient mice show spontaneous development of hepatocellular carcinoma possibly as impaired mitochondria functions with low levels of prohibitin1 (PHB1) protein. Liver-specific PHB1 KO mice, developed to investigate the basic molecular mechanism of carcinogenesis of hepatic SAME deficiency, also show severe liver injuries including faster development of hepatocellular carcinoma than that of MAT1A KO mice. In order to examine the relationship between PHB1 protein and hepatic level of SAME, heterozygote liver-specific PHB1 KO mice will be given normal control diet, methionine choline deficient diet (MCD), or MCD with SAME, then the liver profiles including global differential gene expressions in the livers and the progressions of liver injuries in each group of the mice will be compared.

The afternoon session 1: New Techniques

(4) **Saori EBIHARA** (Ochanomizu University)

Title: Scientific Approach to Nursing Care Food

Currently nursing care food for the elderly is pureed, jellied, or minced most of the time. The appearance is widely different from daily meal. This might cause the quality of life to decrease. The quality of life should be a priority, and it is directly related to everyday nourishment, especially for the elderly. The point is how daily meal becomes easier to swallow, with its appearance kept.

Prolonged heating is regarded as a general way of softening. However, it has some problems. For example, some pigments are changed chemically to brownish substances. In addition, there is room for improvement in loss of nutrients and umami components because of

flowing out or being disintegrated by heat. To solve above problems it is assumed that vacuum cooking, called the fourth method of cooking, following grilling, steaming and boiling, is effective. Comparatively low temperature heating in vacuum cooking prevents contraction and coagulation of protein, which results in softness and also it seems that food becomes soft because vacuum cooking provides high water retention. Furthermore, it is pleasant to the taste (palatability). Unlike boiling, there is no violent water convection, and food does not lose its shape. Besides appearance, it has a possibility of salt use reduction because the seasonings like soy sauce are efficiently absorbed for vacuum packaging.

On the other hand, issues are as follows; it is difficult to reach the same degree of softness as pureed food, so the limits of the method must be examined. It may be possible to improve quality of life of those who have some chewing and swallowing power with vacuum cooking, but there are people who must depend on pureed meal or nutrition supports. In addition, the effectiveness for each type of food should be proved. Same temperature or water volume may not apply to different types, considering that vegetable becomes hard at a certain range of temperature for example.

Based on both assumed advantages and disadvantages, an evaluation should be conducted to achieve an improving quality of life for the elderly people.

(5) Rio YOSHIDA (Ochanomizu University)

Title: Healthier Life with New Things

In these days, there are a lot of health problems caused by nutrients. For example, respiratory diseases, AIDS and diarrheas are most serious diseases in developing countries and heart diseases, apoplexy and respiratory diseases are most serious diseases in developed countries. In developing countries case, they can be improved by material supports such as clean fuels or water. In contrast, in developed countries, there are already enough materials to live in a comfortable life. It means that problems need to be solved by science technology. So, I try to think about how to improve people health with science technology.

However, people in developed countries can get and take any foods what they want and this is a very troublesome point. This means that even though a dietitian give a guidance to her patient, he can easily ignore her guidance and eat his favorite foods. In fact, my grandfather is such a bad patient and I think dietitians have a limit to improve patients' health.

So, I have an idea to improve patients' health with science technology. That is to develop new oil or some seasonings that are good for health because seasonings are contained almost every meal. Though it actually contained a carcinogen, there was oil saying that people don't store fat after they took it. This development met with failure, but, like this case, not only oil but also dressings or some other seasonings, we should develop healthier or better seasonings for health. We still have unclear mechanisms in our body. It is important to study our body mechanisms more carefully and that study may help new seasonings' development.

In conclusion, I think developing new seasonings, which are good for health and to support this, it is also important to study further about our body mechanism. Though science had made remarkable progress, there are still a lot of things to help people health with science.

The afternoon session 2: Functions of Food

(6) Chiaki ISHIKAWA (Ochanomizu University)

Title: Analyzing Functional Ingredients of Food and Developing Their Effective Utilization

Since ancient times, it has been said, "A balanced diet leads to a healthy body". Moreover, it is also said "Our bodies are made from what we ate". Therefore, I think it is very useful for us to eat delicious food and take functional ingredients from them at the same time.

These days, people have much more interests in metabolic syndrome and life-style diseases, for example diabetes, dyslipidemia in Japan. Therefore, there is a greater and greater

demand for healthy food, such as food for specialized health uses, which are called “Tokuhō”. However, I doubt whether taking healthy food is an effective way to take functional ingredients.

In this study, I’m going to separate and extract ingredients that are included in farm products, such as vegetables and fruits, or fermented food. Then, I’m going to analyze their function of health promotion and investigate how to use or take them through experiments that use cultivated cells and animals. I have taken part in a research institution’s internship program during the summer vacation in 2014, so I will make good use of my experience in my study.

I want to find useful functional ingredients from non-ordinary food and think about the best way to take it. I think that it is better to take ingredients from food than from dietary supplements, because it is closer to natural conditions. I also examine how functional ingredients digest, absorb and affect the body. I want to think of the best way to eat food, for example the art of cooking.

Based on this study’s results, we can find other values besides nutrition and good taste to food. This study contributes to human well being from the point of view of food’s functional ingredients. Furthermore, it gives healthy food scientific evidence. Scientific evidence is essential for practical purposes and needed for reliable information.

It is crucial to eat food for everyone. If we can develop the efficient utilization of functional ingredients from this study, people can promote their health while enjoying eating.

I want to discover effective ingredients from existing things to promote health.

(7) **Yumi SATO** (Ochanomizu University)

Title: Power of Summer Vegetables

In Japan, there are four seasons and different vegetables grow in different seasons. Today, we can get various vegetables that are out of season thanks to the development of the technology of preservation. Therefore, we are likely to forget the benefits of seasonal vegetables. But I have heard that seasonal vegetables have good effects on our health in the season. For example, it is said that summer vegetables can cool down our body. So I want to prove that seasonal vegetables contain more nutrients that can prevent health problems in the season than the other season’s vegetables do. On the other hand, Japanese get easily tired in summer. Malnutrition is main reason of that. So I decided to examine summer vegetables and find out whether they contain nutrients that can prevent summer health problems more than the other season’s vegetables do. Now, I’ll suggest a way to conduct the research. First I divide vegetables into two groups; summer vegetables and the others. Next, I examine the ratio of specific nutrients that is contained in those vegetables. Finally, I check whether there is a statistical difference of nutrients between two groups. In this research, I’ll deal with vegetables that are most consumed in Japan and consider vegetables that are distributed mainly from June to August as summer vegetables. I will analyze 7 nutrients. They are vitamin B1, B2, citric acid, vitamin C, sodium, potassium and calcium. I chose these nutrients because they are important and get easily lost in summer. I will use t-test to find out if summer vegetables have more vitamin B1 than the other vegetables. I will test the other nutrients in the same way.

Anyway, if we understand good effects of summer vegetables in summer, we can make better use of them. Therefore, this research will help us to spend summer comfortably.

October 19th

The morning session: Public Health and Nutrition

(8) **Akane YOSHIMURA** (Ochanomizu University)

Title: Poverty in Māori Society

Māori used to grow crops by themselves. Since the treaty of Waitangi was signed between British Crown and Māori, the land Māori possessed have taken away. Only they got from Pākehā were barren land. It is said that the history of poverty in Māori society have begun at that time.

According to New Zealand Adult Nutrition Survey (NZANS)(2009), among Māori, 40.7 percent of men were obese, and 48.1 percent of women. Obesity is a factor that may cause serious health issues ranging from cardiovascular disease through some types of cancer and diabetes to psychological illnesses. It is also shown that most of New Zealander surveyed didn't meet the recommendation for calcium intake. These unbalanced food life style result from Māori poverty. They have tendency to depend on low cost diet, such as McDonald and KFC. The product sold at cheap price, however, it is hard to say that the nutrition and the ingredients are desirable for continual intake in daily life.

Seeing the reason why Māori poverty has been arisen through the history, we will aim to look at health issues in Māori society regarding of mainly diet. Also, conceivable resolution for improving Māori's eating habits.

(9) **Alaine KEOGH** (The University of Minnesota)

Title: The Acceptability of Black Bean Burgers in Elementary School Lunches

Intake of high-calorie, low nutrient-dense foods may contribute to the increasing obesity rate in children in the United States. Therefore, it is important to look at how children's food preferences can be altered. If school food service professionals and parents understand that changing preferences is possible, healthier foods may be incorporated into school and family meals in ways to optimize intake.

My study will test whether children in one elementary school in Wayzata, MN will accept an unfamiliar food based on two strategies, preliminary taste testing and repeated exposure (Birch and Fisher, 1998). First a taste test will be conducted to introduce the product (black bean burgers). Children will be given a sample of the food product and asked to rate it from 1 to 10, 1 being hate it and 10 being love it.

After the taste test, black bean burgers will be served as an alternate option for lunch monthly where the remaining food choices for the meal remain constant. On the days that the product is served, we will collect food production data to determine the number of black bean burgers prepared, served and selected as well as all other alternative options. We will also collect black bean burger plate waste, identify the grade and gender of students who chose the bean burger, and determine how much was eaten. We plan to have the product served and to monitor intake at least 4 times over the course of the school year. Research suggests that children become more accepting of foods the more times they are exposed to them.

Based on the acceptance of the product after repeated exposure, we may also explore the effects of other strategies to improve intake such as persuasion by using alternative names or posters to influence norms. One of the best ways to increase acceptability is to offer a new food along with a favorite familiar food (Devaney, et al.). The school will serve other foods along with the black bean burgers that children are familiar with, including lettuce, tomato and condiments, increasing the likelihood that the children will accept the bean burgers.

Knowledge obtained from this study will help parents and schools gradually change the diets of children by offering healthy foods more often.

Reference

1. Birch, Leann L., and Jennifer O. Fisher. "Development of eating behaviors among children and adolescents," in *Pediatrics*, Mar. 1998: 539+. Expanded Academic ASAP.

Web. 10 Feb. 2014.

2. Devaney B., Pac S., Skinner J., Ziegler P. "Meal and Snack Patterns of Infants and Toddlers," in *J. Am. Diet Assoc.* (2008);104 (Suppl. 1): 65-70.

(10) **Rika BIMOTO** (Ochanomizu University)

Title: Keep Calm and Take Care of Your Teeth

I will make a presentation about teeth. I chose this topic because oral health has a lot to do with food and plays an important role in public health. Furthermore, dental technology has remarkably improved for these years. I want to tell how important it is to care for teeth especially for Japanese people. It is because they tend to go to dentists only when they have to get dental treatments.

On the other hand, Americans go for check-ups and rarely go for treatments. I did surveys by questionnaire about teeth both for Japanese and Americans. It shows people around me have several points of view about teeth.

I have worn braces for about 2 years and keep taking good care of my teeth. After having braces, I laugh more often. It means the quality of my life has improved. Oral health can keep your body healthy. Some surveys show that fact in the study of public health.

In addition, there are some trivia and remarkable improvements about dental technology. I would like to show them at the end of my presentation.

Aim:

To tell those who are interested in foods or health that it is important to get check-ups for your teeth and to take care of these properly.

The research question:

Why do Japanese or Americans go to the dentist?

Argument:

When you keep your teeth healthy, you will keep your body healthy too.
Eating by chewing improves your quality of life.
Oral care plays an important role in public health.

The Structure:

What people around me think about their teeth.
Why is it important to take care of your teeth?
Mystery of teeth and progress of dental techniques.