






### University of Shizuoka : Past & Present

The University of Shizuoka, by absorbing various prefectural universities established in Shizuoka, came into being in **1987**. It combined the **Shizuoka College of Pharmacology**, originally founded in **1916** as **Shizuoka Women's Pharmacology School**, along with **Shizuoka Women's University** and **Shizuoka Women's Junior College**.



### The University of Shizuoka's Aims

**Aims**  
The University of Shizuoka has the following aims for education, research, contributing to the community and international relations.

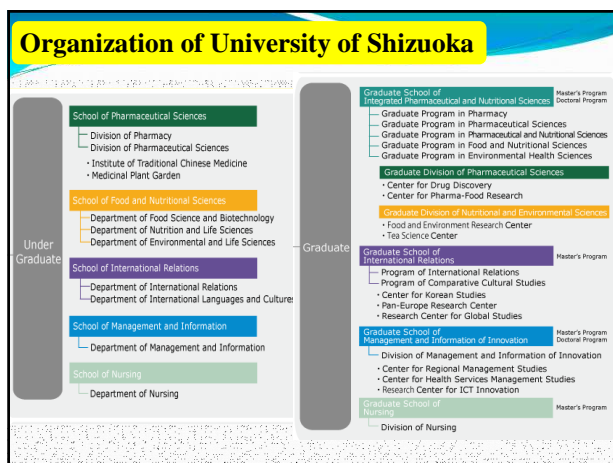
**Education**  
Putting students first, we will improve their quality of life and provide fine-tuned, high-level, excellent education, developing human resources who contribute to society.

**Research**  
Aware of being the highest educational institution in Shizuoka Prefecture, we will gather high-level, original academics and promote research that gets international recognition.

**Contributions to the Community**  
In response to citizen mandates, we will promote ties with the prefectural government and local industry, providing results to the community through research made possible by excellent education and academics.

**International Exchange**  
We will actively take in students and researchers from foreign countries, and by spreading information across the world, strongly promote international relations in Shizuoka Prefecture.

The University of Shizuoka aims to utilize academic and personnel resources to their maximum levels in order to achieve these goals.



### Research activities

**Education and research leading to longer, healthier lives**

Japan now faces a crisis in the form of a globally unprecedented super-aged society. This has necessitated a nationwide shift to a society in which healthy living is maintained even during old age. Shizuoka Prefecture ranks second among Japan's prefectures for "healthy life expectancy". As an educational and research institution of Shizuoka Prefecture, the University aims to establish a new academic discipline that spans preventative and therapeutic fields.



The University of Shizuoka was selected for the Global Centers of Excellence Program administered by the Japanese Ministry of Education, Culture, Sports, Science and Technology. As a result, the Graduate School of Nutritional and Environmental Sciences and the Graduate School of Pharmaceutical Sciences are working collaboratively on the development of functional health foods and pharmaceuticals for maintenance of health, improving nutrition, and increasing usage rates of efficient pharmaceuticals. The goal of this endeavor is to develop the framework for a new "science of health and longevity," a systematic academic discipline that integrates the nutritional and pharmaceutical sciences.

After the achievements earned over a decade of the COE program, in 2012 the University brought together the Graduate School of Nutritional and Environmental Sciences and the Graduate School of Pharmaceutical Sciences to form the Graduate School of Integrated Pharmaceutical and Nutritional Sciences. This key institution for "science of health and longevity" is currently fostering professionals who possess knowledge in both of the aforementioned fields.

**Research into tea**

Agriculture and fisheries developed early on in Shizuoka as a result of its temperate climate and rich natural surroundings. Tea cultivation is particularly worth noting in that crude tea grown in Shizuoka accounts for about 40 percent of all tea produced in Japan. Refined tea also accounts for about 60 percent. In an effort to contribute to one of Shizuoka's best known industries, the University of Shizuoka continues to conduct a university-wide range of studies on tea, covering such topics as the functional properties of tea, its potential to slow aging and prevent illness, and topics such as sales strategies and product development.





## International exchange

The University of Shizuoka has cooperative arrangements with a number of universities throughout the world, and is actively engaged in collaborative research, academic exchanges, and exchange student programs with these overseas institutions.

### Inter-university Agreements

<ul style="list-style-type: none"> <li>California State University, Sacramento</li> <li>Roger Williams University</li> <li>Mahidol University</li> <li>Free University of Brussels</li> <li>University of California, Davis</li> <li>Bremen University of Applied Sciences</li> <li>University of Nebraska, Lincoln</li> <li>University of California, Berkeley</li> <li>The Ohio State University</li> <li>Yonsei University</li> </ul>	<ul style="list-style-type: none"> <li>Bogazici University</li> <li>Lille Institute of Political Studies</li> <li>Gyrfth University</li> <li>The University of Arizona</li> <li>Newcastle University</li> <li>Zhejiang Academy of Medical Sciences</li> <li>University of the Philippines</li> <li>Moscow State Institute of International Relations</li> <li>California State University, Northridge</li> <li>Zhejiang University (formerly Hangzhou University)</li> </ul>
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### Inter-departmental Agreements

<ul style="list-style-type: none"> <li>Rajshahi University</li> <li>New Zealand Institute for Crop &amp; Food Research</li> <li>Hue University</li> <li>Chulalongkorn University</li> <li>Mahidol University</li> <li>Khon Kaen University</li> </ul>	<ul style="list-style-type: none"> <li>Seoul National University</li> <li>Massey University</li> <li>California State University, Sacramento</li> <li>Ridder Institute</li> <li>Dongseo University</li> <li>Foreign Policy Association</li> </ul>
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### Language Study Abroad Programs

<ul style="list-style-type: none"> <li>Roger Williams University</li> <li>California State University, Sacramento</li> </ul>	<ul style="list-style-type: none"> <li>The Ohio State University</li> <li>Zhejiang University</li> </ul>
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Updated to reflect the latest information. To receive detailed information, please contact the International Exchange Center.

## Tea Science Center

The Tea Science Center will facilitate the promotion of research and education related to tea at the university, and also aims to advance the understanding of tea production technologies and the health benefits of tea, not only in Japan but throughout the world.

- 1. Studies on the health benefits and epidemiology of green tea**  
We study the relationship between tea consumption and various illnesses, as well as the scientific functionality of green tea, which has been found to extend healthy life span, and application to the skin, etc.
- 2. Sharing our excellence in research and information about tea**  
We promote the tea industry by offering lessons or teaching seminars, and also making the information. We have acquired about tea available to interested parties.
- 3. Marketing to promote tea consumption**  
We seek to understand both tea quality and consumers' taste characteristics, in order to best determine a suitable and effective marketing strategy.

## Tea Science Center

茶学総合研究センター

At the Tea Science Center, we teach about the health benefits of tea and pass on our knowledge about the best methods of cultivation, processing and marketing the various types of teas. The Center also collaborates extensively with other laboratories and organizations related to the tea industry

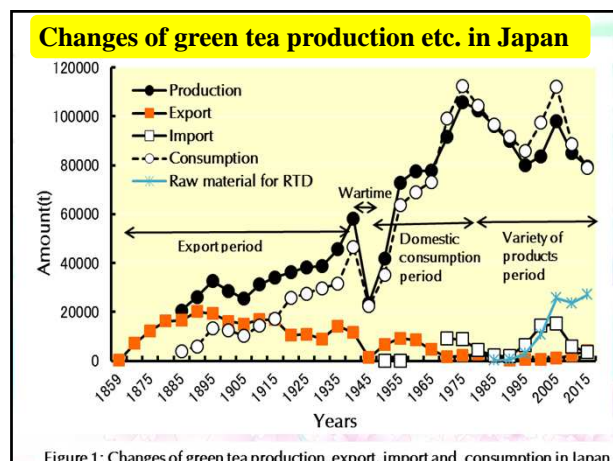


## The Introduction of Tea into Japan

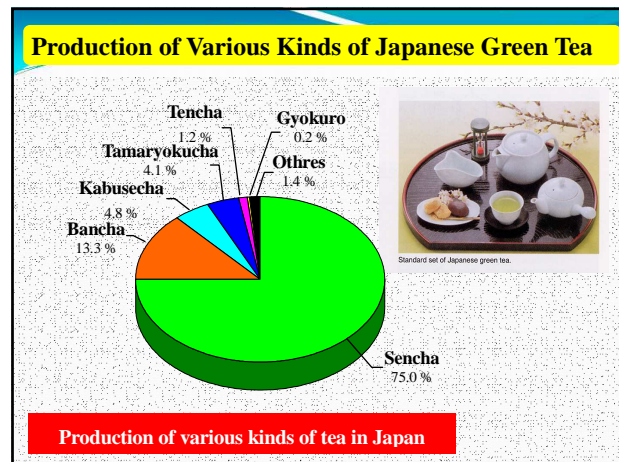
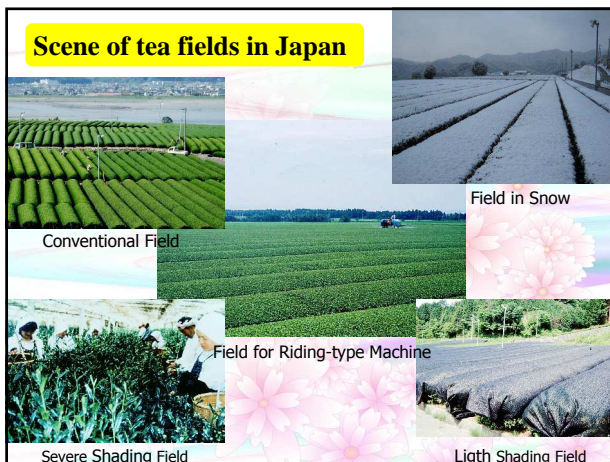
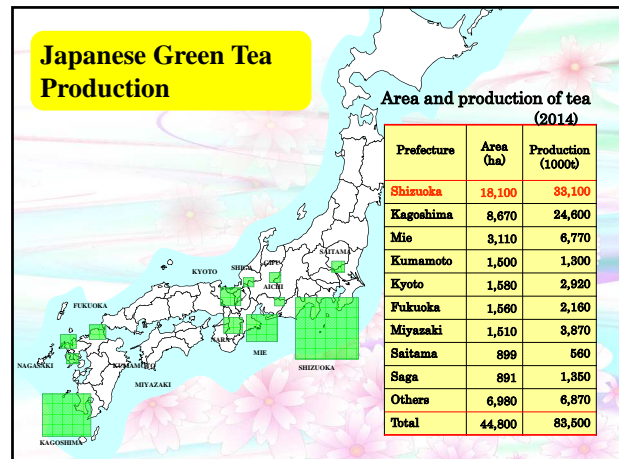
**North-china root**  
North china⇒ Korea⇒ Japan  
Oldest root (about A.D.600)

**Central china root**  
Introduction of the cake tea, powder tea (About A.D.1100)

**South china root**  
Introduce of pour tea (About A.D.1600)









### Culture of Gyokuro or Tencha



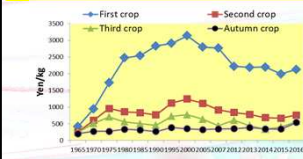
**Gyokuro**

**Tencha**

**Matcha**

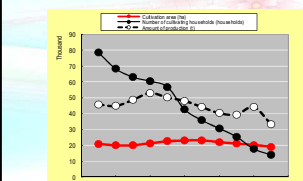
to produce high-grade tea, Gyokuro and Tencha, which are known as the finest tea in Japan, is made from the leaves grown under the ceiling-shelf covering.

### Drastic reduction of farmers and expansion of scale

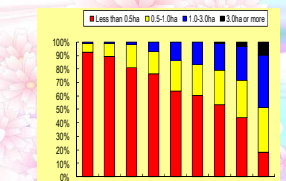


Yen/kg

Changes in the price of each crop season

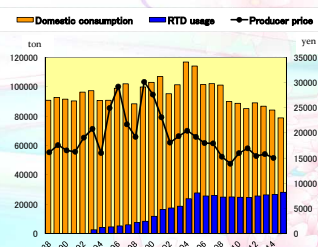


Changes in the number of households that cultivate tea in Shizuoka Prefecture

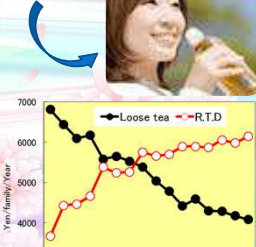


Changes in the number of households that cultivate tea in Shizuoka Prefecture

### Present state of tea consumption in Japan



Changes in domestic consumption and producer price

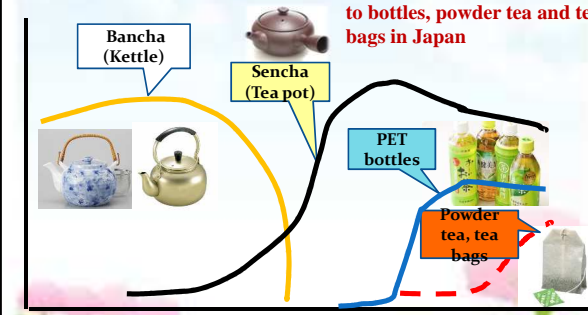


Changes in purchase price of loose tea and RTD

*The way of drinking tea changes greatly with the change of lifestyle*

### Changes in tea to be drunk

Tea is changing progressively toward simplicity from kettle to bottles, powder tea and tea bags in Japan



Bancha (Kettle)

Sencha (Tea pot)

PET bottles

Powder tea, tea bags

year

Bancha

Sencha




R.T.D



### Characteristics of Tea

Tea have different chemical components from other plants

- ☆ Caffeine
- ☆ Catechins of Gallate type
- ☆ Theanine (Free Amino Acid)
- ☆ Others (Fluorine, Aluminum etc.)

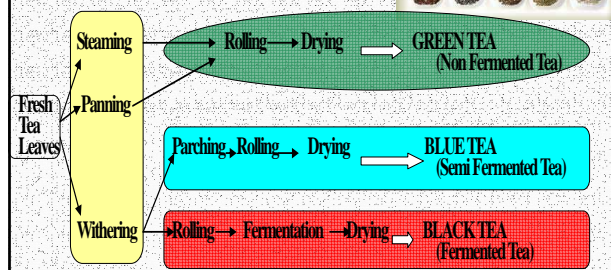




### Why is Green Tea Loved Around the World?

- ① **Psychotropic Use** (warms heart, is a narcotic)  
*Energy drink, cool/exciting, stimulant grass*
- ② **Functional Use** (initially recognized as medicinal plant)  
*Shennong Ben Cao Jing (ancient Chinese book on medicinal plants), Kissa Yojoki, tea wars, etc.*
- ③ **Cultural Drink**  
*Mystery of the Orient, Book of Tea (by Okakura Tenshin), Cha-no-Yu, Tea Culture*
- ④ **Abundantly Fragrant, Delicious Drink**
- ⑤ **Has a Multitude of Possible Variations**
- ⑥ **Others**  
*Colonial strategy, relation with alcohol*



### Different kinds of Tea in the World



On the base of method of processing Japanese system classifies tea to three groups, however Chinese tea is basically divided into six groups: Green tea, Yellow tea, Dark tea, White tea, Blue tea, Black tea

### Characteristics of green tea components



Tea leaves	Green tea	Black tea
Catechines	Catechines ⇒	Theaflavins, Thearubigins
Chlorophyll	Chlorophyll ⇒	Pheophytin
Vitamine C	Vitamine C ⇒	Nothing(Oxide, Hydrolyzate)
Aroma	Fresh, Grassy ⇒	like frowerly or fruity

### Comparison of chemical contents of green tea and black tea

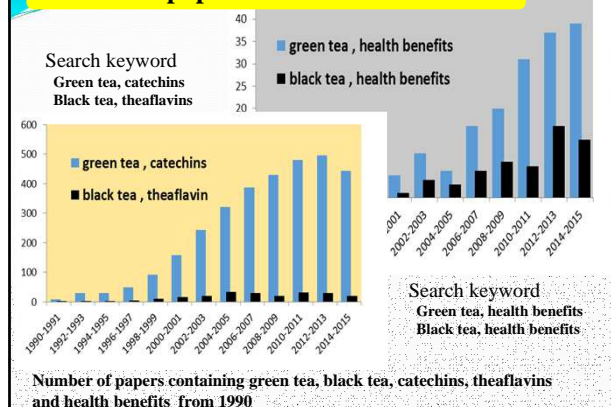
#### Characteristic constituents of Green tea and Black tea (Dry weight)

	Green tea	Black tea
<b>Amino acid (mg/100g)</b>	4023.16	2355.32
<b>Theanine (mg/100g)</b>	875-3030	1461
<b>Glutamic acid(mg/100g)</b>	184-533	130
<b>Chlorophyll(mg/g)</b>	0.435-2.569	1.039
<b>Carotene(mg/g)</b>	0.0196-0.0510	0.017
<b>Theaflavins(%)</b>	0.00-0.33	2.31
<b>Thearubigins(%)</b>	0.00-11.51	14.45
<b>EGCG(mg/g)</b>	23.37-155.15	5.53
<b>Total Catechins(mg/g)</b>	36.62-279.22	17.36

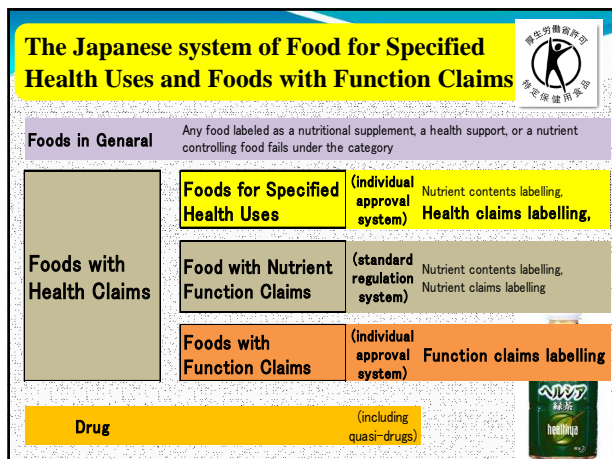
### Physiological functions of green tea components

Green Tea Components	Contents	Functions
<b>Catechins</b>	10~18%	Anti-oxidative, radioprotective, Anti-mutagenic, Anti-tumor, Enzyme inhibitory, Anti-hypercholesterolemic, Anti-hyperglycemic, Fat reducing, Anti-hypertensive, Anti-ulcer, Anti-bacterial etc.
<b>Caffeine</b>	3~4%	Removal of fatigue, Sleepy feeling, Diuretic etc.
<b>Vitamin C</b>	150~250mg%	Removal of stress, Cold prevention
<b>Vitamin B</b>	1.4mg%	Excitometabolic action of carbohydrates and amino acids
<b>Vitamin E</b>	25~70mg%	Anti oxidative, Aging prevention
<b>γ amino butyric acid</b>	0.1~0.2%	Anti hypertensive
<b>Flavonoids</b>	0.6~0.7%	Halitosis prevention
<b>Theanine</b>	0.6~2%	Anti hypertensive

### Number of papers from 1990 in PubMed



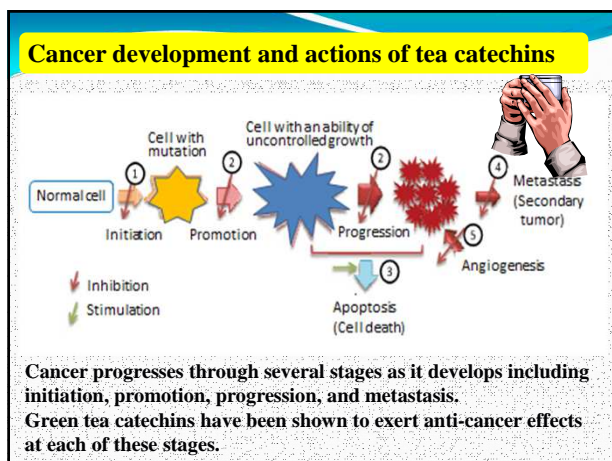




### Various Functions Thanks to Catechin

- Antioxidant
- Antimutagen
- Cancer-fighting
- Oxidation resistant
- Anti-atherogenic
- Lowers blood cholesterol
- Lowers fat absorption
- Antibacterial, antivirus
- Prevents cavities
- Improves intestinal flora
- Eliminates odors
- Controls blood pressure
- Etc. Etc. Etc.

Crystals of tea catechins

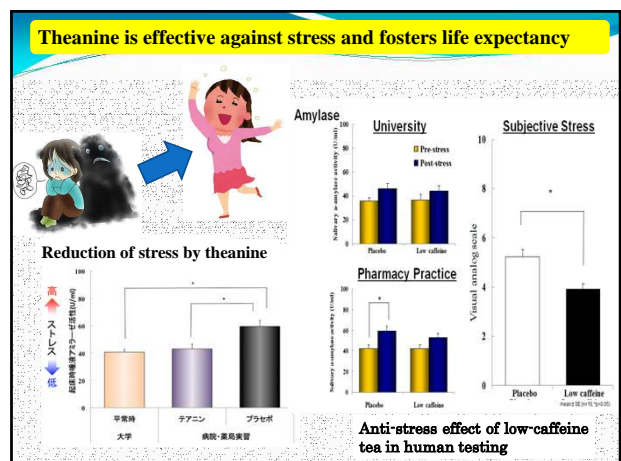
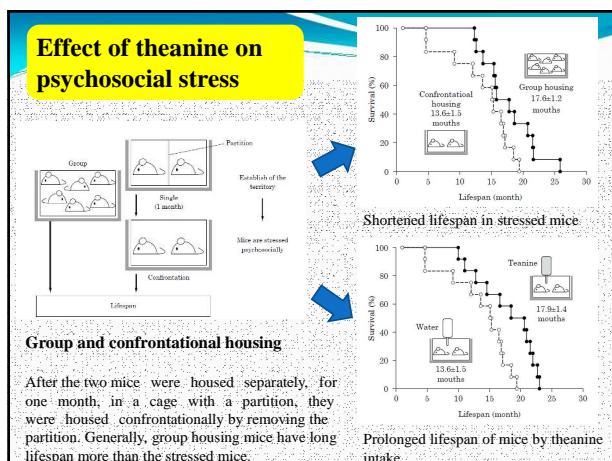
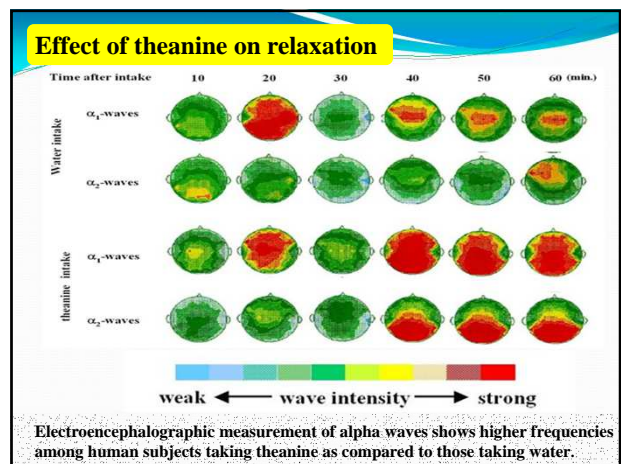
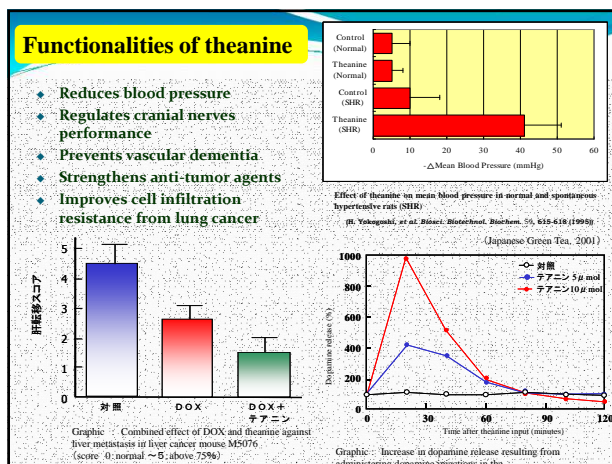
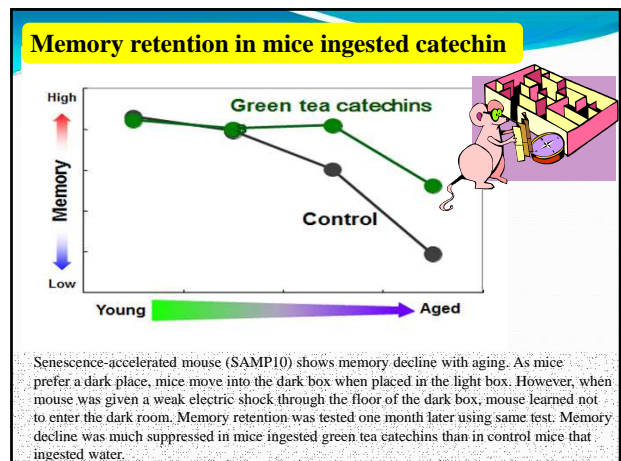
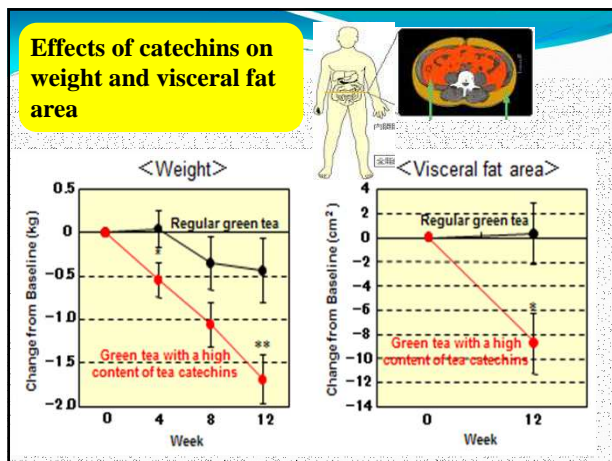


### Epidemiological studies on correlation between green tea intake and the risk of human cancer

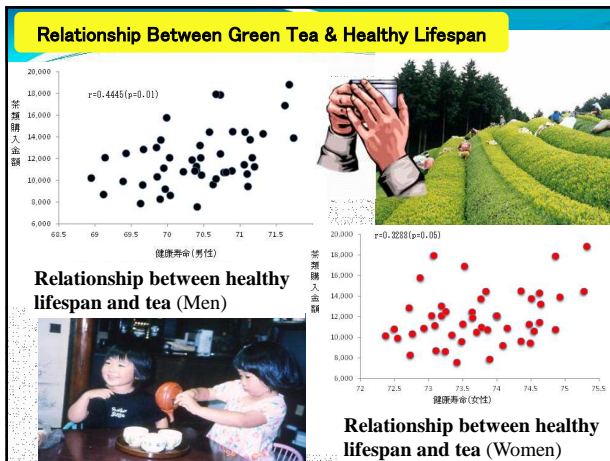
Study type	Cohort		Case-control	
	Risk reduction	No risk reduction	Risk reduction	No risk reduction
Colon	3	6	4	3
Lung	0	4	2	3
Stomach	2	6	8	8
Esophagus	0	2	4	5
Breast	3	5	3	0
Prostate	2	0	2	0
Ovaries	1	0	2	0
Pancreas	0	2	2	1
Kidney and bladder	0	1	1	4
Liver	1	0	0	0
Endometrium	0	0	2	1
Thyroid	1	1	0	0
Blood	1	0	0	0

**Cohort study:** a group of similar individuals who differ with respect to certain factors under study to determine how these factors affect the rates of a certain outcome.

**Case-control study:** two existing groups differing in outcome are identified and compared on the basis of some supposed causal attribute.







### Green Tea is Necessary for Ages to Come

**Nutrient supply** → **Nutritional balance** → **Health/Mind**

**Food Product** → **Happy**

Saves from starvation ⇒ Maintains/develops body ⇒ **Healthy**

**Green Tea Makes Our Lives Better**

If your throat is dry, drink water  
If your heart is dry, drink green tea

We take supplements to boost our health, but will they make us happy?