Excessive fat accumulation increases the risk of lifestyle diseases

- 17.8 million* people suffer from lifestyle diseases
- Lifestyle diseases account for about 30% of medical expenses and about 50% of deaths

Composition ratio of general medical expenses

- Malignant neoplasms 14.1%
- Hypertensive disease 6.0%
- Cerebrovascular disease 5.9%
- Diabetes 4.0%
- Ischemic heart disease 2.5%
- Other 67.6%

Percentage of deaths by cause

- Malignant neoplasms 27.9%
- Heart disease 15.3%
- Cerebrovascular disease 8.2%
- Diabetes 1.0%
- Hypertensive disease 0.7%

Source: "Overview of National Medical Expenditures in FY 2016" Ministry of Health, Labour and Welfare

Source: "Overview of Vital Statistics (Final Figures) for 2017" Ministry of Health, Labour and Welfare

About this technology

Matured hop bitter acids (MHBA) is an ingredient unique to Kirin products that helps reduce body fat.

Abdominal fat around the abdomen = visceral fat + subcutaneous fat

Subjects who consumed beverage without MHBA

Subjects who consumed beverage with MHBA

Change in total abdominal fat area

Unique mechanism that MHBA promotes fat burning and thermogenesis

Promotes fat burning and thermogenesis as opposed to suppressing fat absorption or promoting fat breakdown

Two types of adipose cells

**Accumulating white adipose cells**
- Nucleus
- Mitochondria
- Cytoplasm
- Lipid droplets (accumulation of triglycerides)

**Burning brown adipose cells**
- Nucleus
- Mitochondria
- Cytoplasm
- Lipid droplets

**MHBA activates brown adipose cells!**

Promotes fat burning!

Released as thermal energy!

*Yamazaki T. et al. Biochem Biophys Res Commun, In Submission
MHBA is recognized by intestinal bitter sensors, transducing the signal by the gut-brain-brown adipose cell axis, resulting in burning fat.

Unlike many other food ingredients, MHBA works without being absorbed by the body!
Kirin's new and unique matured hop extract, which works to reduce body fat without strong bitterness, was developed by taking a "reverse thinking" approach to aging.

**Ingredients in hops**

- **Alpha-acid**
  - (bitterness component of hops)

**Brewing beer with fresh hops**

**Ingredients in beer**

- **Iso-alpha acids**
  - Can reduce body fat, but is too bitter to the taste...

**Ingredients in aged hops**

- **Matured hop bitter acids (MHBA)**

**Deliberately age the hops to break down the alpha acids!**

**Extract matured hops with water**

**Matured hop extract**

(Extract containing MHBA)
"Heat maturing" technology enabling the quick maturation of hops was developed over the course of eight years.

History of this technology's development

- Developed over the course of eight years.
- Heat maturing technology:
  - 20°C: About 1 year
  - 60°C: Within 5 days

Bitterness comparison with bitterness sensor:

- Fresh hops
- Matured hops

Relative bitterness intensity comparison:

- Iso-alpha acids
- Bitter acid derived from MHBA

80% less bitterness!

References:

Future potential

Liquid/powder form of matured hop extract can be applied to various foods in Japan and overseas.

Matured hop extract can be manufactured in either liquid or powder form.

Has potential for extensive use in beverages, supplements, confectionery and other products.
Uniqueness of this technique

Unique material derived from beer ingredients thanks to Kirin's technological capabilities

Characteristic flavor with reduced bitterness
Natural material derived from hops
Extensive application potential
Highly reliable evidence

Abundant evidence
- 7 research papers on effectiveness
- 2 research papers on safety

Highly rated both in Japan and abroad

Robust patent network already in place