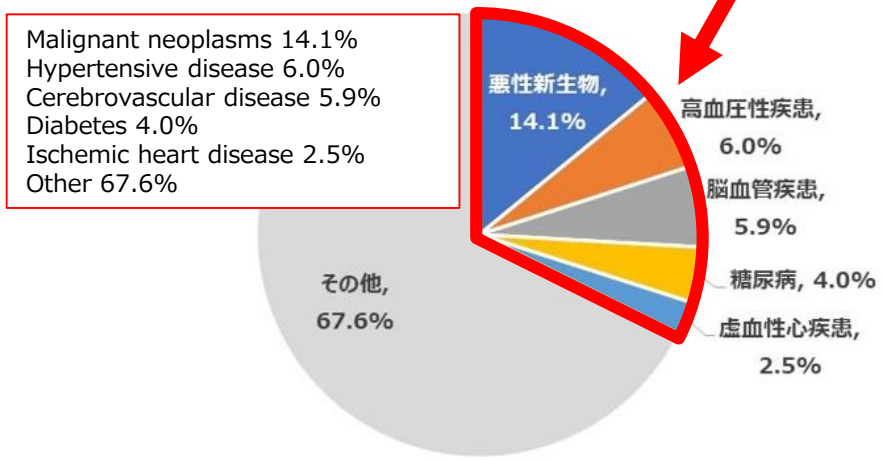
Excessive fat accumulation increases the risk of lifestyle diseases

* "Patient Survey 2014" Health Statistics Office, Policy Planning and Evaluation Division, Ministry of Health, Labour and Welfare

■17.8 million* people suffer from lifestyle diseases

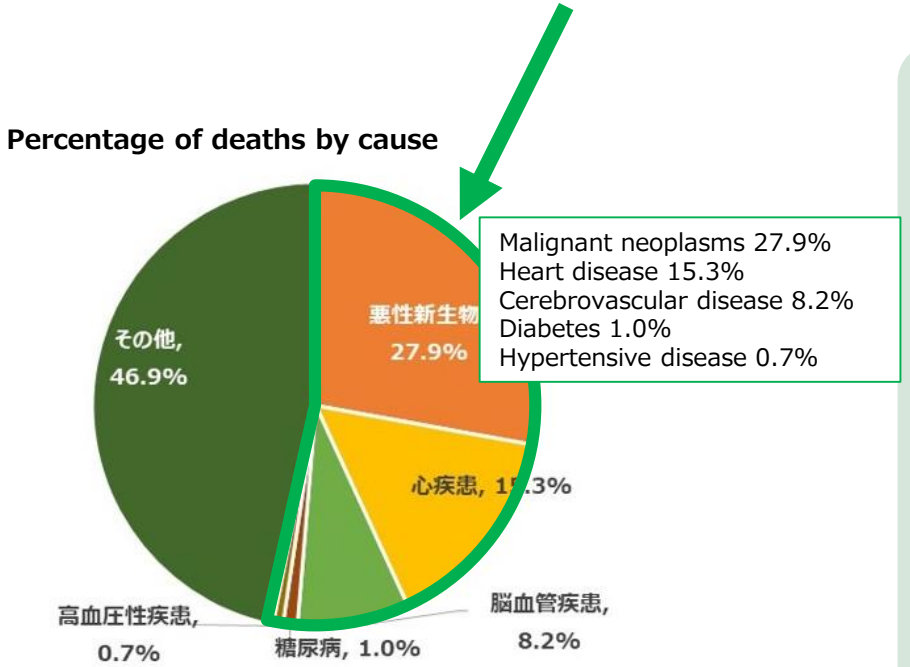
■Lifestyle diseases account for about 30% of medical expenses and about 50% of deaths

Composition ratio of general medical expenses



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

Percentage of deaths by cause



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

Excessive fat storage

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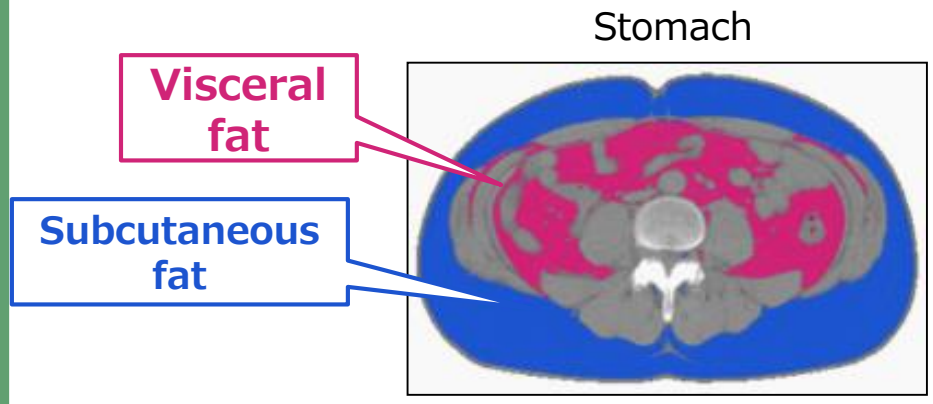
Increase risk of disease

- Diabetes
- Arteriosclerosis
- Fatty liver

About this technology

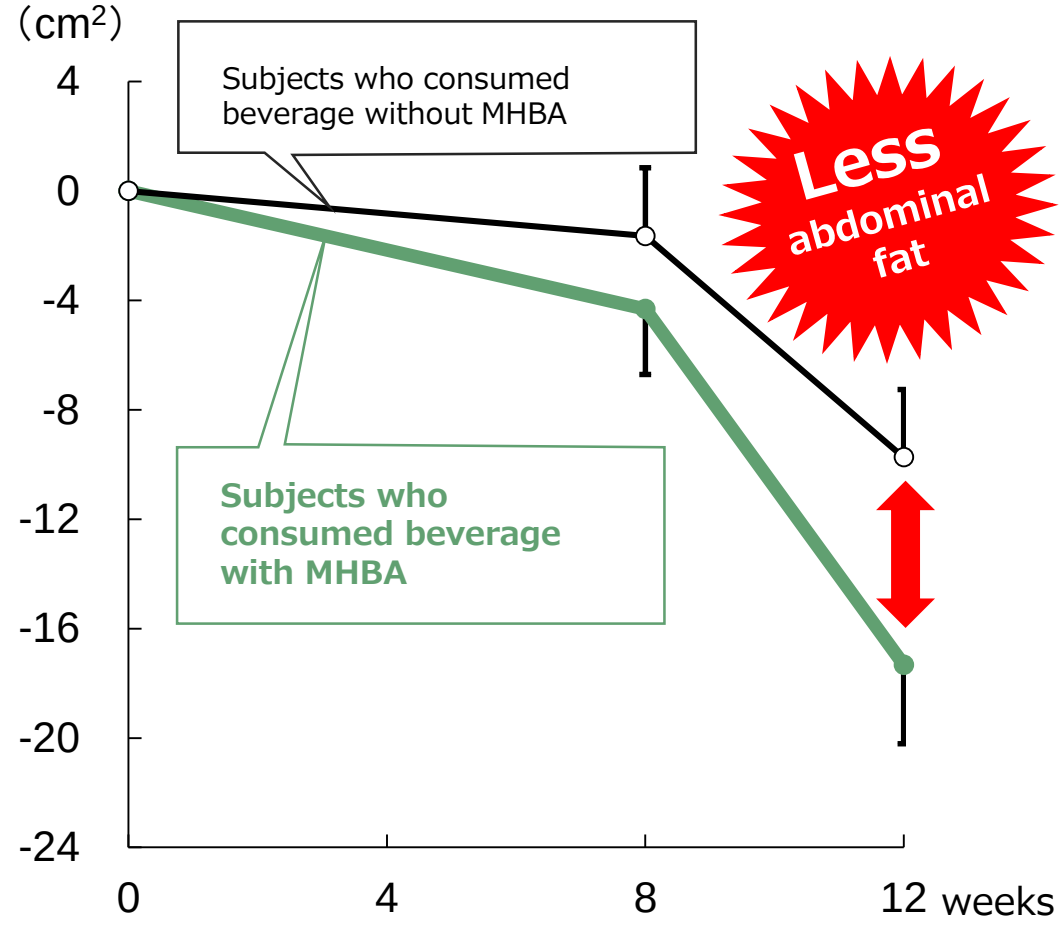
Matured hop bitter acids (MHBA) is an ingredient unique to Kirin products that helps reduce body fat

Abdominal fat around the abdomen
= visceral fat + subcutaneous fat



* Black/gray : air and other tissues

Change in total abdominal fat area



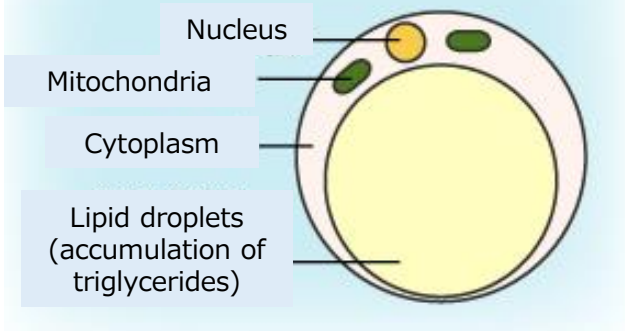
*Morimoto-Kobayashi Y. et al. Nutri J, 2016, 15, 25.
*Yamazaki T. et al. Jpn Pharmacol Ther, 2016, 44, 8. 1193.
*Koizumi K. et al. Jpn Pharmacol Ther, 2016, 44, 8, 1179.

Unique mechanism that MHBA promotes fat burning and thermogenesis

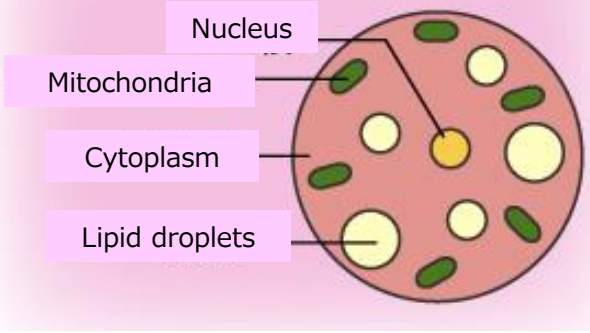
Promotes fat burning and thermogenesis as opposed to suppressing fat absorption or promoting fat breakdown

Two types of adipose cells

Accumulating
white adipose cells



Burning
brown adipose cells



MHBA activates brown adipose cells!

↓

Promotes fat burning!

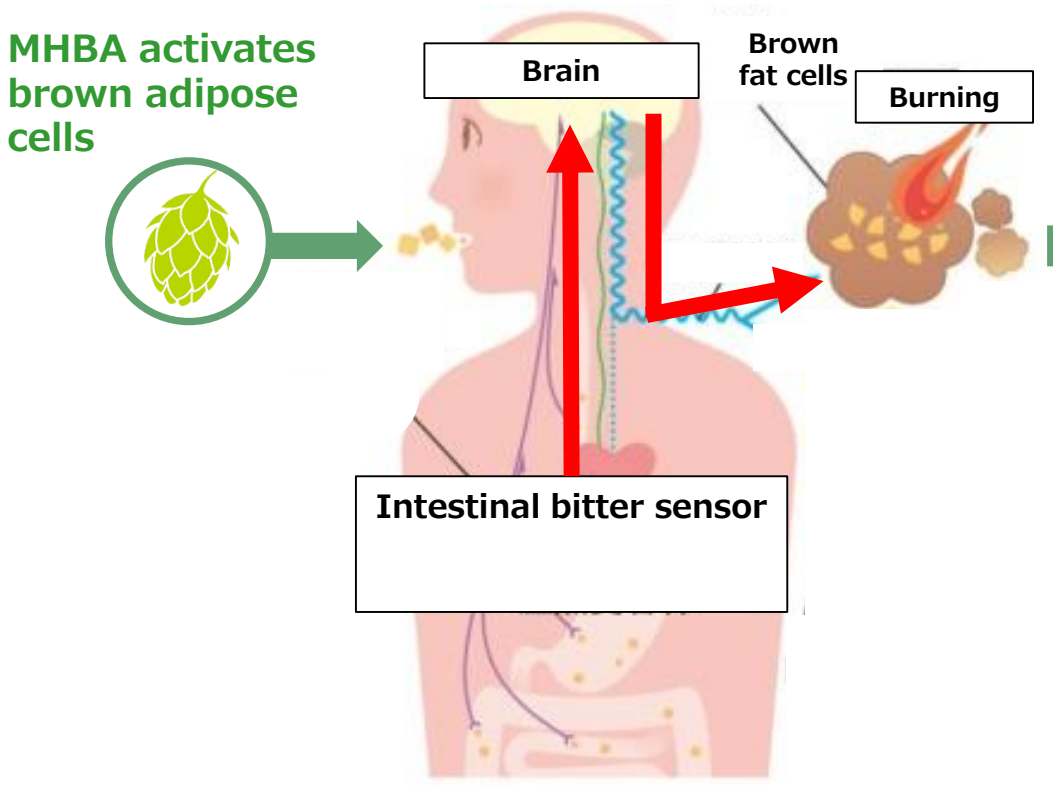
↓

Released as thermal energy!

*Morimoto-kobayashi Y. et al. PloS one, 2015, 10, 6: e0131042.
*Yamazaki T. et al. J Nutr Biochem, 2019, 64, 80.
*Yamazaki T. et al. Biochem Biophys Res Commun, In Submission

About this technology

MHBA is recognized by intestinal bitter sensors, transducing the signal by the gut-brain-brown adipose cell axis, resulting in burning fat.



Body fat reduction effect

Unlike many other food ingredients, MHBA works without being absorbed by the body !

*Morimoto-kobayashi Y. et al. PloS one, 2015, 10, 6: e0131042.
*Yamazaki T. et al. J Nutr Biochem, 2019, 64, 80.
*Yamazaki T. et al. Biochem Biophys Res Commun, In Submission.

History of this technology's development

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)

Deliberately age the hops to break down the alpha acids !

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)

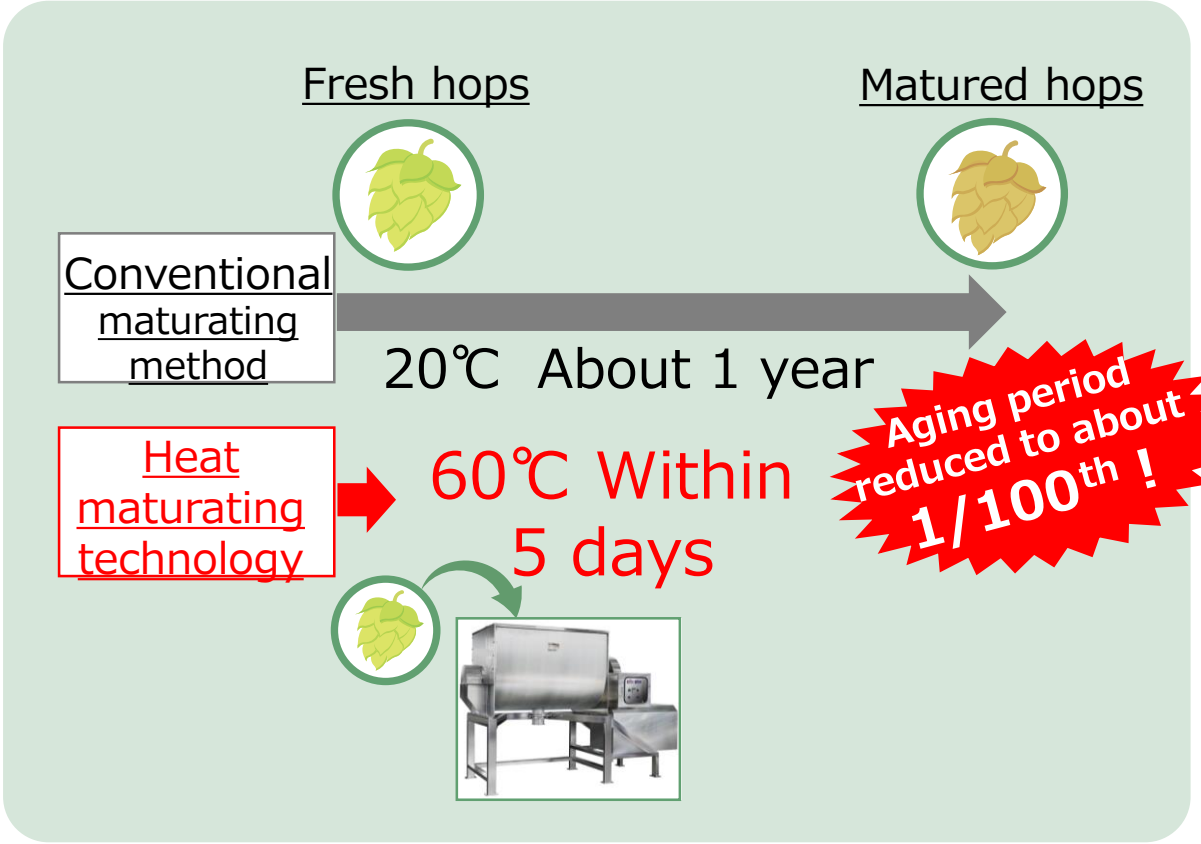
Extract matured hops with water

Matured hop extract

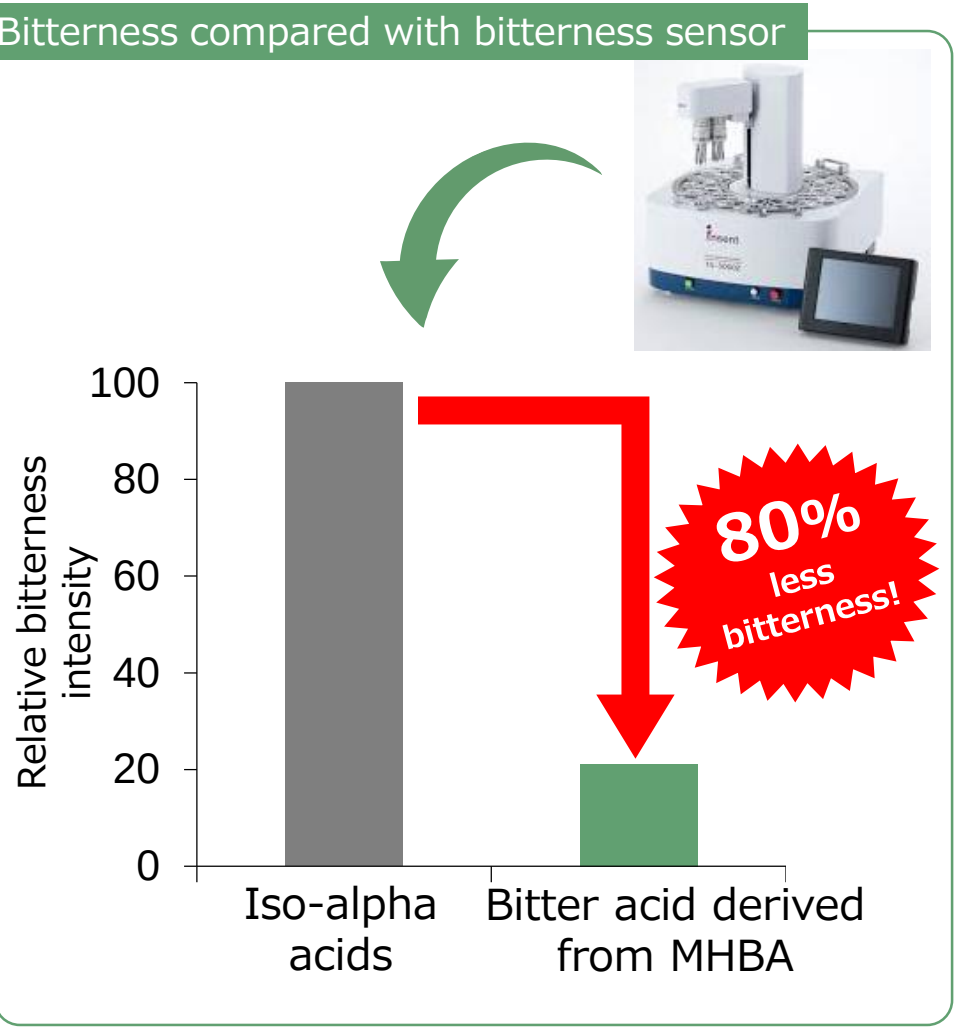
(Extract containing MHBA))

History of this technology's development

" Heat maturating " technology enabling the quick maturation of hops was developed over the course of eight years



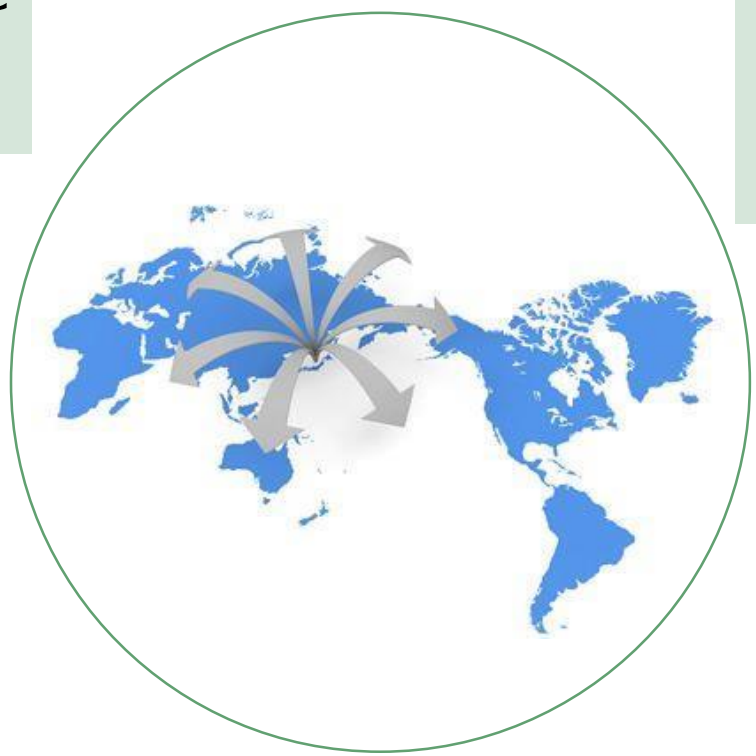
Bitterness compared with bitterness sensor



*Taniguchi Y. et al. Biosci Biotechnol Biochem, 2015, 79.10: 1684-1694.
*Taniguchi Y. et al. J Agric Food Chemistry, 2013, 61.12: 3121-3130.
*Taniguchi Y. et al. J Nat Prod, 2014, 77.6: 1252-1261.
*Yamazaki T. et al. 36th European Brewery Convention, 2017.

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

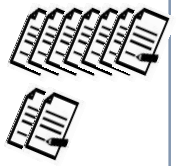
Natural material derived from hops

Highly reliable evidence

Extensive application potential

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