

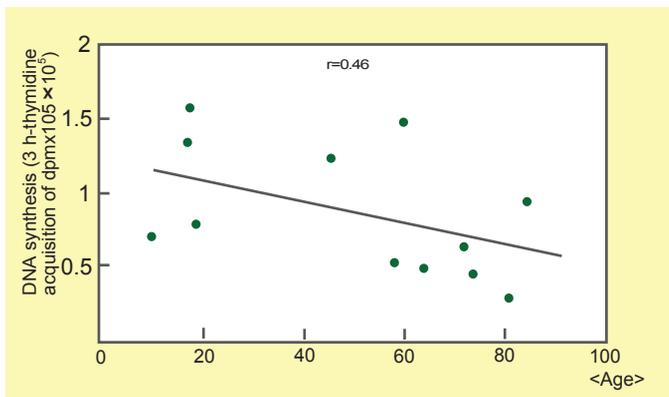
# Product Name ■ Beer yeast extract RNA

Normal beer yeast contains 1 to 5% RNA. We have extracted, refined, and concentrated RNA from yeast so that “beer yeast extract RNA” containing more than 50% RNA. Ingested RNA is broken down by enzymes in the body, absorbed as a nucleotide (NT), a nucleoside (NS) or sugar/alkali and is believed to be involved in a variety of functions not limited to brain functions such as memory and learning but also stress reduction.

## Nucleic acids tend to become deficient accompanying aging (DNA, RNA)

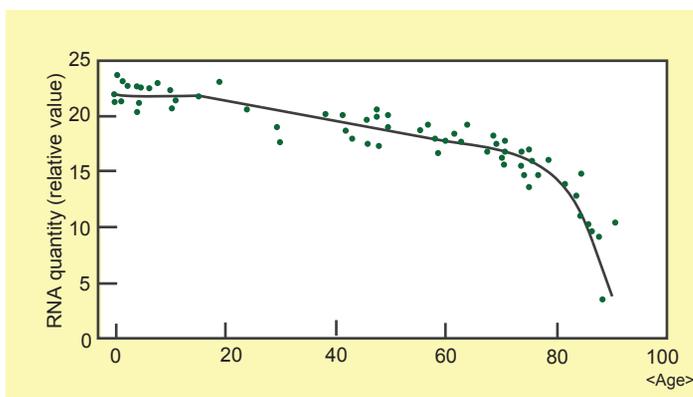
Nucleic acid synthesis capacities in the body decrease with age-related dysfunctions in liver or kidney. When nucleic acids are deficient, metabolism and cellular functions are inhibited which is also thought to be one of the causes of aging. Figure 1 shows the result of research based on isolating human tendon cells and studying DNA synthesis with 3 h-thymidine acquisition method. Figure 2 shows the result of a research measuring the RNA in human brain cells. In these studies, it was confirmed that DNA synthesizing capacity and the quantity of RNA in human cells both reduce by aging.

Figure 1: Age-related changes in DNA synthesis in human tendon cells



(Chard MD et al. Ann Rheum Dis. 1987 May;46(5):385-90)

Figure 2: Age-related changes of quantity of RNA of human brain cells

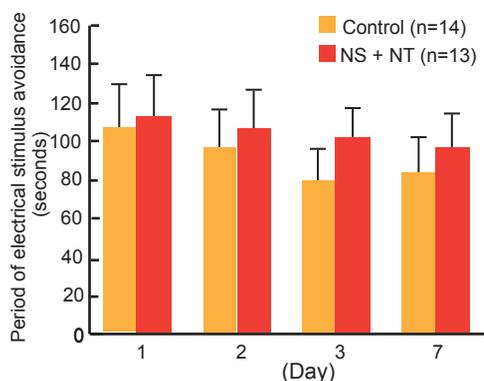


(Mann DM et al. Brain. 1974 Sep;97(3):481-8)

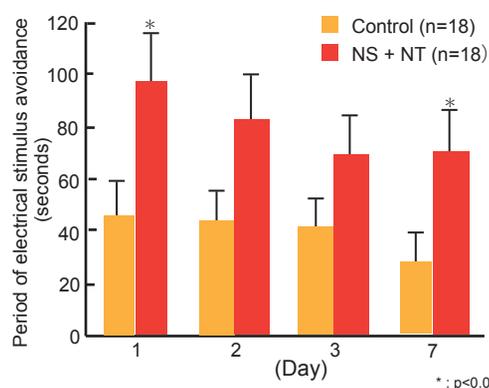
## RNA impacts on memory

We tested the differences in memory abilities in young mice and elderly mice when given food with RNA (NS+NT) and when food with RNA was not given (control) for 14 weeks. In the testing, mice memorized an electrical stimulus (penalty), and memory abilities in mice that avoided the electrical stimulus under the test environment for the longest period of time were assessed to be the highest. Tests were undertaken respectively once per day; 1, 2, 3, and 7 days following the end of the feeding period. As a result, there was almost no difference observed between the RNA ingested group (NS+NT) and the non-ingested group (control) for young mice, but there was a clear difference between the RNA ingested group (NS+NT) and the non-ingested group (control) for elderly mice. This result in the improvement in memory abilities is thought to be a result of RNA ingestion. Additionally, the results indicated that memory abilities faded as time passed.

### Young mice



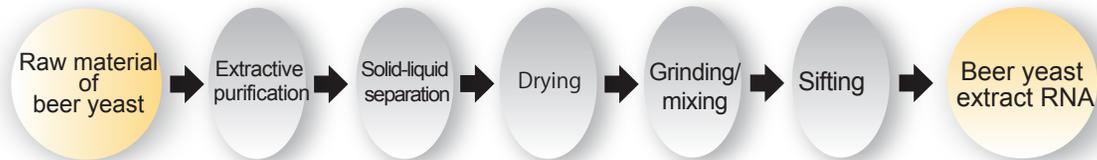
### Elderly mice



(Yamamoto et al, J.Ntr. 130,3085-3089(2000))

# ■ Product Name ■ Beer yeast extract RNA

## ■ Manufacturing process



## ■ Ingredients

- Beer yeast extract (contains RNA)

## ■ Recommended daily intake

- 200 - 4,000mg / day

## ■ Uses

- Dietary supplements and nutritional supplements

## ■ String method

- Avoid direct sunlight, store at room temperature

## ■ Packing

- 5 kg× 2 /box

## ■ Expiration date

- 2 years

## ■ SPEC

Item	Standard	Method for Analysis
Appearance Color	Yellowish-brown powder	Visual
Particle size (mesh)	60 pass	Sieve
Taste	Characteristic	Sensory test
Odor	Has an ethanol odor	Sensory test
Beer yeast extract RNA wt %	50 or more	STS method
Dry weight wt %	7.0 or less	Normal pressure, 105°C, 3 hours
Arsenic (as As <sub>2</sub> O <sub>3</sub> ) ppm	2 or less	Silver diethyldithiocarbamate method
Heavy metal (as Pb) ppm	20 or less	Sodium Sulfide colorimetric method
Total plate count /g	3,000 or less	Standard agar plate culture method
Coliform group	Negativity	BGLB method

## ■ Safety

- Single oral dose study (male and female mice): LD50 > 2,000 mg/kg
- Mutagenicity test: negative

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