

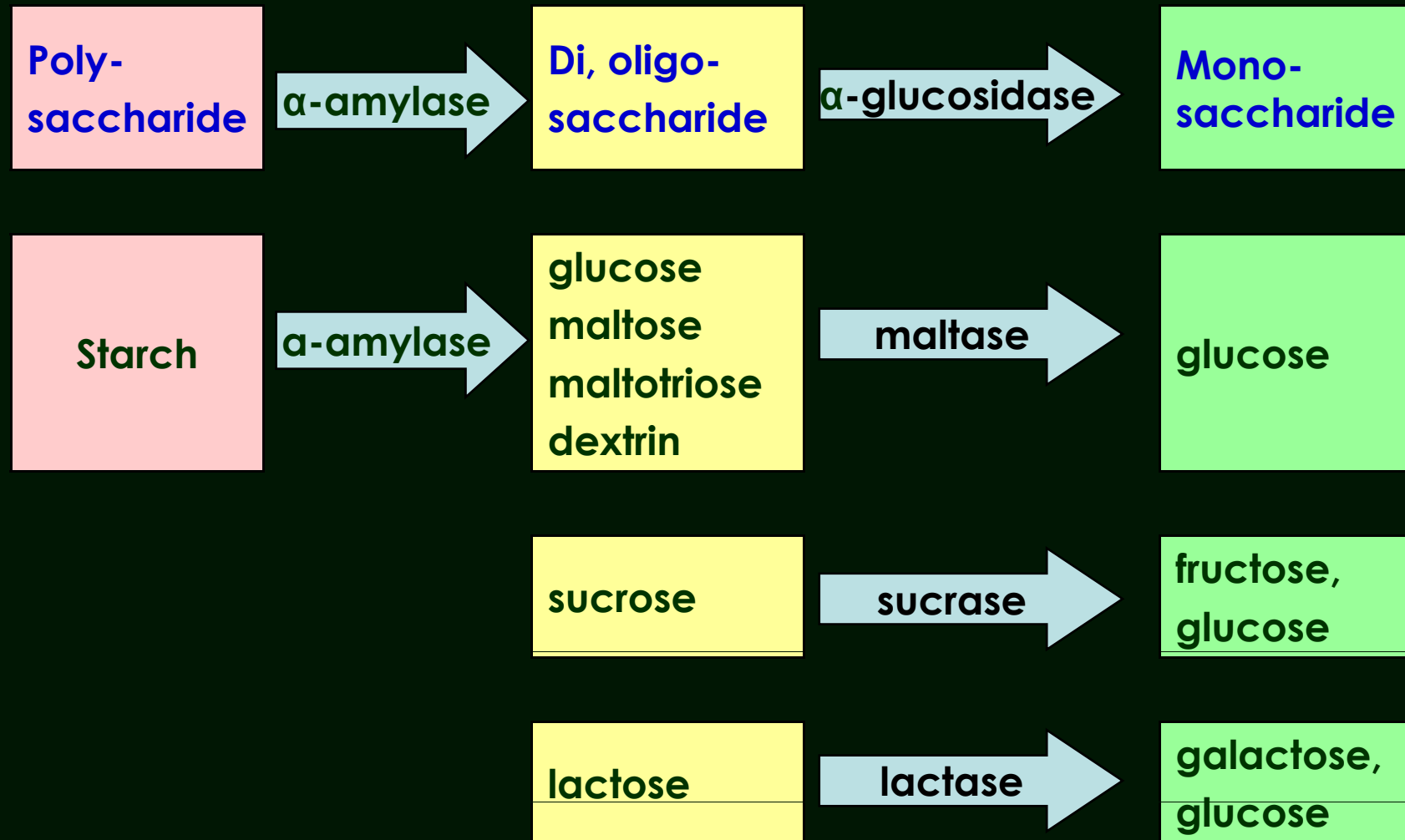
α -Glucosidase Inhibitor (AGI) from Natto : Production and Application



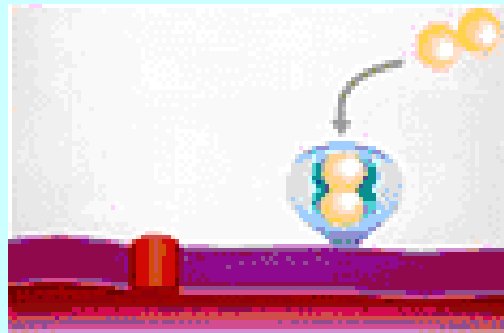
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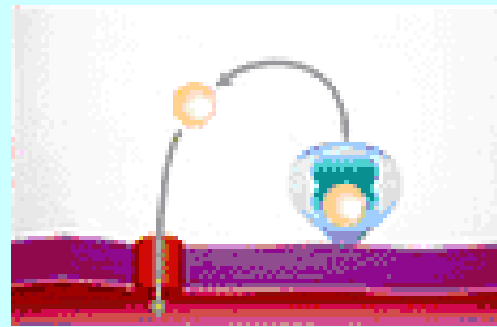
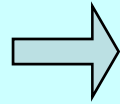
Digestion of Carbohydrates



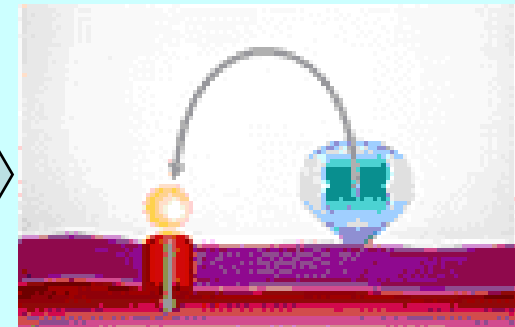
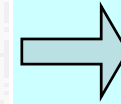
Normal absorption of disaccharide



disaccharide
+
enzyme



hydrolysis

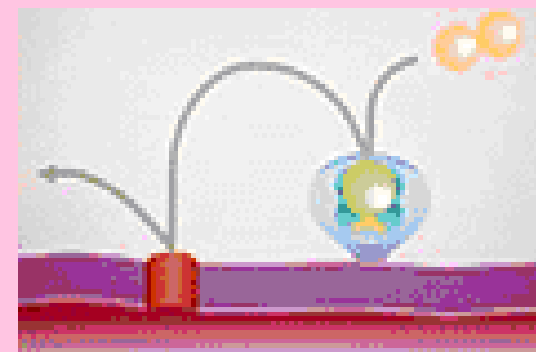
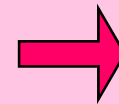


absorption of
monosaccharide

Inhibition of α -glucosidase by AGI



inhibitor
+
enzyme



inhibition of
hydrolysis & absorption

Cheong-guk-chang



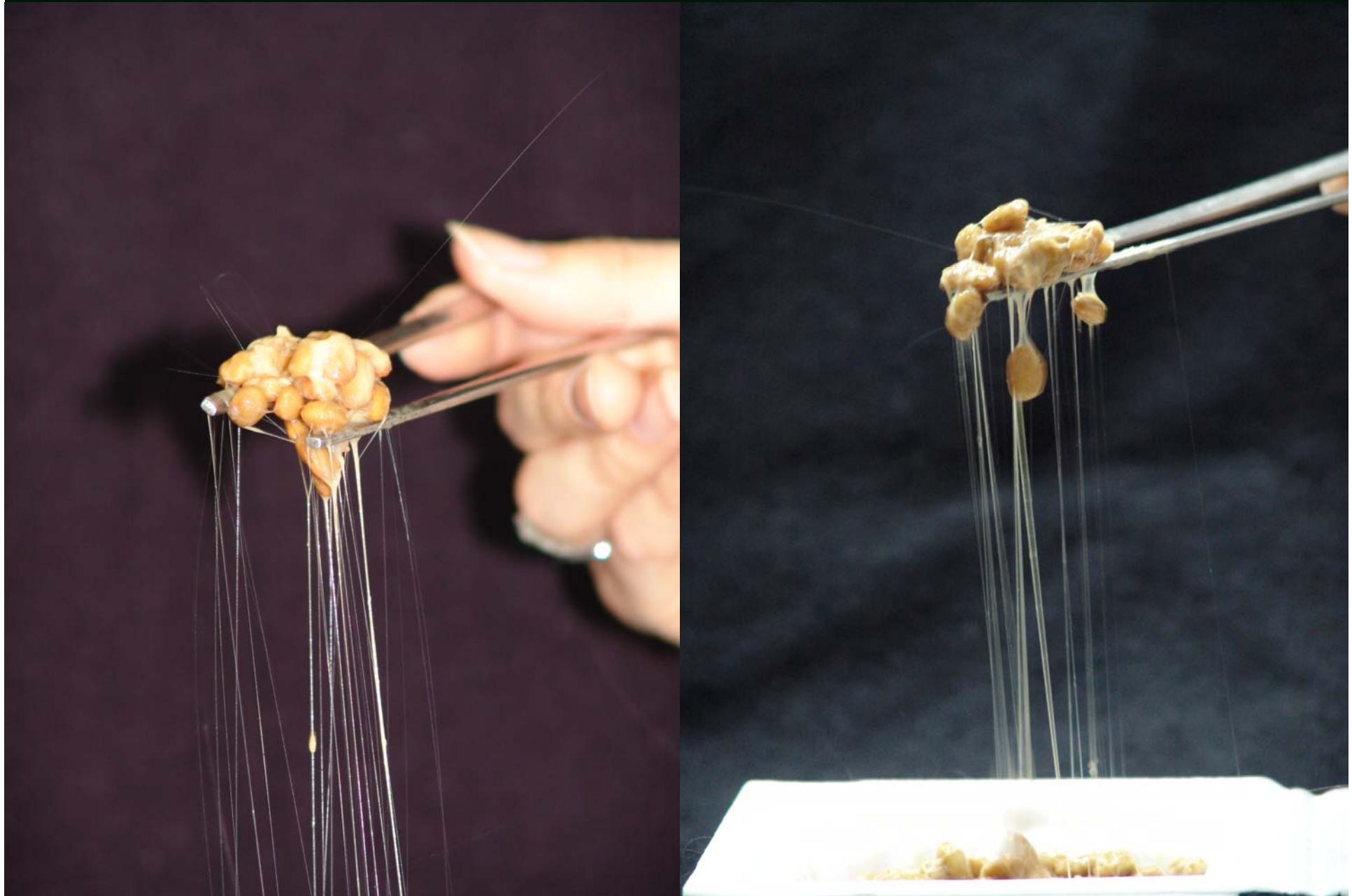
Characteristics of DC-15

| | | | |
|----------------------|-----------------------------|----------------------------|---|
| Gram staining | + | Nitrate reduced to nitrite | + |
| Shape | rod | Formation of Indole | - |
| Size | 0.6 ~ 0.7 × 1.6 ~ 1.9 μm | Catalase | + |
| Spore | ○ | Hydrolysis of starch | + |
| Spores position | endospore | Hydrolysis of casein | + |
| Motile | + | Utilization of propionate | - |
| Growth temperature | 25 ~ 40°C | Acid production from | |
| Growth in NaCl 7% | + | Glycerol | + |
| Aerobic growth | + | L-Arabinose | + |
| Anaerobic growth | - | D-Xylose | + |
| Voges-Proskauer test | + | D-Galactose | + |
| | | D-Glucose | + |
| | | D-Mannitol | + |
| | | D-Maltose | + |
| | | D-Sucrose | + |
| | | D-Lactose | + |



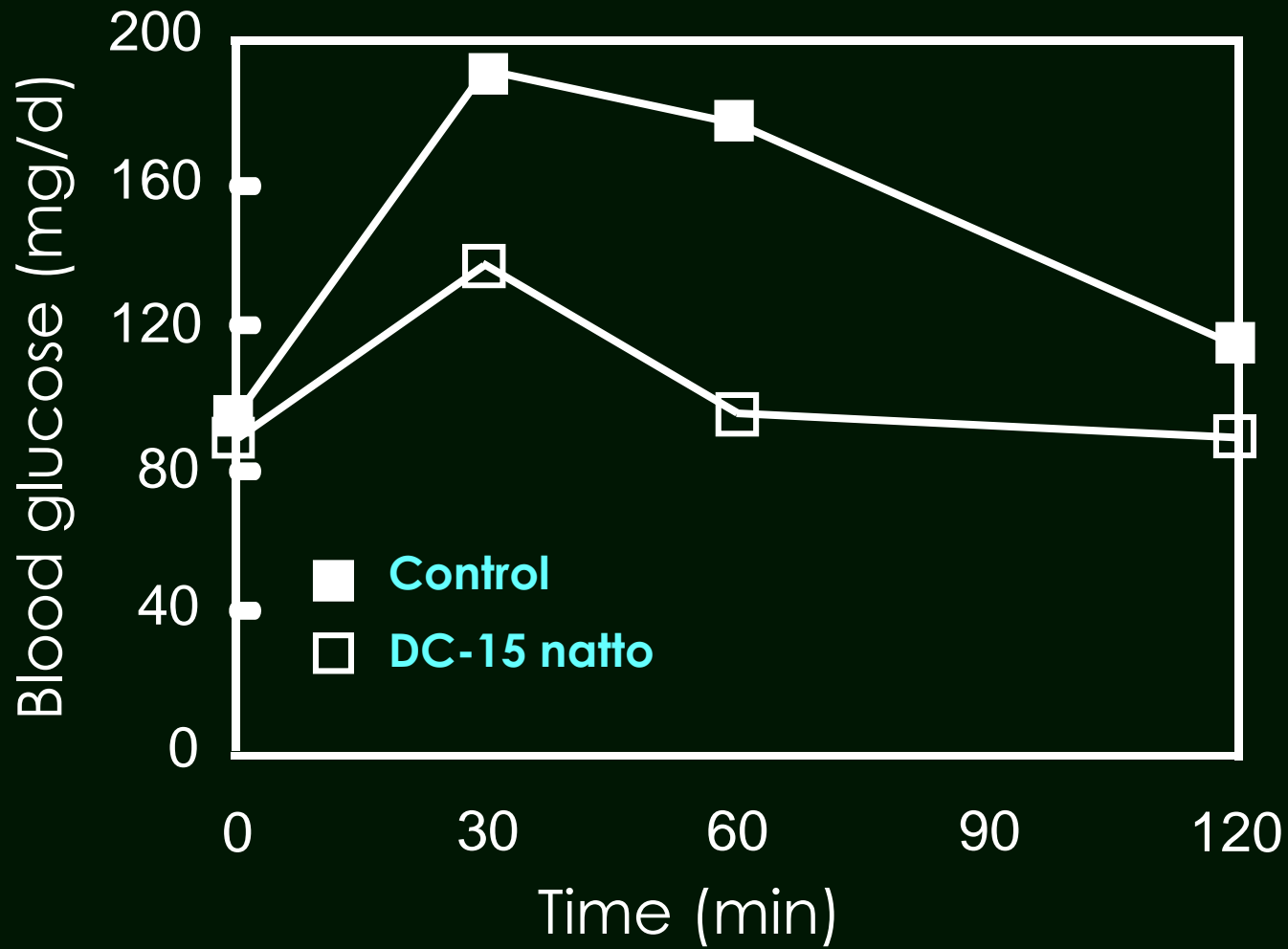
Electron microscopy of DC-15

DC-15 Natto



Distribution of α – glucosidase inhibitory activities

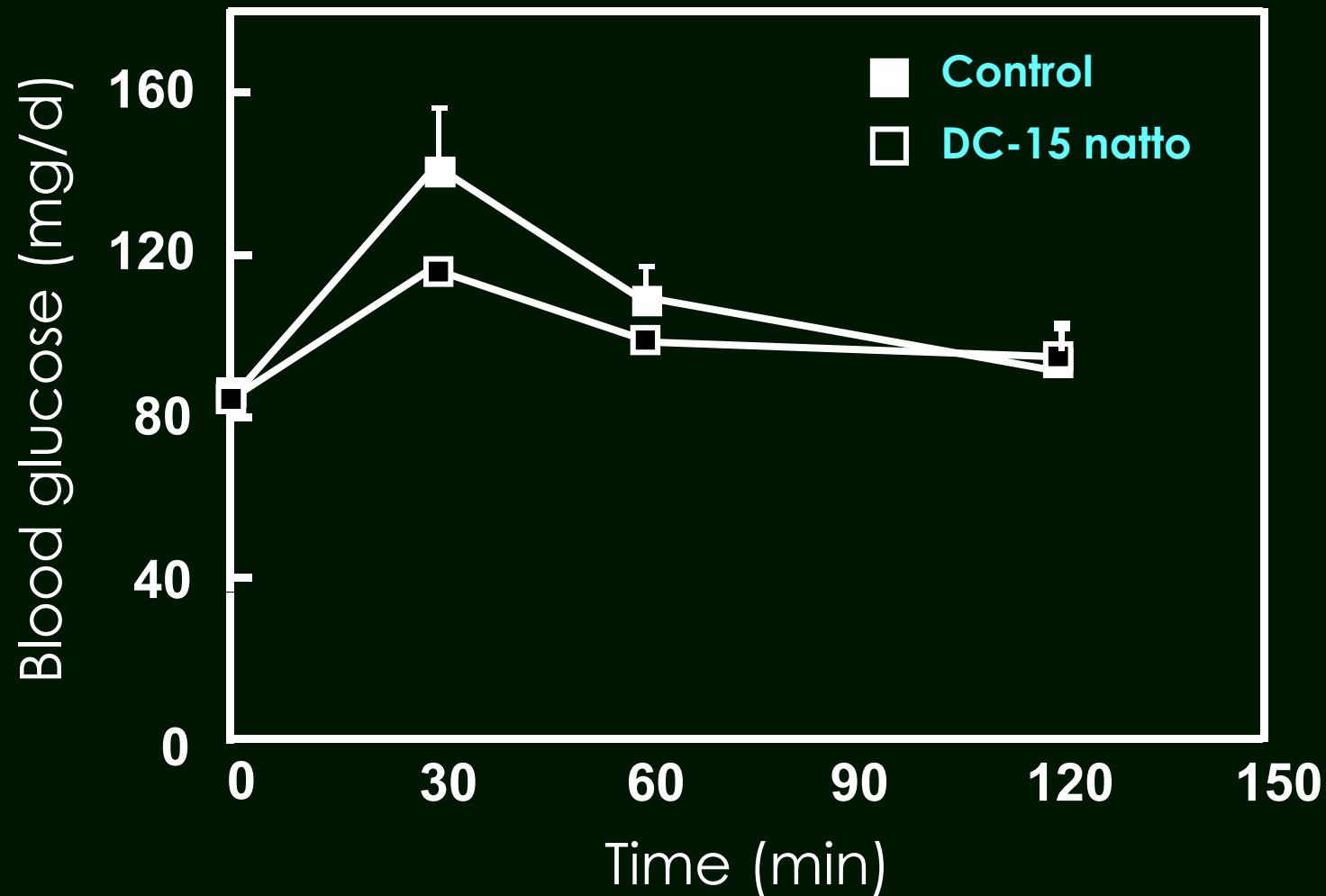
| Sample | UnitX10 ³ /g | |
|------------------|-------------------------|--------|
| DC-15 natto | Freeze dry | 21,000 |
| | Spray dry | 23,000 |
| | wet, 24hr | 7,400 |
| | wet, 36hr | 12,800 |
| | wet, 48hr | 17,800 |
| Commercial natto | 1 | none |
| | 2 | none |
| | 3 | none |
| | 4 | none |
| | 5 | none |



Effect of DC-15 natto on blood glucose levels

AGI activity in DC-15 natto ramen

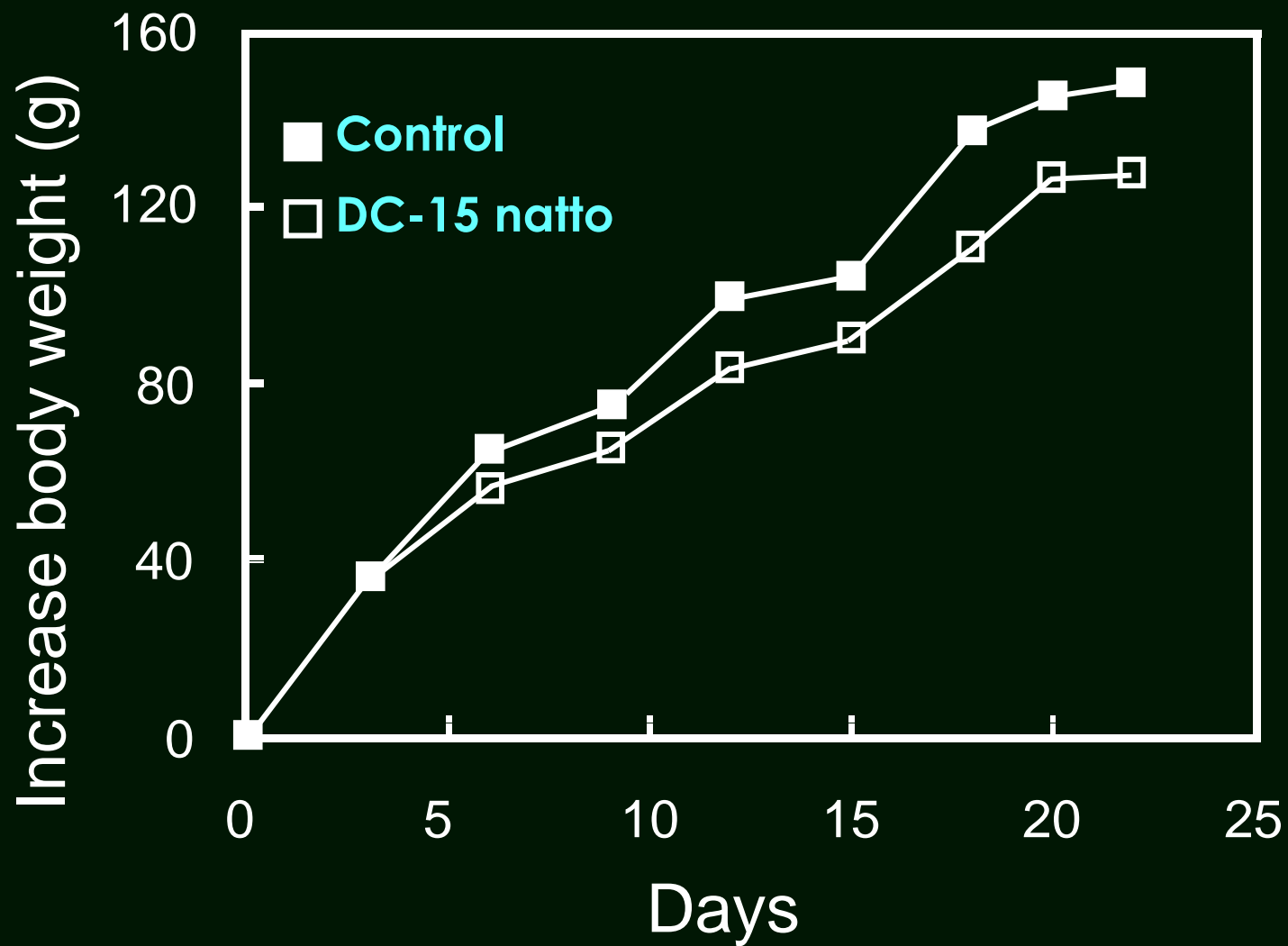
| Sample | Unit x 10 ³ /g | Natto(g)/ Flour 100g | Total activity (unit x 10 ³) | |
|----------------------------|---------------------------|-------------------------|---|--------|
| | | | Estimated | Actual |
| DC-15 natto (Spray Dry) | 20,850 | 0 | - | - |
| Ramen 1 | | 2 | 41,700 | 37,000 |
| Ramen 2 | | 3 | 62,550 | 60,000 |



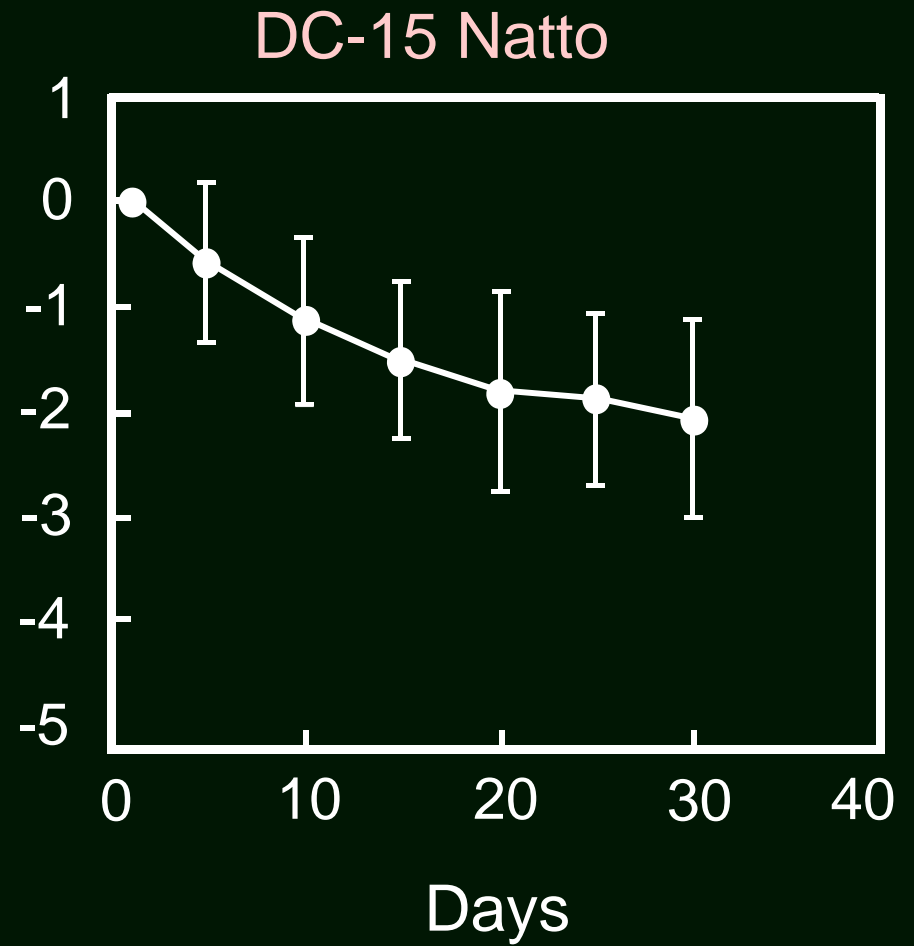
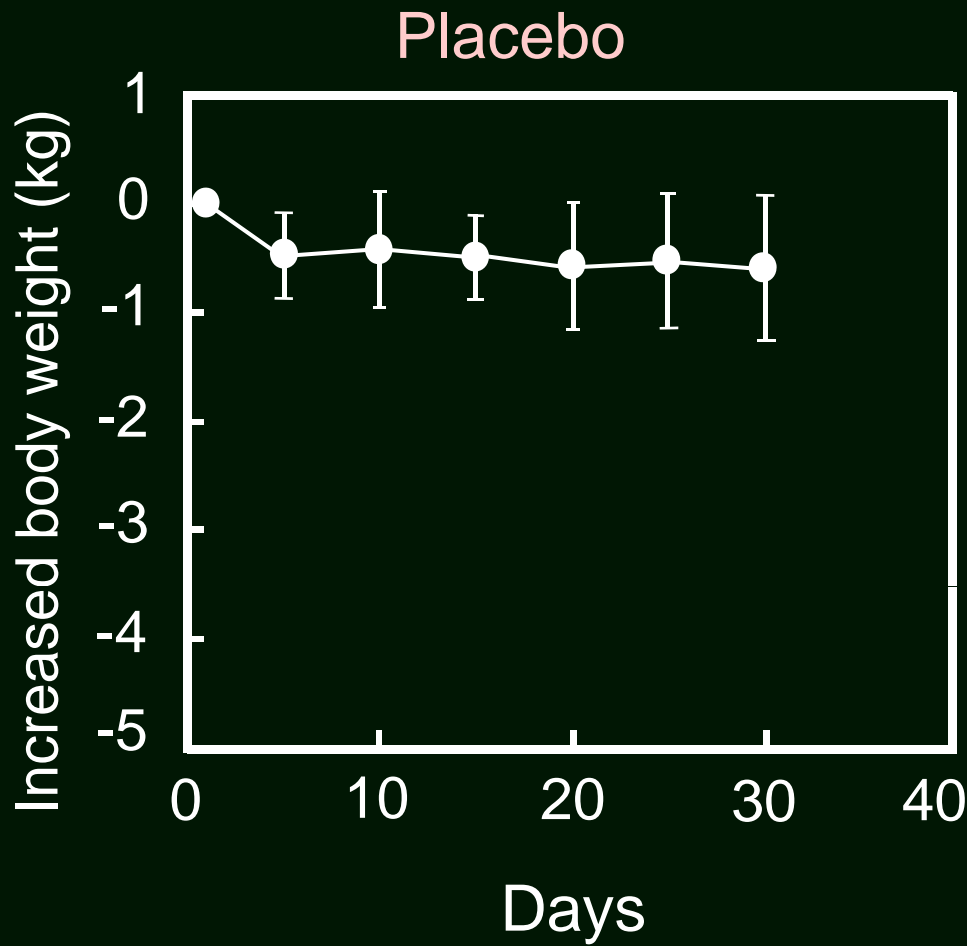
Effect on blood glucose levels after ingesting ramen containing DC-15 natto

Diet composition

| Ingredient (g/kg) | Control | DC-15 |
|-------------------|---------|-------|
| Casein | 204 | 204 |
| Sucrose | 699 | 699 |
| Corn oil | 50 | 50 |
| Mineral mix | 35 | 35 |
| Vitamin mix | 10 | 10 |
| Choline chloride | 2 | 2 |
| Commercial natto | 15 | - |
| DC-15 natto | - | 15 |



Effect of DC-15 natto on body weight of rats



Body weight gain in women for 30 days

Conclusion

- We isolated microorganism producing α -glucosidase inhibitor from Cheong-guk-chang which is traditional fermented soybean food in Korea.
- It is identified *Bacillus subtilis* and named DC-15.
- After ingesting DC-15 natto, increase of blood glucose is repressed.
- There is significant body weight decrease after giving DC-15 natto.
- DC-15 natto can be used as a functional food without extraction and concentration.