THICKENERS FOR DYSPHAGIC PATIENTS: COMPARISON OF A NEW AMYLASE RESISTANT PRODUCT WITH A STANDRAD STARCH-BASED PRODUCT.
- IN VIVO STUDY WITH HEALTHY VOLUNTEERS -

Introduction
Texture-modified diets are commonly prescribed for patients with swallowing disorders like dysphagia. To increase the viscosity of their drinks, mainly starch-based thickeners are being used, which are highly sensitive to α-amylase. This may result in a thin unsafe fluid consistency in the mouth during swallowing. This study reports the effect of human saliva produced by healthy volunteers on the consistency of a fluid thickened with an α-amylase-resistant and a standard starch-based thickener.

Methods
35 healthy adult persons (young female (n=12), old female (n=13), young male (n=2), old male (n=6); young < 45 years, old ≥ 45 years) participated in this double blind cross-over study. Each person performed four tests (2 products and 2 mixing times) on the first day. The same set in different order was tested the next day. The tests were offered in two different orders regarding time and type of product. The samples were freshly prepared before every session with a custard consistency between 1200 and 1400 mPa.s at 50 s⁻¹. In each test, the person took one spoon of 10 g artificial tap water (10°DH) thickened with α-Amylase-Resistant Thickener (ART, Nutilis®, Nutricia, 6.00 g/100 ml) or a standard Starch-based Thickener (ST, Thick&Easy®, Hormel, 6.30 g/100 ml). Persons were instructed to move the tongue approximately 1 rotation per second. After 10 and 20 seconds the bolus was spat out into a coded cup containing 1 ml 0.2 M HCl and mixed to stop the α-amylase activity. The closed cup was stored at -20°C.

Viscosity measurements on thawed out acidic samples were performed in a rotational rheometer using Couette-DIN geometry at 50 ±1 and 20°C. The viscosity was obtained after 300 seconds. The relative viscosity was calculated as the percentage remaining viscosity compared to the viscosity at time zero.

Results
The relative viscosity of artificial tap water thickened with ART and ST is shown in figure 1. The relative viscosity of water thickened with ART was 61% after 10s of treatment in the mouth. This value was significantly (p<0.0001) higher compared to water thickened with ST (27%). The effect of treatment time in the mouth on the relative viscosity was less pronounced in the case of an α-amylase-resistant thickener (ART) than for a standard starch-based thickener. After 20s the relative viscosity of ART was decreased to 45% compared to 14% for ST. Even, the relative viscosity of artificial tap water thickened with ART at 20s was significantly higher compared to that of ST at 10s.

The relative viscosity of artificial tap water thickened with ART and ST for OLD (≥ 45 years) and YOUNG adults (< 45 years) is shown in figure 2. The difference in relative viscosity data for both thickeners is clear. In the case of ART, the relative viscosity for OLD adults changed from 66 to 49% and for YOUNG adults from 56 to 44%. In the case of ST, the relative viscosity for OLD adults changed from 65 to 18% and for YOUNG adults from 62 to 11%. The OLD adults showed a significantly (p=0.0001) higher relative viscosity compared to YOUNG adults after 10s treatment. This difference disappeared after the 20s treatment. This result shows that for OLD adults the viscosity decreases less after 10s. This effect might be caused by the fact that OLD adults produce saliva with less activity compared to YOUNG adults or that for OLD adults the mastication is more difficult. This result requires further investigation.

Conclusion
Saliva produced by adults (young and old) has a significant effect on the viscosity of drinks thickened with α-amylase-resistant thickener (ART) and standard starch-based thickener (ST). During the oral phase the viscosity reduction of artificial tap water thickened with ART is significantly less compared to ST. It is therefore hypothesized that the use of an α-amylase resistant thickener supports safer swallowing in patients with dysphagia.

References:
1 W.J. Dodds, Dysphagia 3, 171 (1989).