

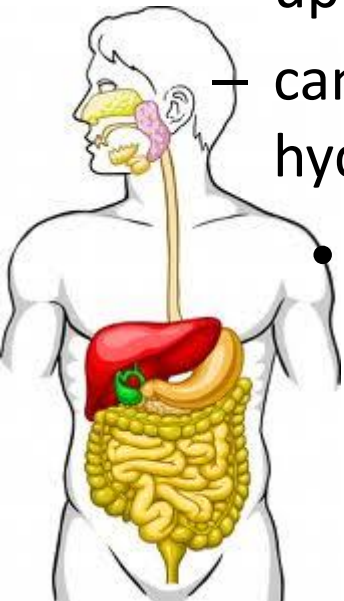


Effect of salivary amylase on cooked starch

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Rationale

- Products with specific matrices are consumed and digested in the human digestive tract.
- In humans: salivary α -amylase, pancreatic amylase, sucrase-isomaltase and maltase-glucoamylase.
- Complementary activities but
 - upper gut starch digestion products
 - can synergistically amplify and/or inhibit further steps in the hydrolysis of glucan polymers into glucose in the lower gut.
- **This may have implications on the glucose delivery into the blood and possibly insulin release following digestion of processed starchy foods.**



Rationale (continued)

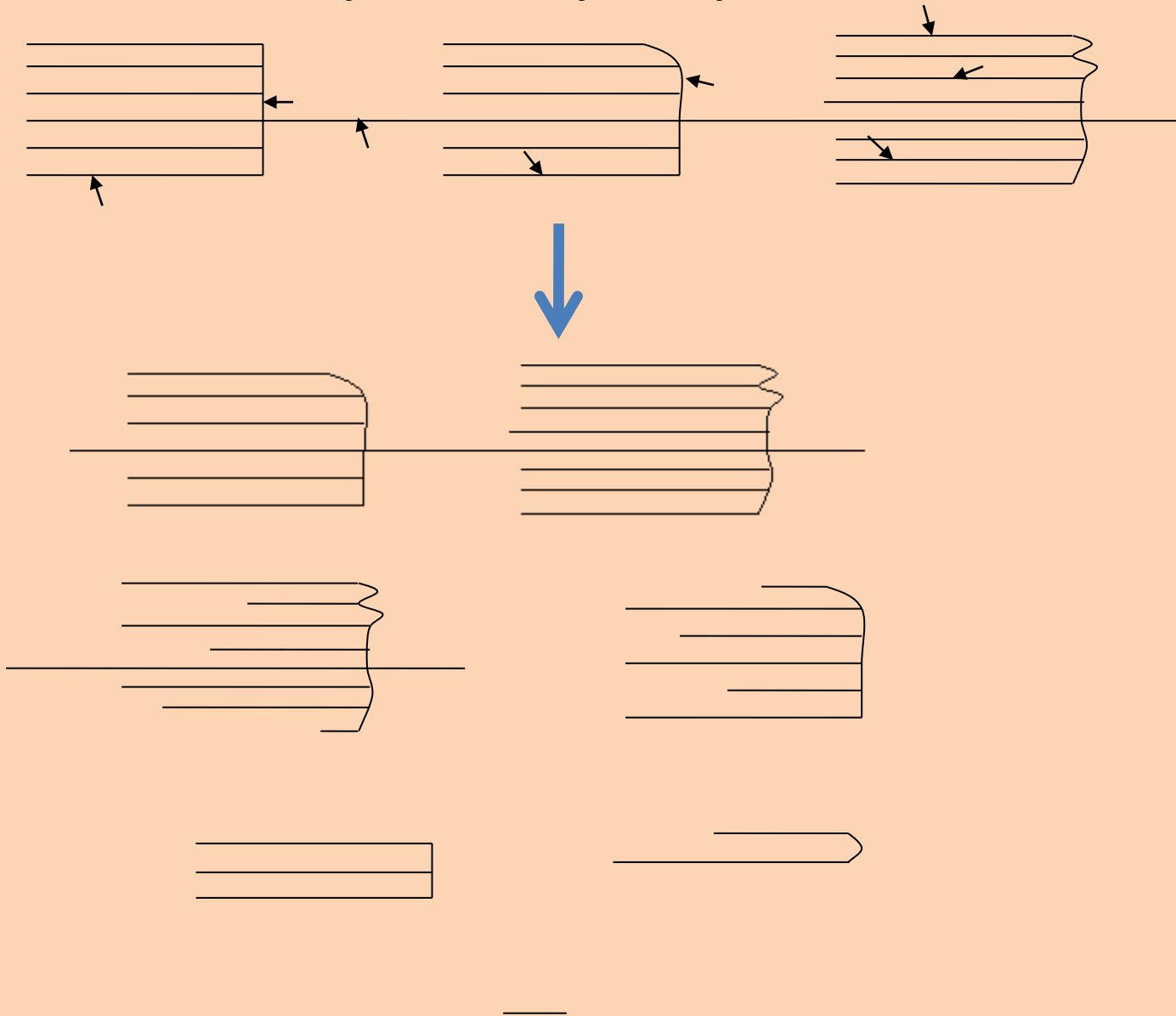
- Incretin hormones are secreted in the gastrointestinal mucosa
 - cause an increase in the amount of insulin released after eating, even before blood glucose levels become elevated
 - slow the rate of absorption of nutrients into the blood stream
- Intraluminal glucose one of the triggering factors for their secretion
- “Type” of carbohydrate ingested influences the stimulation of incretin hormones
- Thus it appears that the digestion of cooked starches following consumption – and the consequent impact on insulin response – is also strongly influenced by the molecular architecture of starch

(Dr RJ Vonk research)

Problem statement

- Starch digestion not a static function, thus should not be looked at independently of the way in which a starchy food is sequentially digested
- Research needed to investigate the way starch is digested and identify rate-determining steps and factors that influence those steps.
- This could help to provide a roadmap to designing and modifying starch structures that can regulate glucose production.
- For instance, there is a need to identify and characterize molecular structures of salivary amylase digestion products as these may impact on the rate of glucose release further down in the gut

Hypothetical hydrolysis products of Amylopectin by salivary amylase

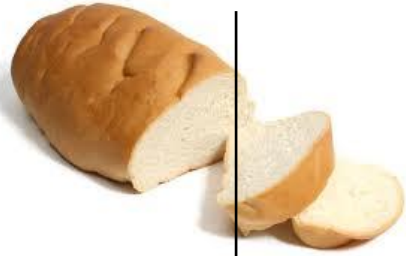




Are the extent of salivary amylase hydrolysis and products of processed starches from different botanical origins the same?

Will the modulation of starch gelatinisation by controlling the starch to moisture ratio during heat processing yield different salivary amylase digestion rates and products.

Starch



Starch:Water
1:0.7

Starch:Water
1:1

Starch:Water
1:1.5

Heat and hold at 95 °C (30 min)

Salivary amylase hydrolysis (30 seconds)

Determination of extent of salivary amylase digestion

Characterisation of the salivary amylase digestion products

Analysis of soluble saccharides

Molecular size distribution

Chain length distribution of starch polymers

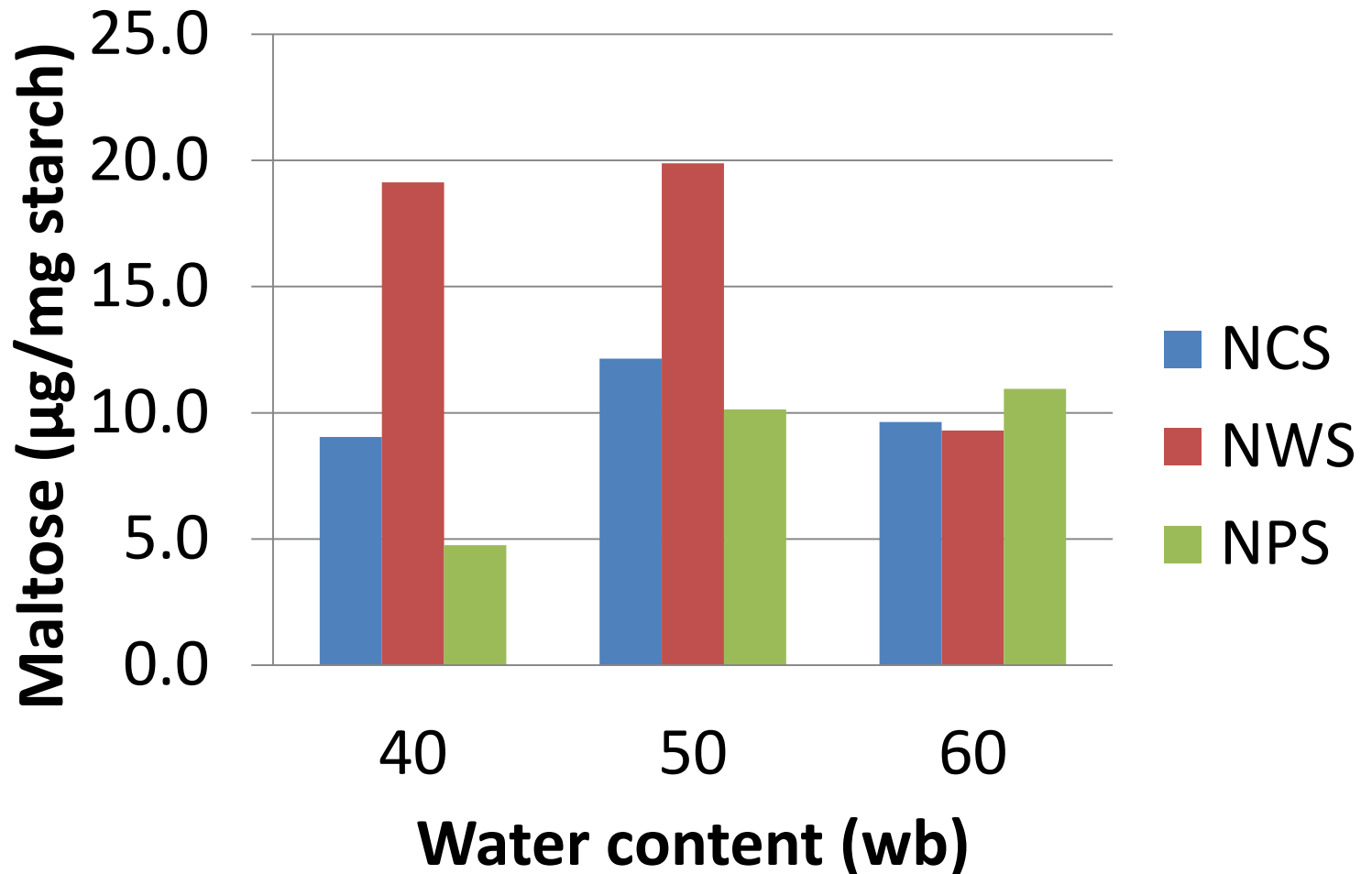




Summary of results



Sugar content from salivary amylase hydrolysis of starches
(30 s)



NCS = Normal Corn Starch, NWS = Normal Wheat Starch, NPS = Normal Potato Starch

Conclusions

- Moisture content had significant influence on starch paste hydrolysis by salivary amylase
- Extent of salivary amylase hydrolysis differed between cooked starches from different botanical origin
- Pending:
 - Characterisation of products from salivary amylase hydrolysis of starches cooked in limited water
 - Characterisation of molecular structures of starch polymers from the starches used in this study

A serene sunset scene over a body of water. The sky is filled with soft, wispy clouds in shades of blue, orange, and yellow. The sun is low on the horizon, casting a warm glow. In the foreground, several palm trees are silhouetted against the bright sky. The water in the foreground reflects the colors of the sunset.

Thank you