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Regular fat dairy products and type 2 diabetes

The role of dietary fats and their food sources

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Conflict of interest regarding this presentation:

I have no conflict of interest to report in relation to this presentation.

Background

- The prevalence of diabetes increases and it is of great concern to identify modifiable life style factors that may affect the incidence of type 2 diabetes.

- Dietary fats could affect glucose metabolism and body weight, and may thereby have a crucial role in the development of type 2 diabetes.

- Recommendations regarding fat intake are mainly based on the adverse effects of saturated fat on blood lipids and cardiovascular disease.

- Studies on fat intake and incident type 2 diabetes are inconclusive (Schwab et al), but some studies have indicated that replacing saturated fat with monounsaturated and polyunsaturated fats might be favorable in the prevention of T2D.

Type of fat translated into fat sources

Plant sources of fat have been suggested to be a better choice than animal sources.

-Red meat and meat products show positive associations with risk of type 2 diabetes. (Micha et al)

-But epidemiological studies have indicated that **dairy products are protective** (Aune et al).

-**Fatty fish?**

?

=>**The importance of food sources of fat remains to be clarified.**

Aim

To examine intakes of main dietary fat sources, classified according to fat type and fat content, in relation to incident type 2 diabetes.

Methods

- Study sample: n=26 930, from the Malmö Diet and Cancer cohort, who were without prevalent diabetes at baseline

  45-74 y of age, 60% women

- 2 860 incident cases of type 2 diabetes 1991- 2009

- Cox proportional hazards regression model.
  Diabetes incidence in quintiles of energy adjusted food intakes.

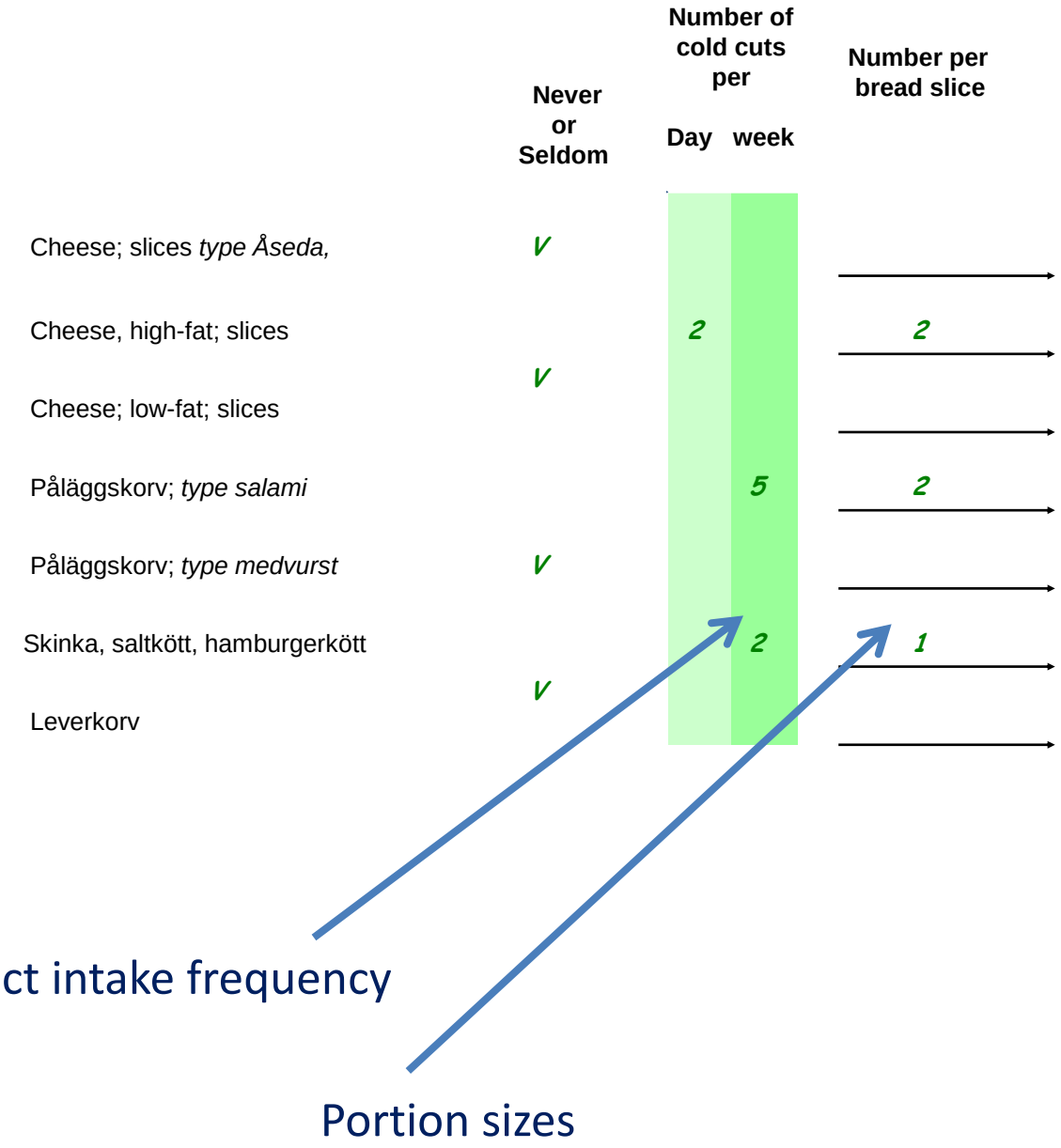
- Adjustments for age, sex, alcohol intake, smoking, leisure time physical activity, education and BMI.

- Additional adjustments for intakes of protein, fiber, calcium, vitamin D, magnesium , fruits and vegetables, and sugar sweetened beverages.

- Dietary data was obtained with a modified diet history method.

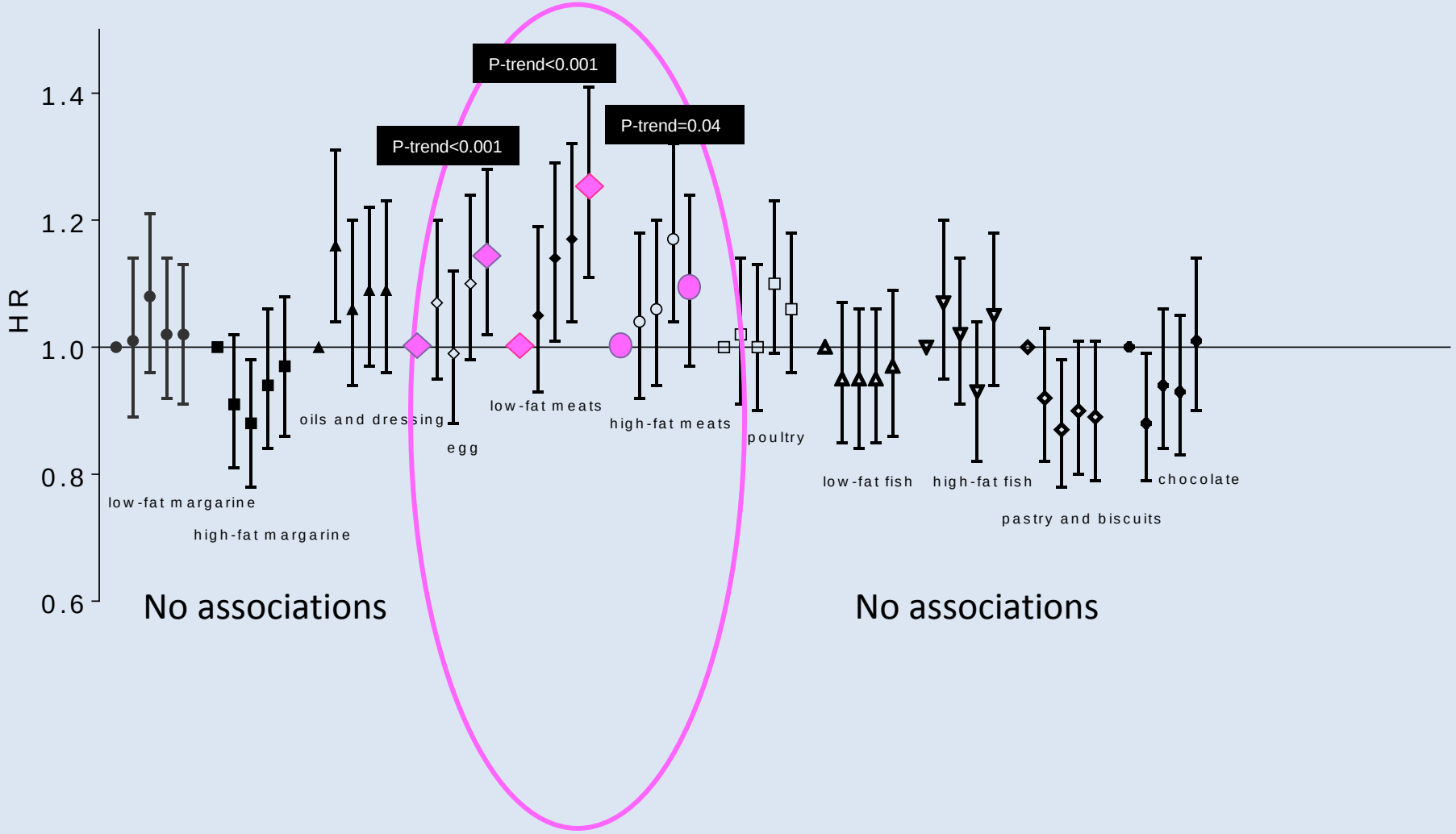
Diet assessment method

- 7- day record of cooked meals
- 168-item questionnaire
- Interview, 45 minutes



Results

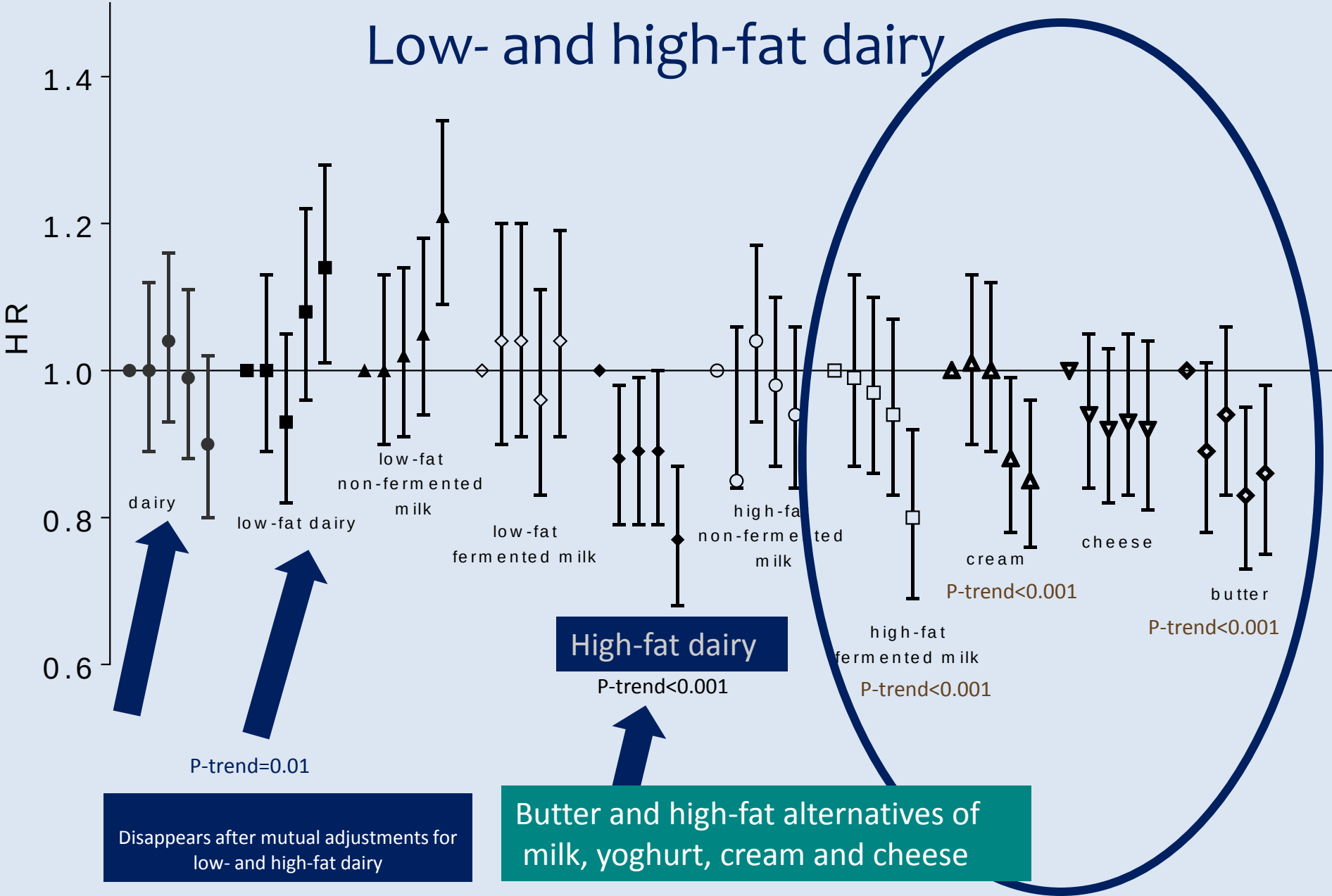
Dietary fat sources and incident type 2 diabetes



Adjusted for age, sex, season, diet method version, energy intake, alcohol intake, smoking, leisure time physical activity, education and BMI

Dietary fat sources and incident type 2 diabetes;

Low- and high-fat dairy



Comparison with other studies?

Two meta-analyses showed inverse associations between low-fat dairy and incident type 2 diabetes (Aune et al, Tong et al)

Which factors differ between the studies? Could they explain differing results?

-Different intake levels depending on study population?

Dairy is the most important fat source in Sweden

~30% of the total dietary fat (12 % in the U.S.A., where meat contributes more fat)

-Different categorization of high- and low-fat dairy?

Example: In our study was yoghurt with 3% fat classified as high-fat dairy

- Other qualities?

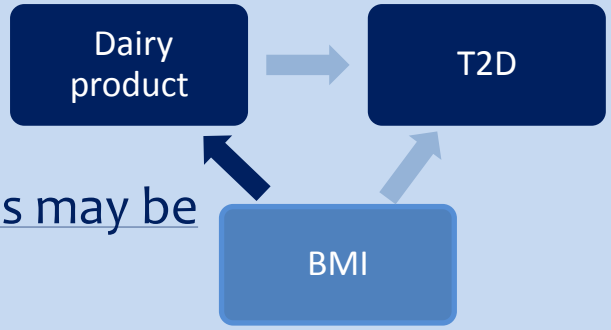
E.g. Sugar content?

-Different diet assessment methods?

Previous studies have mainly used diet data from FFQ.

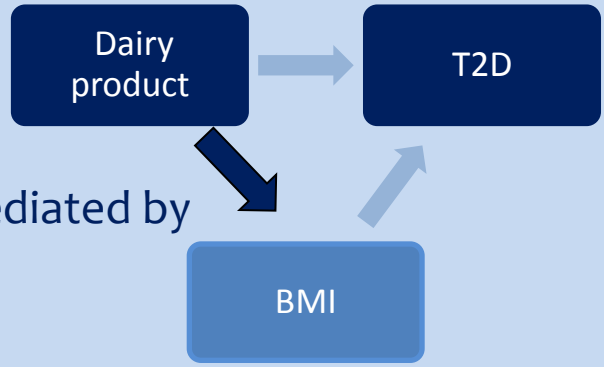
BMI adjustment?

1



→ Associations between dairy intake and type 2 diabetes may be confounded by BMI if we do not adjust.

2



Associations between dairy and type 2 diabetes may also be mediated by BMI.

→ less correct to adjust for BMI, because

true associations between dairy and type 2 diabetes may disappear.

Our results showing inverse associations between high-fat dairy intake and type 2 diabetes were even stronger without BMI adjustment.

Sensitivity analysis:

Exclusion of individuals reporting dietary change in the past (24%)

- Individuals identified to have unstable food habits.
  Their reported dietary intake may have less influence on developement of chronic disease, because it may reflect a shorter time period.

- Weaker associations, but similar tendencies (power issue?)

High intakes of high-fat fermented dairy products (P for trend =0.01) and cream (P for trend=0.01) remained significantly associated with decreased incidence of type 2 diabetes.

Possible explanations

- Part of a lifestyle pattern? Healthy? Traditional?

- Specific fatty acids mainly found in dairy products could have beneficial effects. Supported by studies showing inverse associations between biomarkers of dairy fat and insulin levels or T2D.

  -Short-chain or odd-chain saturated fatty acids? (e.g. butyrate or 15:0, 17:0)

  -Conjugated linoleic acid?

  -Trans-palmitoleic acid?

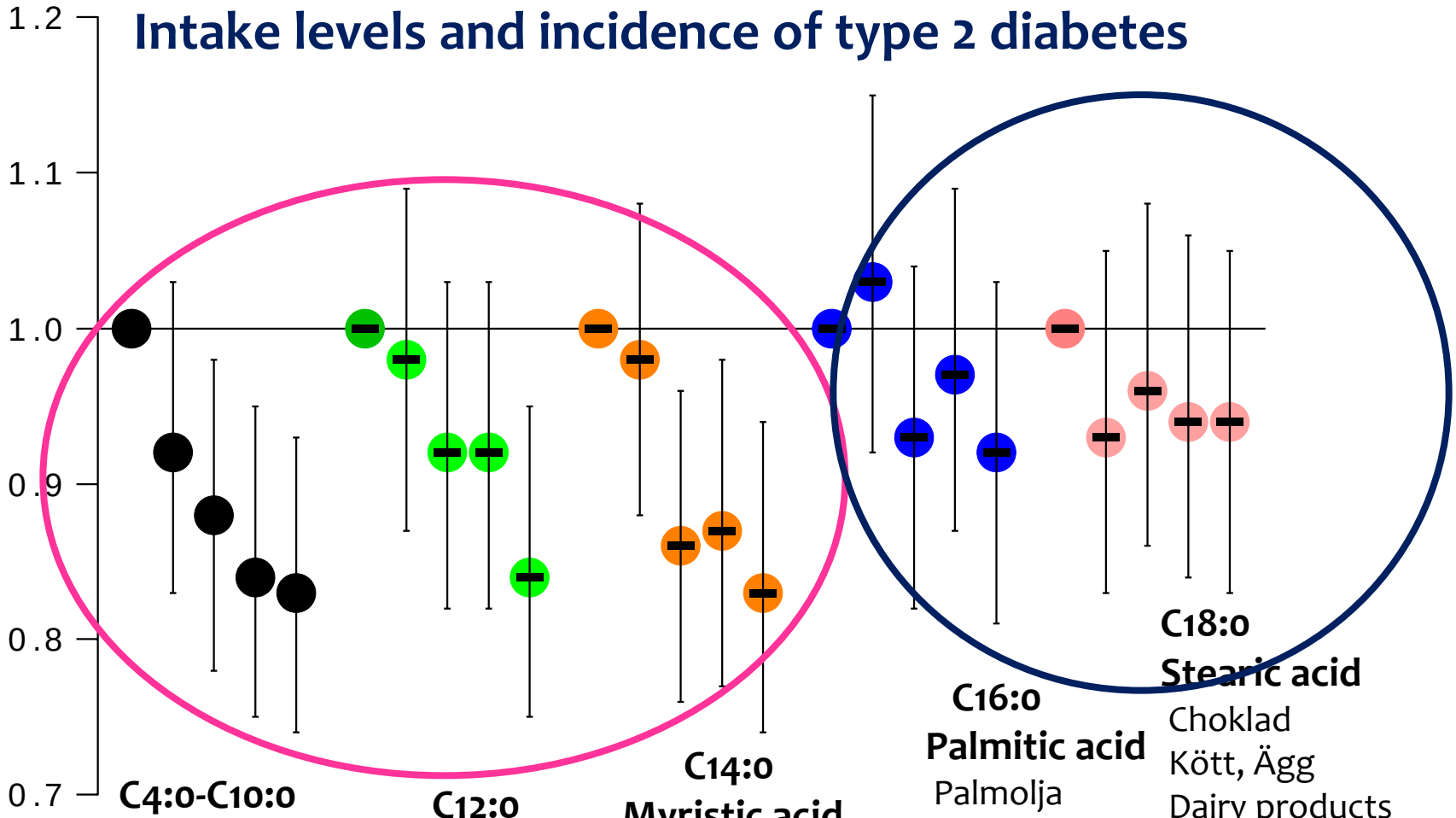
#15. Slide 15

- High fat dairy-satiety?

- Food specific qualities

  -Saturated fatty acids may have differing effects due to interaction with other food components

Different saturated fatty acids
Intake levels and incidence of type 2 diabetes



C4:0-C10:0
e.g. buturate
In dairy products
P-trend<0.001

C12:0
Lauric acid
Coconut oil
Dairy products
P-trend=0.003

C14:0
Myristic acid
Dairy products
P-trend<0.001

C16:0
Palmitic acid
Palmolja
Meat
Fish
Egg
Milk
P-trend=0.10

C18:0
Stearic acid
Choklad
Kött, Ägg
Dairy products
P-trend=0.36

Possible explanations

- Part of a lifestyle pattern? Healthy? Traditional?
- Specific fatty acids mainly found in dairy products could have beneficial effects. Supported by studies showing inverse associations between biomarkers of dairy fat and insulin levels or T2D.

  -Short-chain or odd-chain saturated fatty acids? (e.g. butyrate or 15:0, 17:0)

  -Conjugated linoleic acid?

  -Trans-palmitoleic acid?
- High fat dairy-satiety?
- Food specific qualities

  -Saturated fatty acids may have differing effects due to interaction with other food components

Does the type of high fat dairy product matter?

Food matrix tex milk fat globule membrane?

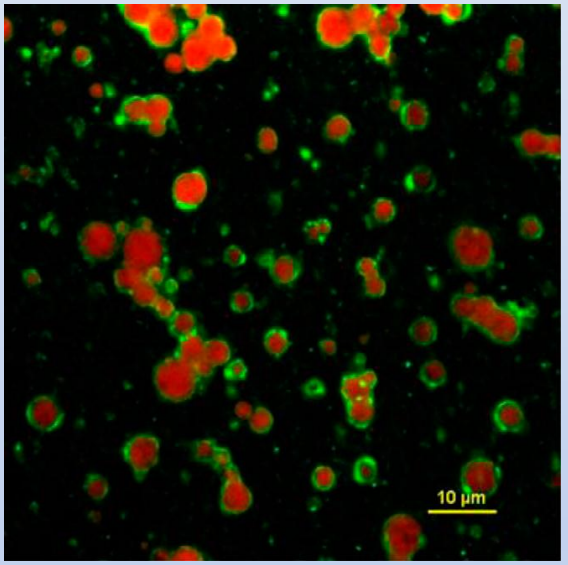
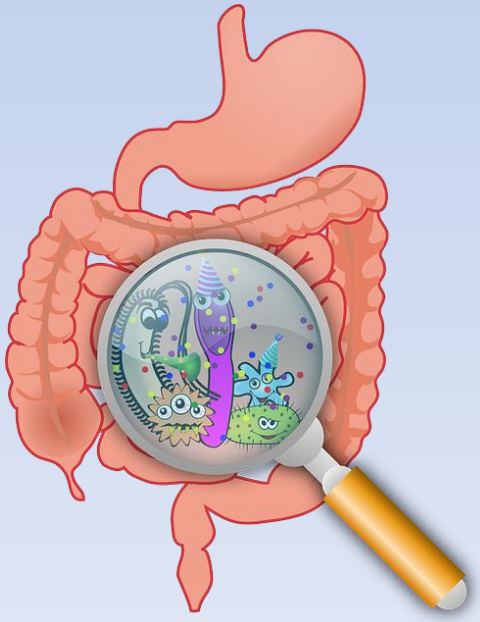


FIGURE 1 Confocal laser scanning microscopy micrograph of milk fat globules from whipping cream (40% fat) stained with Alexa WGA 488 (Invitrogen) and Nile red (Sigma-Aldrich) fluorescent dyes; fat appears red, and milk fat globule membrane appears green. Images were captured at magnification 32.58 with an objective lens 360. Scale bar = 10 mm. Rosqvist et al. Am J Clin Nutr 2015

Fermentation?



Dietary habits

Extremely complex exposure!

⟶ Difficult to isolate the effect of one nutrient

⟶ Must be taken into account when interpreting results.

Dietary pattern

- We do not eat nutrients or single foods, but a combination.
- Factor analysis to obtain food patterns.
- Consumption of 33 food groups was reduced into factors representing dietary patterns.

Dietary pattern 1

Mainly characterized by high intake of **fiber-rich bread**, but also by high intakes of **breakfast cereals, fruits, vegetables, fish** and **low-fat yoghurt**.

	Women	Men
Type 2 diabetes	↓	↓
Coronary event	↓	↓
Stroke	+-0	↓
Weight change	+-0	↓ less pronounced weight gain: 1kg/10y)

Associated with **less pronounced weight gain** and **decreased risk of type 2 diabetes and cardiovascular disease**

Conclusions

1. The decreased risk at high intakes of high-fat dairy products, but not of low-fat dairy products, indicate that dairy fat, at least partly, explains observed protective associations between dairy intake and T2D.

2. Diets including low or high-fat dairy products may have favorable or unfavorable properties with regard to cardiometabolic disease, partly depending on other qualities of the dairy products and the overall dietary patterns.

3. Our observations contribute to clarifying previous findings regarding dietary fats and their food sources in relation to T2D.

Thank you for listening!

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