

# PROTEIN CONTAINING PREMEALS FOR PATIENTS WITH METABOLIC SYNDROME AND TYPE 2 DIABETES

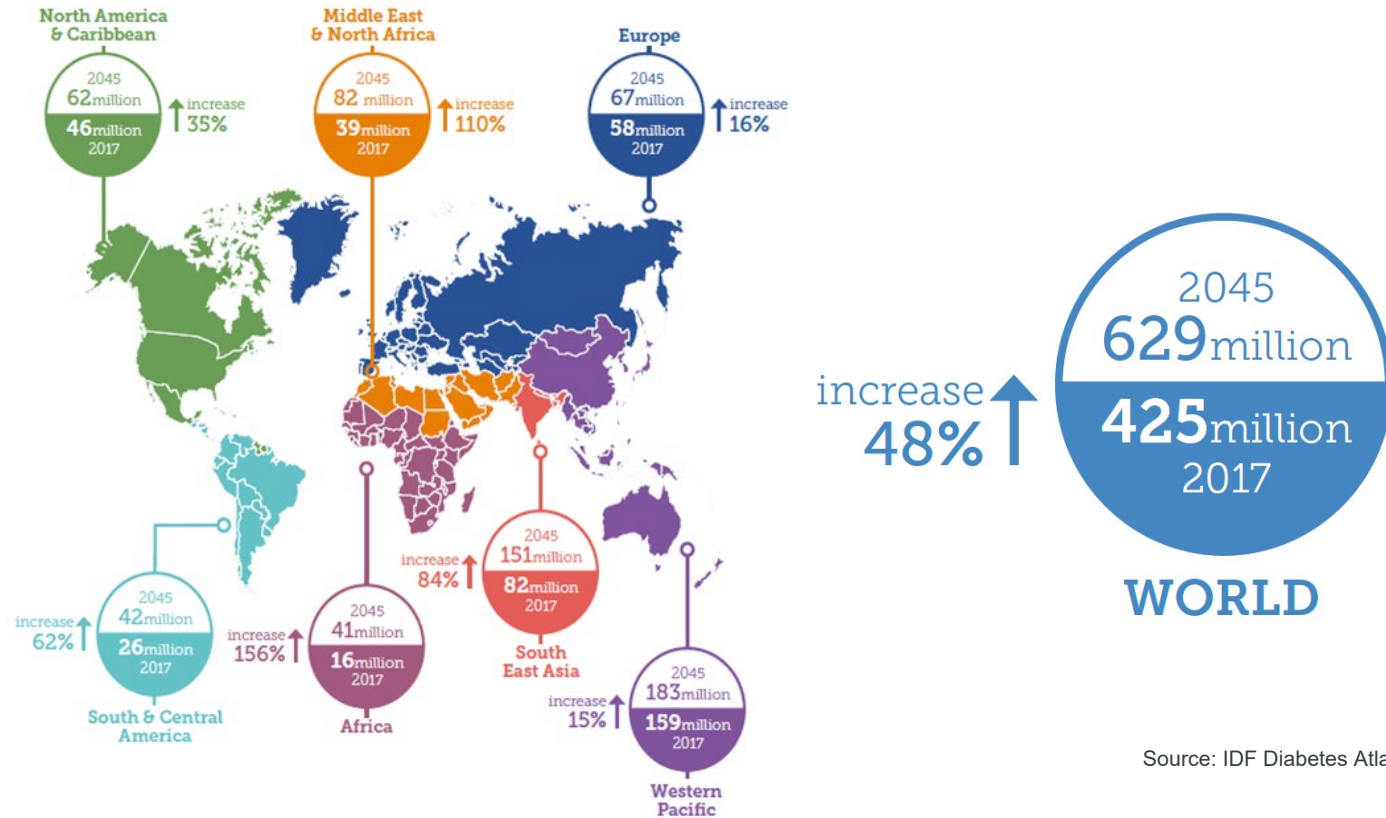
Ann Bjørnshave

DairyResearch Day 2019

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# PREVALENCE OF DIABETES WORLDWIDE



Source: IDF Diabetes Atlas, 8 ed.

# DEFINITION TYPE 2 DIABETES

Multi-factional disease:

- Hyperglycaemia
- Dysfunction of  $\alpha$ - and  $\beta$ -cells (bihormonal)
- Insulin resistance

Diagnostic criteria:

- Hb1Ac  $\geq$  48 mmol/ mol

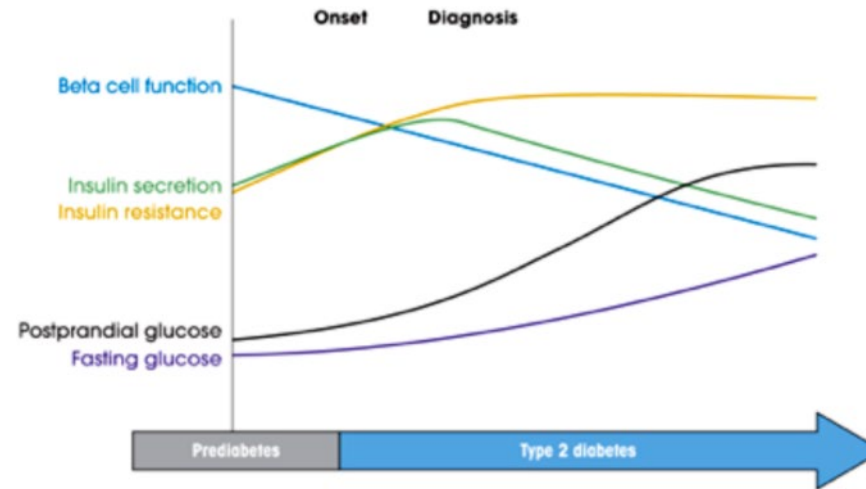


Figure: medscape.org

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# DEFINITION OF METABOLIC SYNDROME

Worldwide:  
Women: 34 %  
Men: 29 %

Cluster of risk factors (IDF definition):

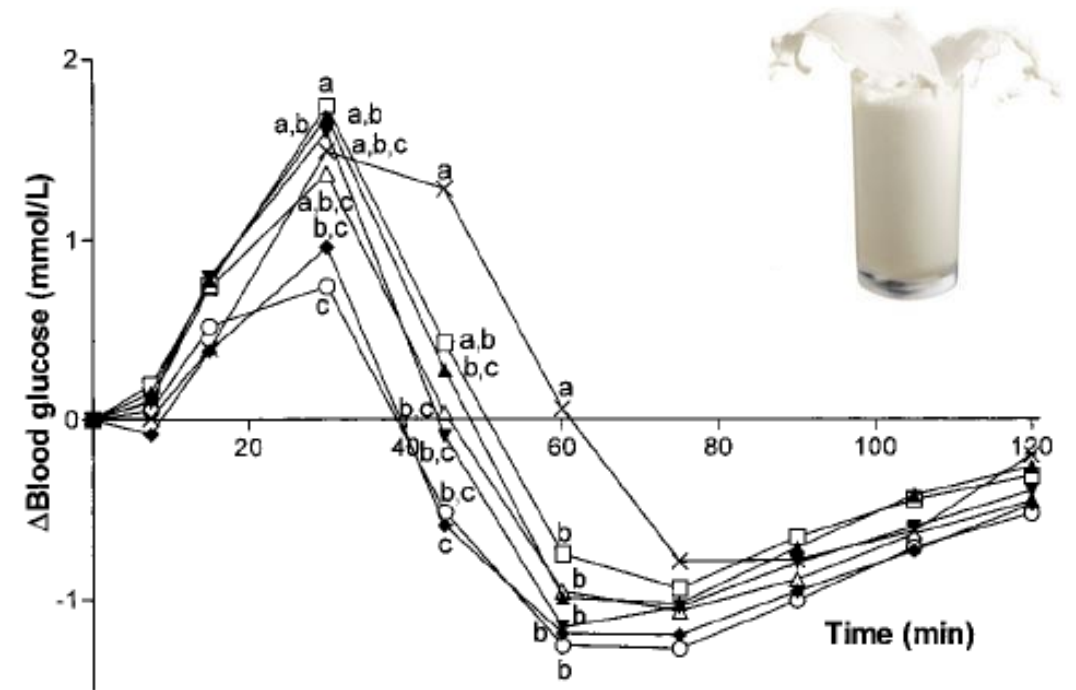
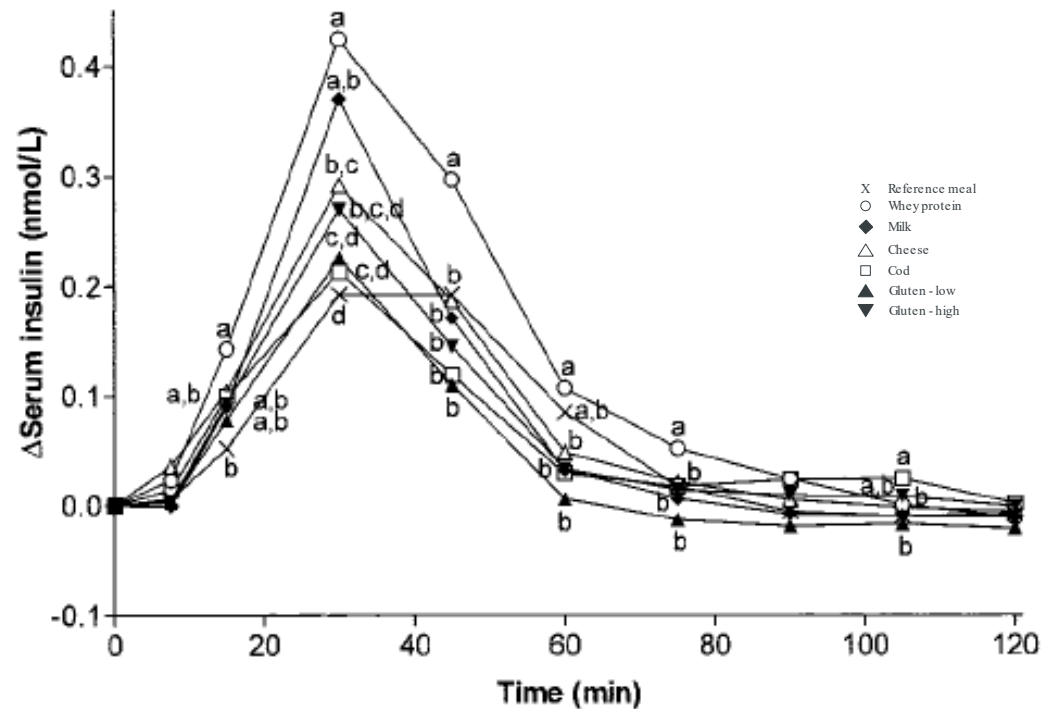
Measure	Cut points
Elevated waist circumference <sup>1</sup>	♀ ≥ 80cm ♂ ≥ 94cm
<i>Plus ≥2 of the criteria below</i>	
Elevated triglycerides <sup>2</sup>	≥ 1.7 mmol/L
Reduced HDL cholesterol <sup>2</sup>	♀ < 1.3 mmol/L ♂ < 1.0 mmol/L
Elevated blood pressure <sup>2</sup>	Systolic ≥ 130 and/or diastolic ≥ 85 mm Hg
Elevated fasting glucose <sup>2</sup>	≥ 5.55 mmol/L

<sup>1</sup> Waist circumference is population- and country specific. The given numbers represents Euroid.

<sup>2</sup> Use of drugs are an alternate indicator. Abbreviations: *HDL* high-density lipoproteins.

# INSULINOTROPIC EFFECT OF WHEY PROTEINS

Whey proteins have stronger insulinotropic effect than other protein sources in both in T2D patients, healthy individuals and also overweight and obese individuals



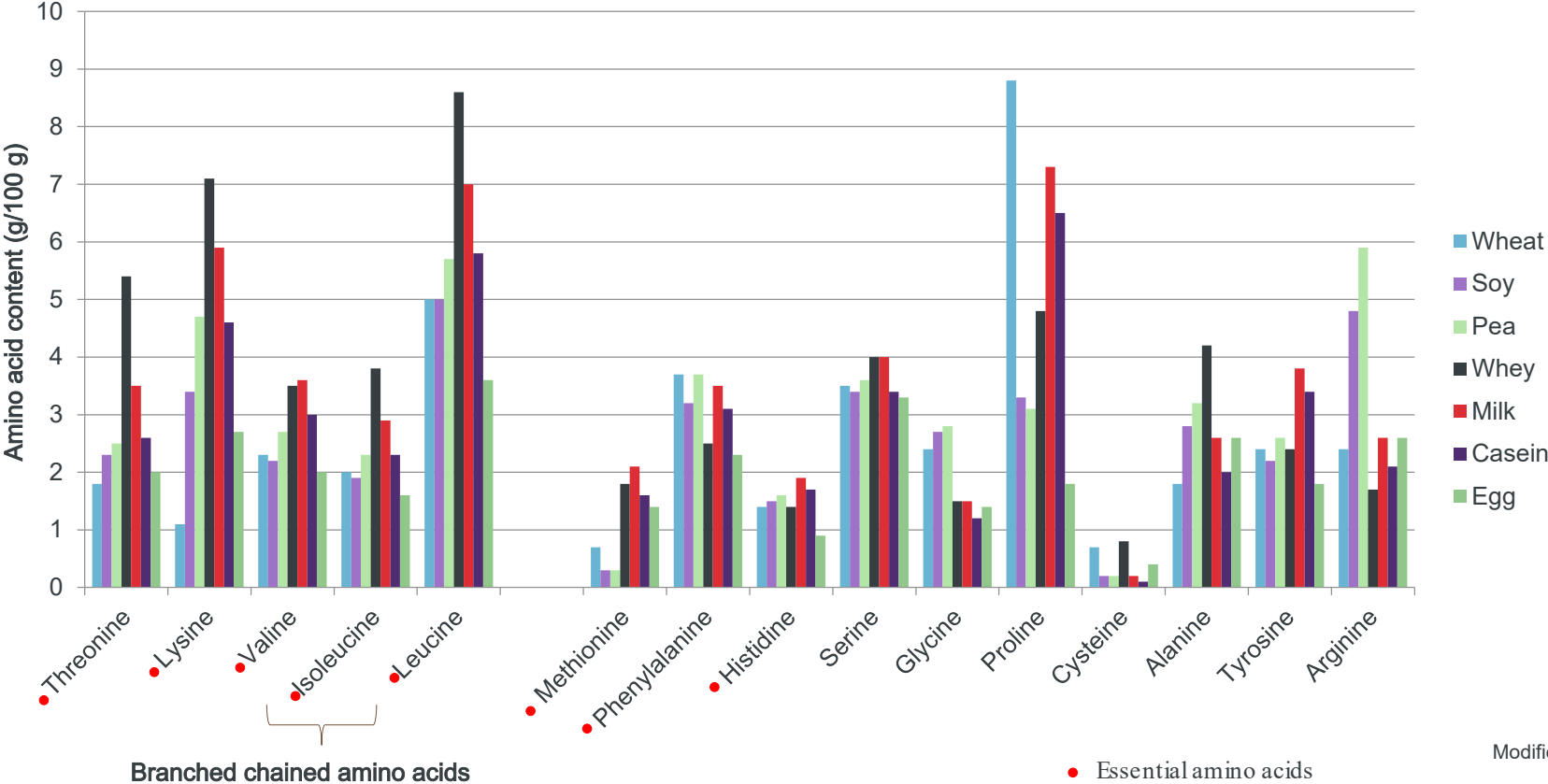
Nilsson et al. 2004 *Am J Clin Nutr*

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# AMINO ACID COMPOSITION IN WHEY



Modified from Gorisser 2018, *Amino Acids*

## The Staub-Traugott effect:

‣ In normal people, a drop in blood glucose that follows a second oral dose of glucose given 30 min or so after the first

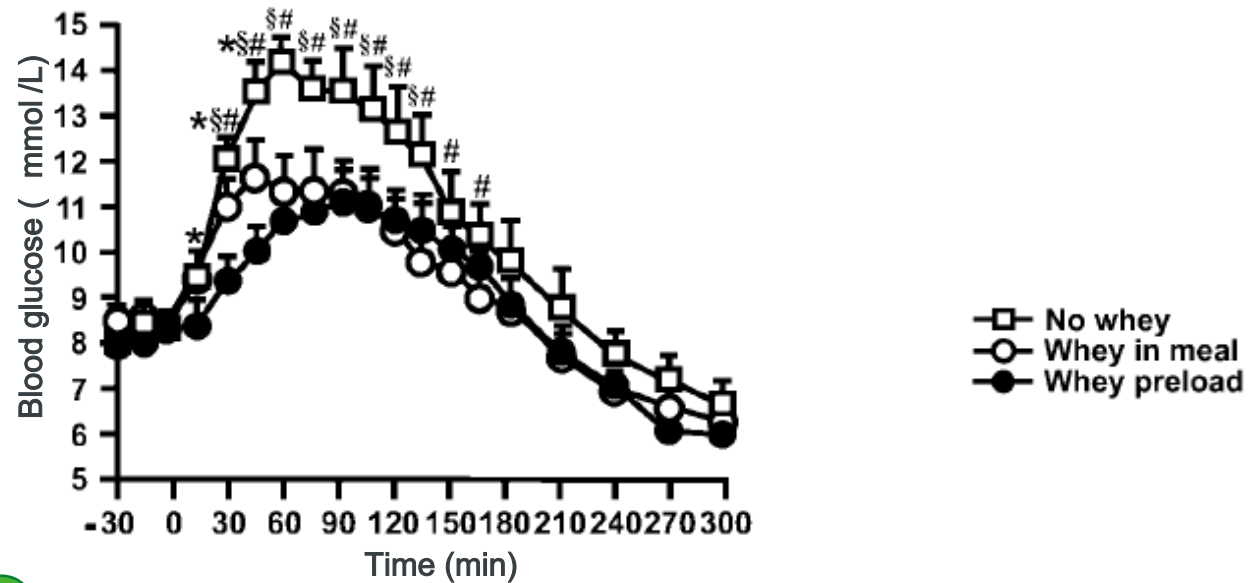


Staub, 1920  
Traugott, 1922



# PREMEAL OF WHEY PROTEINS INSULINOTROPIC EFFECT

A premeal intake of whey protein reduce blood glucose more than the same amount as a part of a carbohydrate meal.

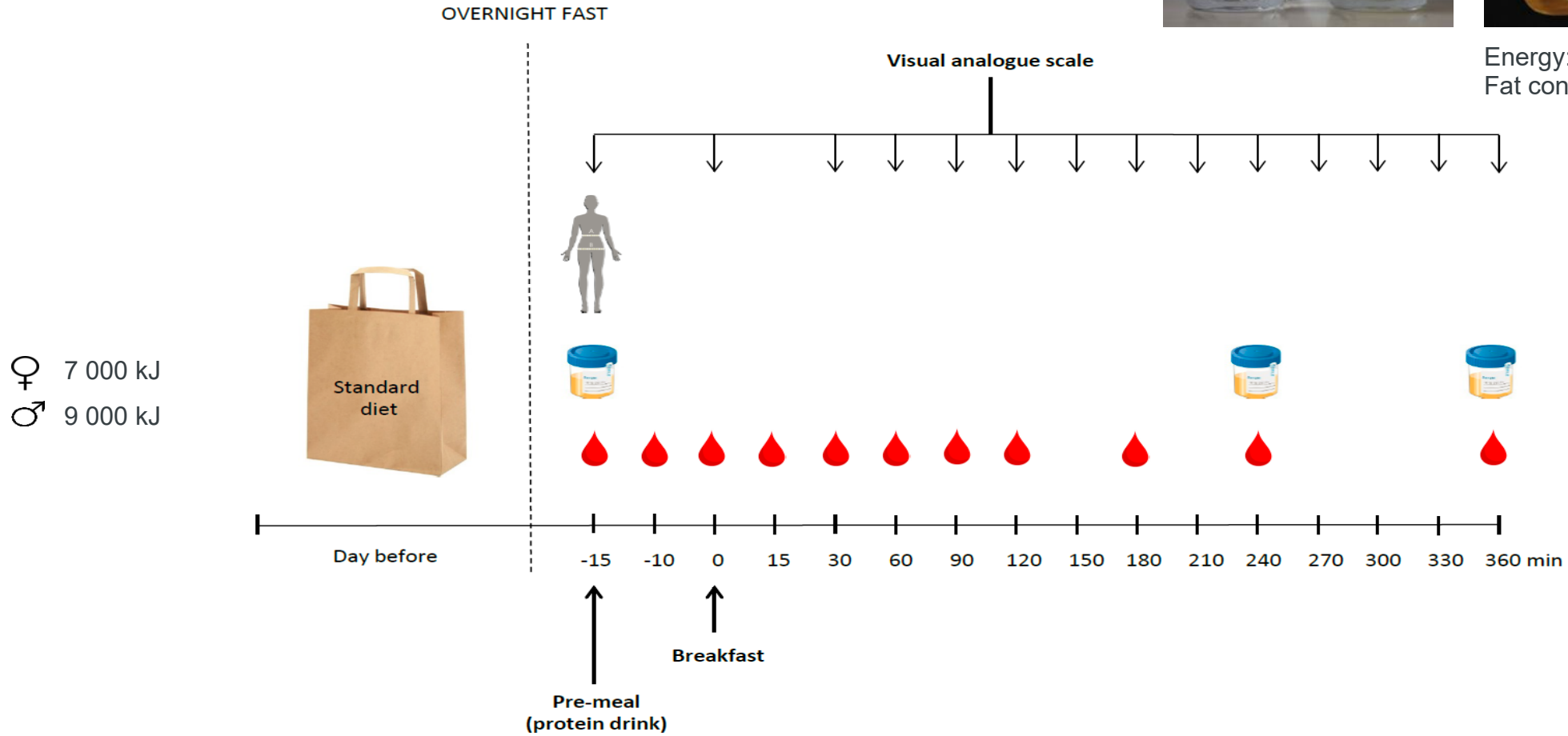


Subjects: Type 2 diabetes (n=8)  
Study: Acute  
Dose: 55 g whey proteins

Ma et al. 2009, *Diabetes Care*



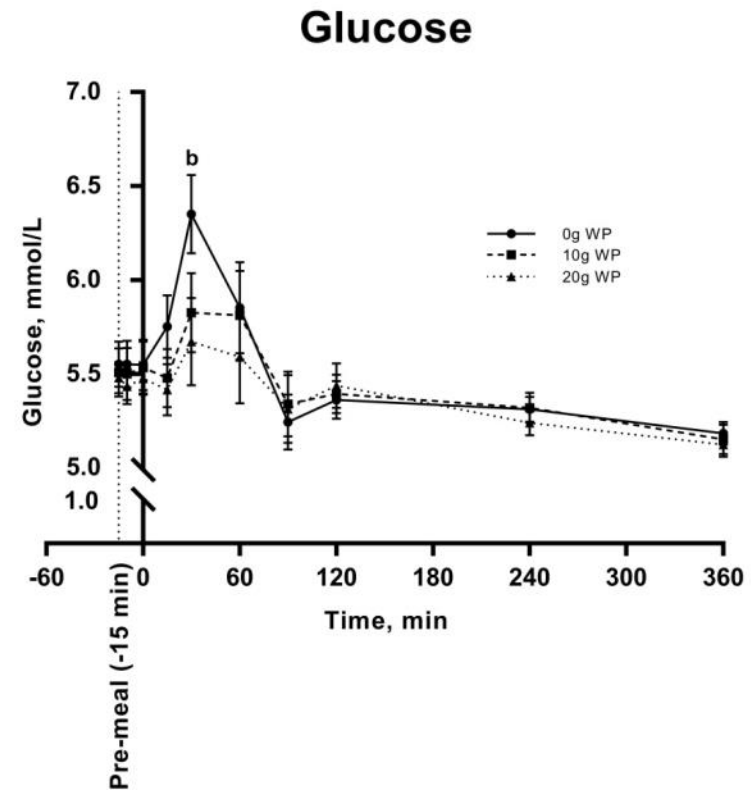
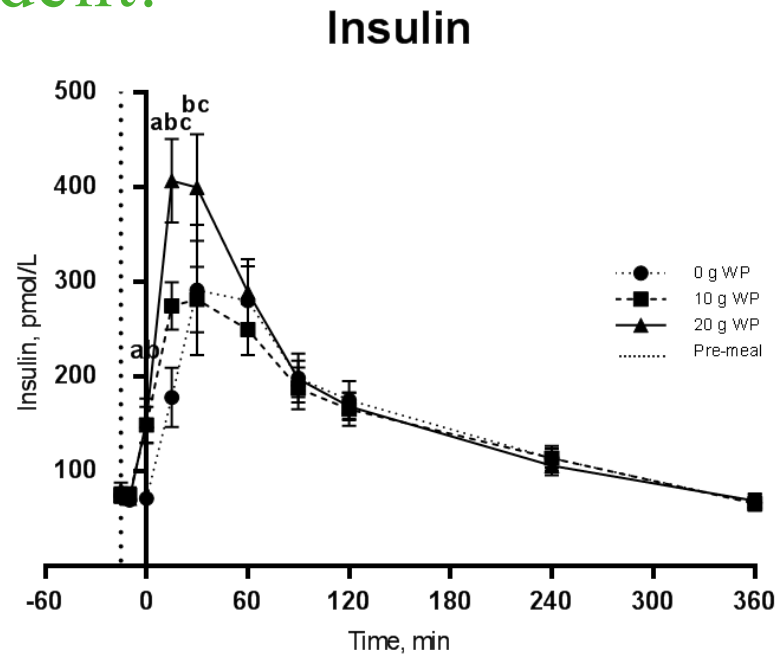
# METHODS



Energy: 3 900 kJ  
Fat content: 70 g

# DOSE

The effect of whey protein consumed as a pre-meal is insulinotropic and dose-dependent.



Subjects: Metabolic syndrome (n=20)  
Study: Acute randomised crossover design

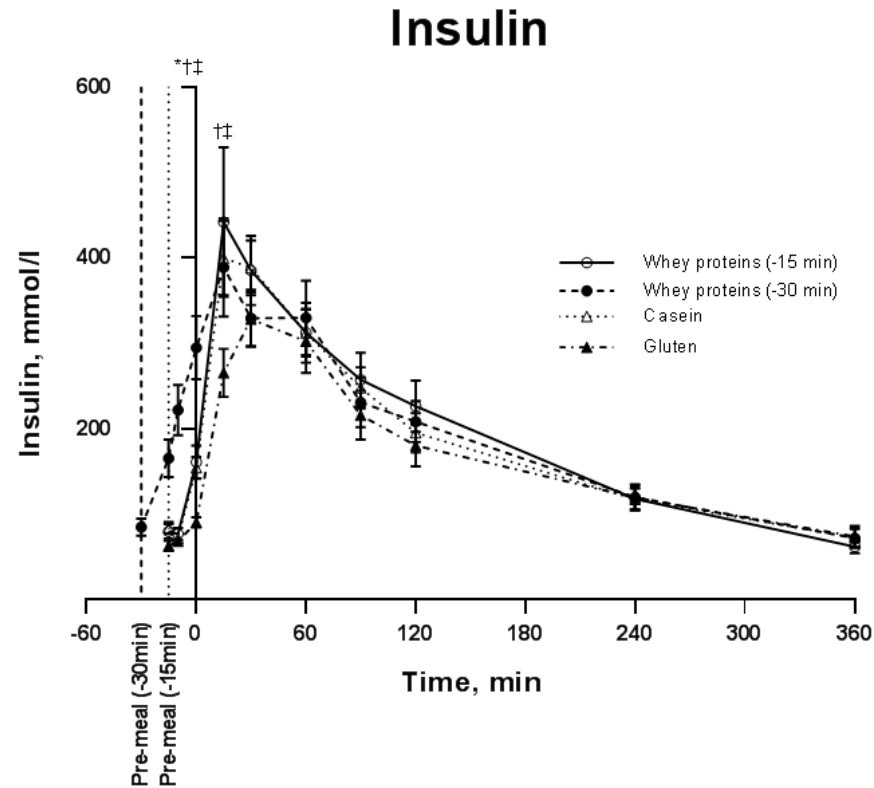
Bjørnshave et al. 2018 *Eur J Clin Nutr*

03/02/2020 17/05/  
2018

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# TIMING AND PROTEIN SOURCE

Whey proteins consumed 30 min before main meal more effectively increase insulin secretion. Likely, whey protein is better than gluten protein.



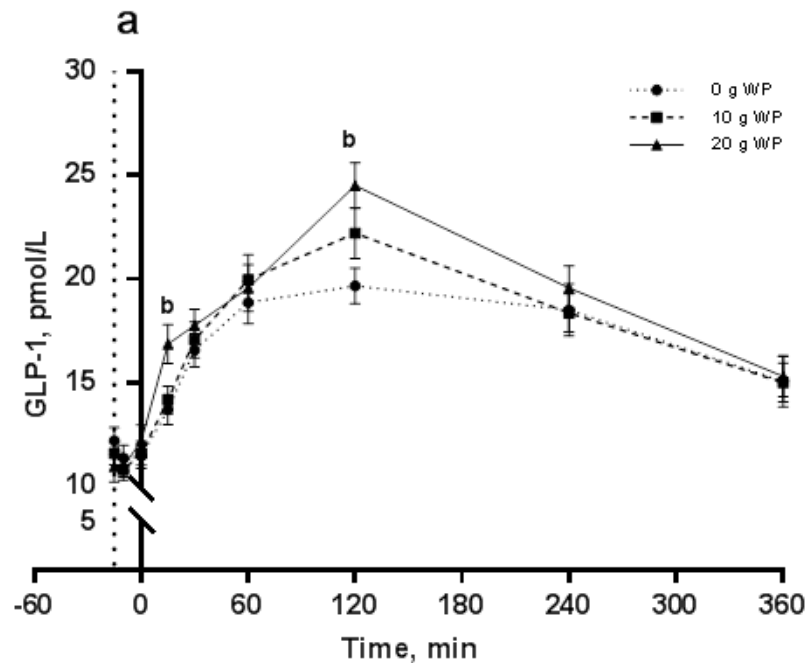
Subjects: Metabolic syndrome (n=16)  
Study: Acuterandomisedcrossover design

Bjørnshave et al. 2019 *J Clin Nutr*

# INCRETINS- GUT HORMONES

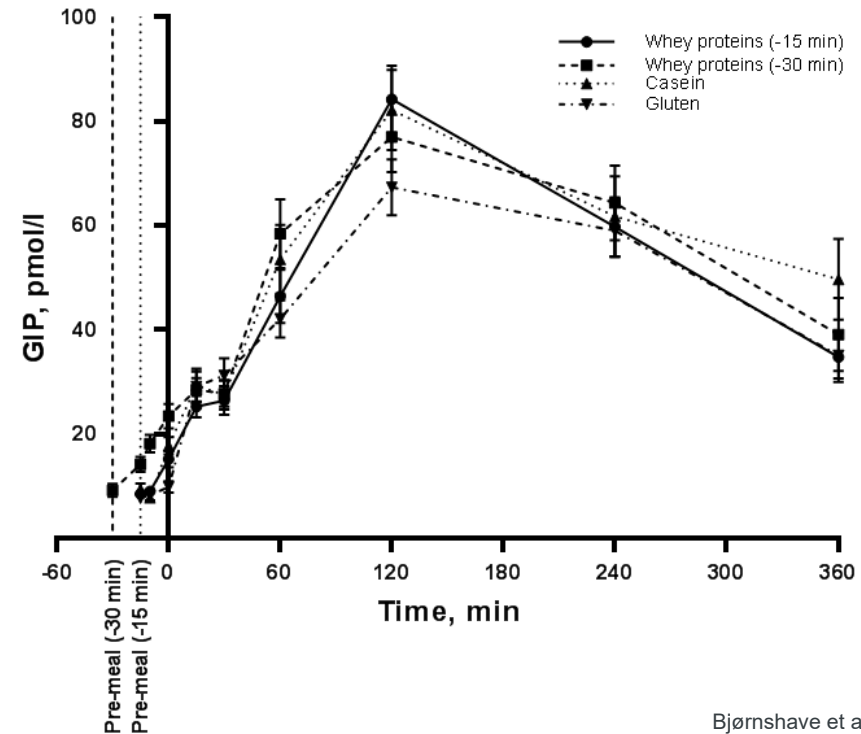
Incretin hormones may be involved in the increased insulin secretion.

Subjects: Metabolic syndrome (n=20)  
Study: Acute randomised crossover design



Bjørnshave et al. 2018, *EurJ Clin Nutr*

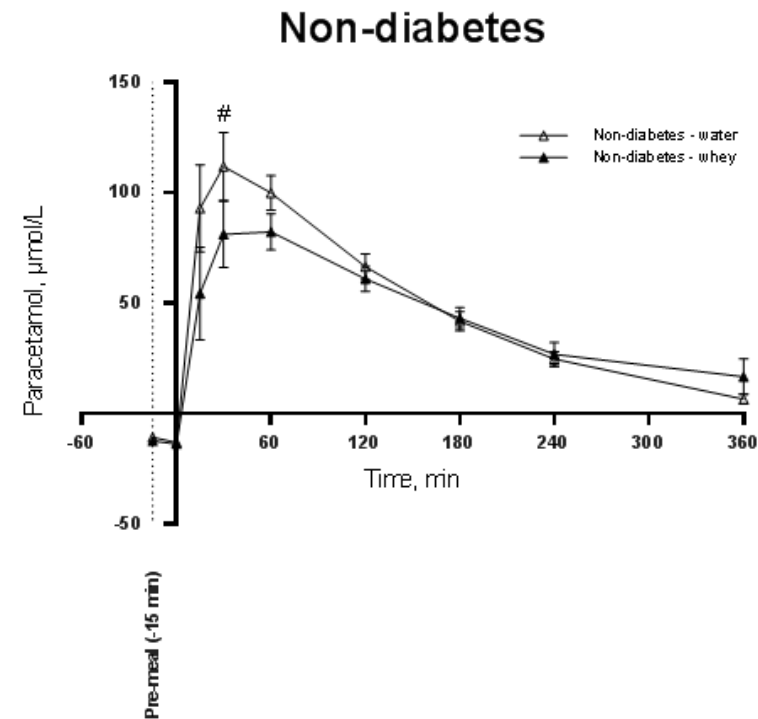
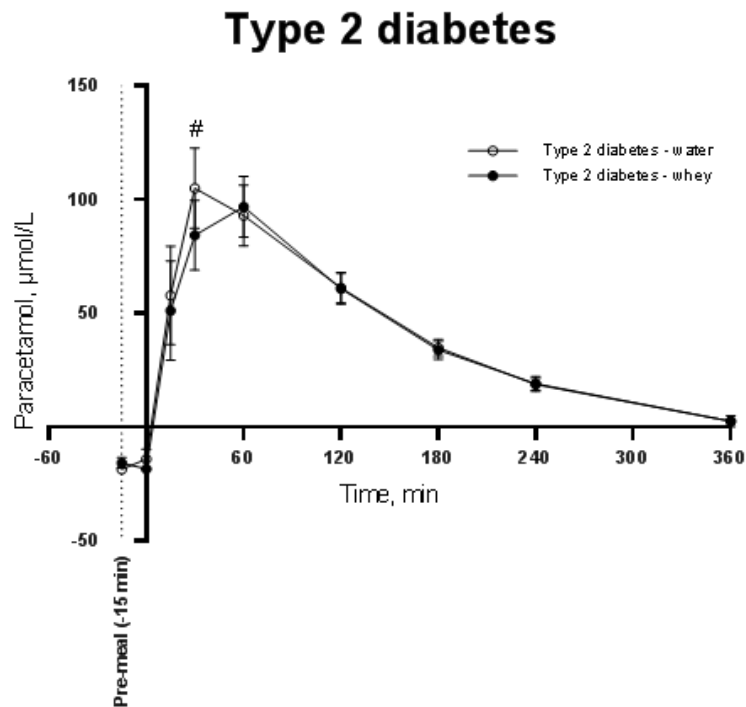
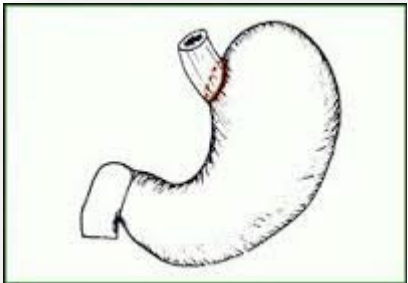
Subjects: Metabolic syndrome (n=16)  
Study: Acute randomised crossover design



Bjørnshave et al. 2019 *J Clin Nutr*

# GASTRIC EMPTYING

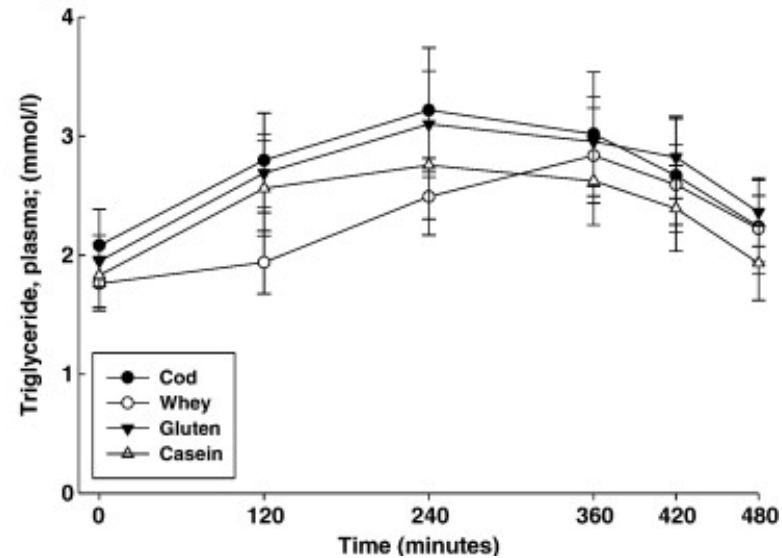
Whey proteins consumed 30 min before main meal more effectively increase insulin secretion. Likely, whey proteins are better than gluten protein.



Bjørnshave et al. 2018 *Nutrients*

# LIPIDS

45 g of whey proteins reduce the concentration of triglycerides in the blood



Subjects: Obese, nondiabetic  
Study: Acute, crossover design

Holmer-Jensen et al. 2013 *NutrRes*

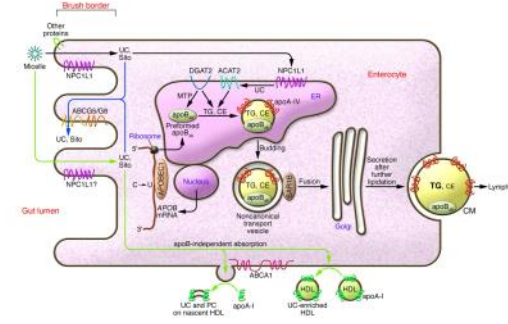
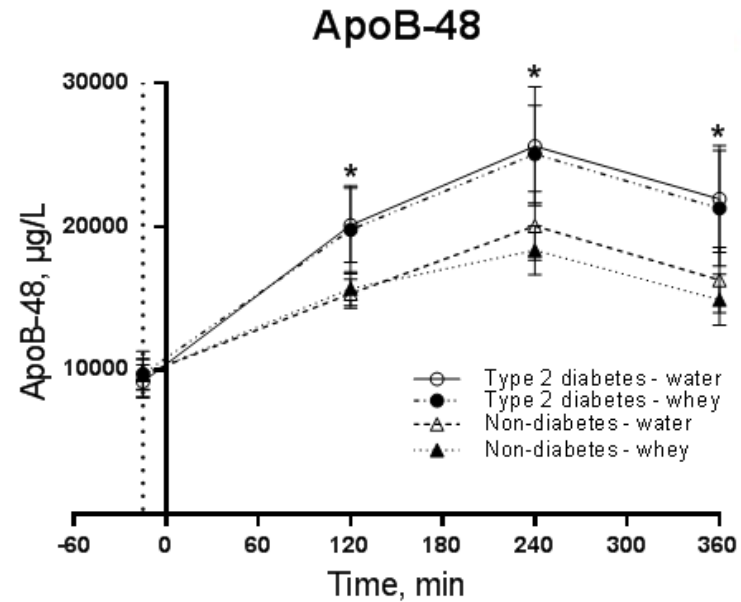
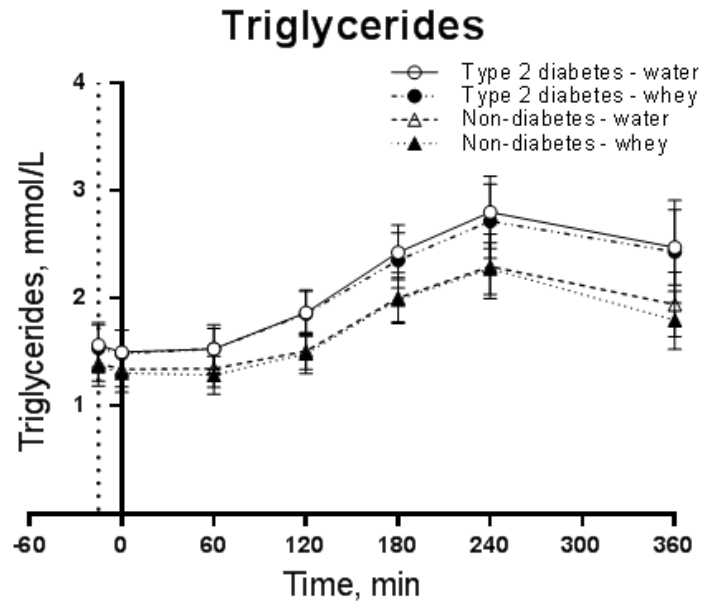
03/02/2020 17/05/  
2018

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# LIPIDS

Whey protein consumed as a premeal does not affect the concentration of triglycerides in the blood.



Subjects: Non-diabetic (n=12) and T2D (n=12)  
Study: Acute, crossover design

Bjørnshave et al. 2018 *Eur J Clin Nutr*

# TAKEHOMEMESSAGES



## Beneficial effects as whey proteins as a premeal:

- Insulinotropic effect: stimulation of insulin secretion and subsequently reduction of blood glucose.
- Incretin hormones: stimulation of gastric hormones (GLP and GIP) increasing the insulin secretion.
- Gastric emptying: delay the liquid phase of gastric emptying and contribute to control of blood glucose fluctuations after a meal.

## Factors influencing the beneficial effects of whey proteins as a premeal:

- Protein dose
- Protein quality
- Timing of the premeal relative to main meal.

**THANK YOU**