# Glycaemic and insulin response after germinated rye flakes RESEARCH ON THE POTENTIAL PROTECTIVE EFFECTS OF WHOLE GRAINS IN LATVIA

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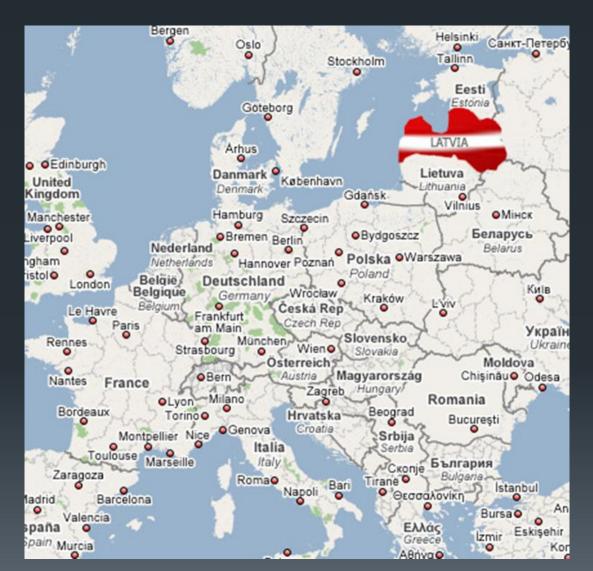


This research received financial support from the Norwegian Financial Mechanism 2009-2014 under Project Innovative approach to hull-less spring cereals and triticale use from human health perspective (NFI/R/2014/011).









### **RIGA**



# Dietary guidelines





- Plant based:
  - ✓ Vegetables & fruits
  - ✓ Whole grains



### Whole grains

The ratio of bran, germ and endosperm is the same as in the original grain kernel

### **Cereals**

- Wheats, including spelt
- Rye
- Triticale
- Oats, including hull-less or naked oats
- Barley, including hull-less or naked barley
- Rice, wild rice
- Maize (corn)
- Millet

### **Pseudocereals**

- Buckhweat
- Amaranth
- Quinoa



# Whole grains



### Reduce risk:

- metabolic syndrome
- obesity
- ✓ type 2 diabetes
- cardiovascular disease
- colorectal cancer



### Fiber intake

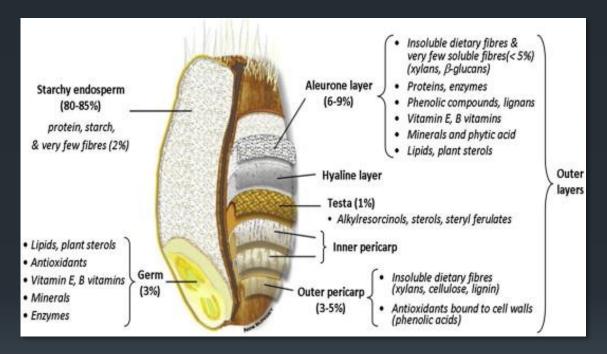


- Reduces risk:
  - cardiovascular disease & coronary heart disease
  - beta-glucan fiber lowers blood pressure
  - ✓ all-cause mortality (cereal fiber)

Threapleton DE et.al.. Dietary fibre intake and risk of cardiovascular disease: systematic review and meta-analysis. BMJ. 2013 Dec 19;347:f6879. Evans CE. et al.. Effects of dietary fibre type on blood pressure: a systematic review and meta-analysis of randomized controlled trials of healthy individuals. J Hypertens. 2015 May;33(5):897-911.

# Whole grains Dietary fiber complex





- Slower digestion
- Satiety/less overeating
- Lower kcal absorption
- Glycemic response
- Lower insulin responce
- ↓ Hol, LDH, TG
- Antioxidant activity
- Anti-inflammatory activity

#### Histological structure of wheat grain

Brouns F. et al. Does wheat make us fat and sick? J Cereal Sci. 2013; 58: 209–215.

Adlercreutz H. Lignans and human health // Critical Reviews in Clinical Laboratory Sciences, 2007; 5-6: 483-525.

Anderson J.W. et al. Health benefits of dietary fiber // Nutrition Reviews, 2009; 67(4): 188-205.

## Nontraditional cereals



- Triticale & Rye
  - weight management
  - blood sugar control
  - ✓ Hol
- Hull-less barley
  - metabolic syndrome, Hol
- Hull-less oat
  - ✓ ↓blood glucose, Hol



# Alkylresorcinol, lignan metabolites and vitamin D in prostate cancer patients

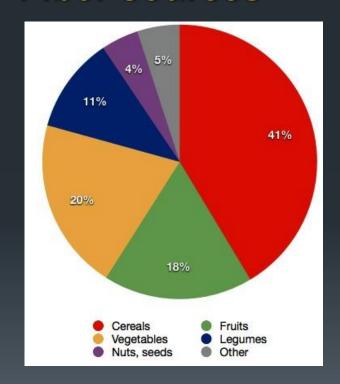
Laila Meija, PhD theses, 2014; Rīga Stradiņš University



#### **Herman Adlercreutz**

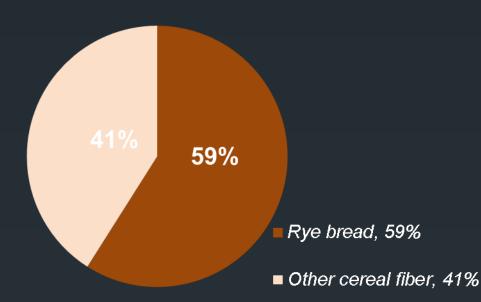
Institue for preventive Medicine, Nutrition and Cancer Folkhälsan Research Center, Biomedicum Helsinki University of Helsinki, Finland

### Fiber sources



### Cereal fiber sources





- Rye bread 28% of total fiber
  - ✓ men 61% of cereal fiber
  - ✓ women 56% of cereal fiber

### Other cereal fiber:

- ✓ wheat bran
- ✓ bran bread
- mixed flour bread



L. Meija, D.Erdmane, G.Ignace, I.Siksna, R.Joffe, V. Lietuvietis, A. Lejnieks. Dietary fiber intake and food sources in aged men and women in Latvia. 5th International Dietary Fibre Conference 2012. Book of Abstracts, 65

# Alkylresorcinols in Latvian and Finnish breads



Are Latvian breads comparable with other Baltic sea region breads? What is the amount of "real whole grain" in the diet in Latvia?

AR content in 9 Latvian and 11 Finnish soft breads (gas chromatography-mass spectrometry)

- Rye breads: 560 840 µg/g dry matter (DM)
- Mixed rye and wheat flour breads:
  - ✓  $500 700 \,\mu\text{g/g}$  DM in Finnish
  - ✓ 200 300 µg/g DM in Latvian
- White wheat breads: 25 to 30 μg/g DM

### Lignans in diet in Latvia

- Fiber cereals
- Cereals –bread
- Bread lignans?

# Lignan content in 9 Latvian and 11 Finnish soft breads (gas chromatography-mass spectrometry):

- Rye breads: 800 1400 μg/100g
- ✓ White bread with seeds: 3800-1000 µg/100g
- ✓ Mixed rye and wheat flour breads: 500 900 µg/100g
- ✓ White wheat breads: 85 to 100 µg/g100g
- Lignan intake 2782 μg/d
- Lignan sources:
  - ✓ Seed bread 31%
  - ✓ Rye bread 26%





# Dietary potential of new variety in Latvia originated hull-less oat "Stendes Emīlija"

- Breeding and investigation of crops
  - Dietary value
    - Beta –glucan
    - α-tocopherol
    - total phenolics
    - radical scavenging activity
- Producing breakfast cereals
- Clinical study: intervention study with oat flakes:
  - ✓ inflammatory bowel disease (n=40)
  - ✓ irritable bowel syndrome (n=33)
  - ✓ controls (n=25)

Establishment of a new scientific group for multi-branch research In Latvia for assessment of local cereal material on characteristics determining the dietary potential and use in prevention of chronic bowel diseases.

### Hull-less oat flakes 100g / 8 weeks



Naked oats Hulled oats

### Results



- 90% accepted taste
- 38% subjective improvement

- Antioksidants ↑ (p=0.02)
- Irritable bowel syndrome Mg介 (p=0.01)

Meija L., Bodnieks E., Ozola K.., Cauce V., Sondore L., Zute S., Stāka A. Potential nutritional benefits of hull-less oats in patients with inflammatory bowel diseases and irritated bowel syndrome // VII Latvian Gastroenterology Congress with International participation ABSTRACT BOOK. Rīga Stradiņš University, Collection of Scientific Papers 2015, 84

# Innovative approach to hull-less spring cereals and triticale use from human health perspective



- Hull-less oats
- Hull-less barley
- Triticale
- Germinated grains
- Non-germinated grains

- New breakfast cereal products
- Sensory attributes
- Glycemic and insulin index of different grain and germinated grain products

### **Nutritional values:**

✓ vitamins B2, E, C, niacin, flavonoids

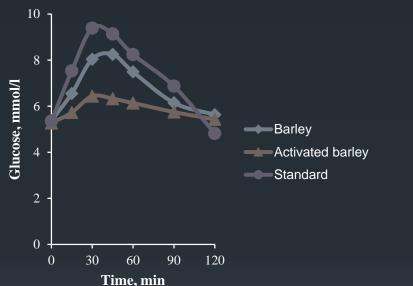
# Starch & Fiber

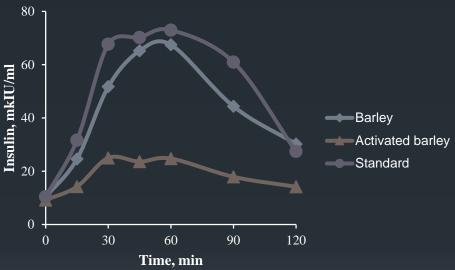
Flakes	Starch (%)	Resistant starch (g/100g)	Soluble fiber (g/100g)	Insoluble fiber (g/100g)
Wheat	55.5	0.0	2.4	9.7
Germinated wheat	49.2	1.1	2.8	6.8
Rye	44.8	0.2	4.6	12.9
Germinated rye	42,3	0.0	4.5	10.5
Triticale	47.3	0.3	1.7	7.3
Germinated triticale	51.6	0.2	2.9	10.0
Oats	51.4	0.0	2.5	6.3
Germinated hulless oats	45.2	0.0	5.5	9.4
Barley	53.4	0.5	4,3	4.4

Eurofins Lab.



# Barley / activated barlay



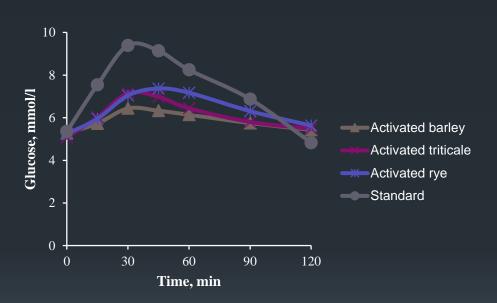


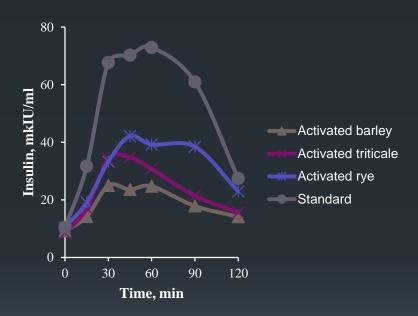
The research leading to these results has received funding from the Norwegian Financial Mechanism 2009-2014 under Project Innovative apporach to hull-less spring cereals and triticale use from human health perspective (NFI/R/2014/011).

G. Havensone, L. Meija, L. Balode, T. Kince, E. Straumite, A. Lejnieks. Glycaemic and insulin response after consuming barley and germinated hullless barley flakes. 2nd International conference «Nutrition and Health» Riga, Latvia 2016, Book of Abstracts, 64



# **Activated grains**





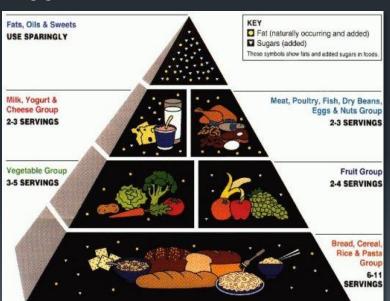
#### Unpublished data

### How much?



2011.

1992.







### Nordic Nutrition Recommendations

Integrating nutrition and physical activity









Fiber  $\geq 25 - 35 \text{ g/d}$ 

# Thank you for your attention!



