



Canola Oil Research Builds Science for Good Health

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Richardson Centre
for Functional Foods
and Nutraceuticals



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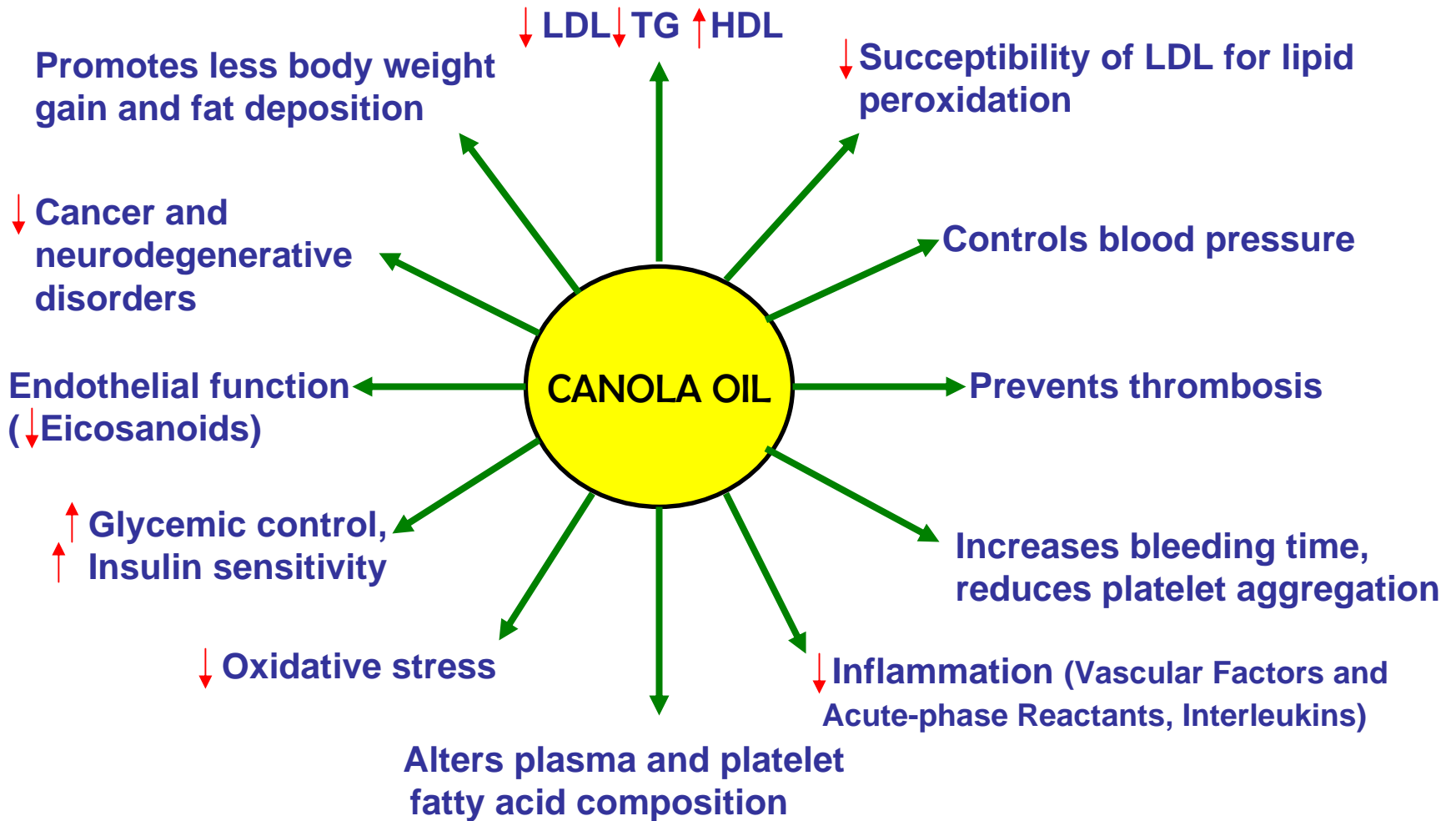


Canola Oil



- Important economic cultivar in Canada
- Leading global source of vegetable oil
- Approved for sale in Canada (1974) and in the US (1985),
- Approved for Generally Recognized as Safe (GRAS) status
by the FDA

Health benefits of canola oil



Composition of canola oil

Canola Oil



High in omega-3 fatty acids

High in monounsaturated fatty acids

High in plant sterols

Antioxidant vitamin E

Low in saturated fat

Unique fatty acid profile

Epidemiologic studies on health benefits of alpha linolenic acid (ALA)

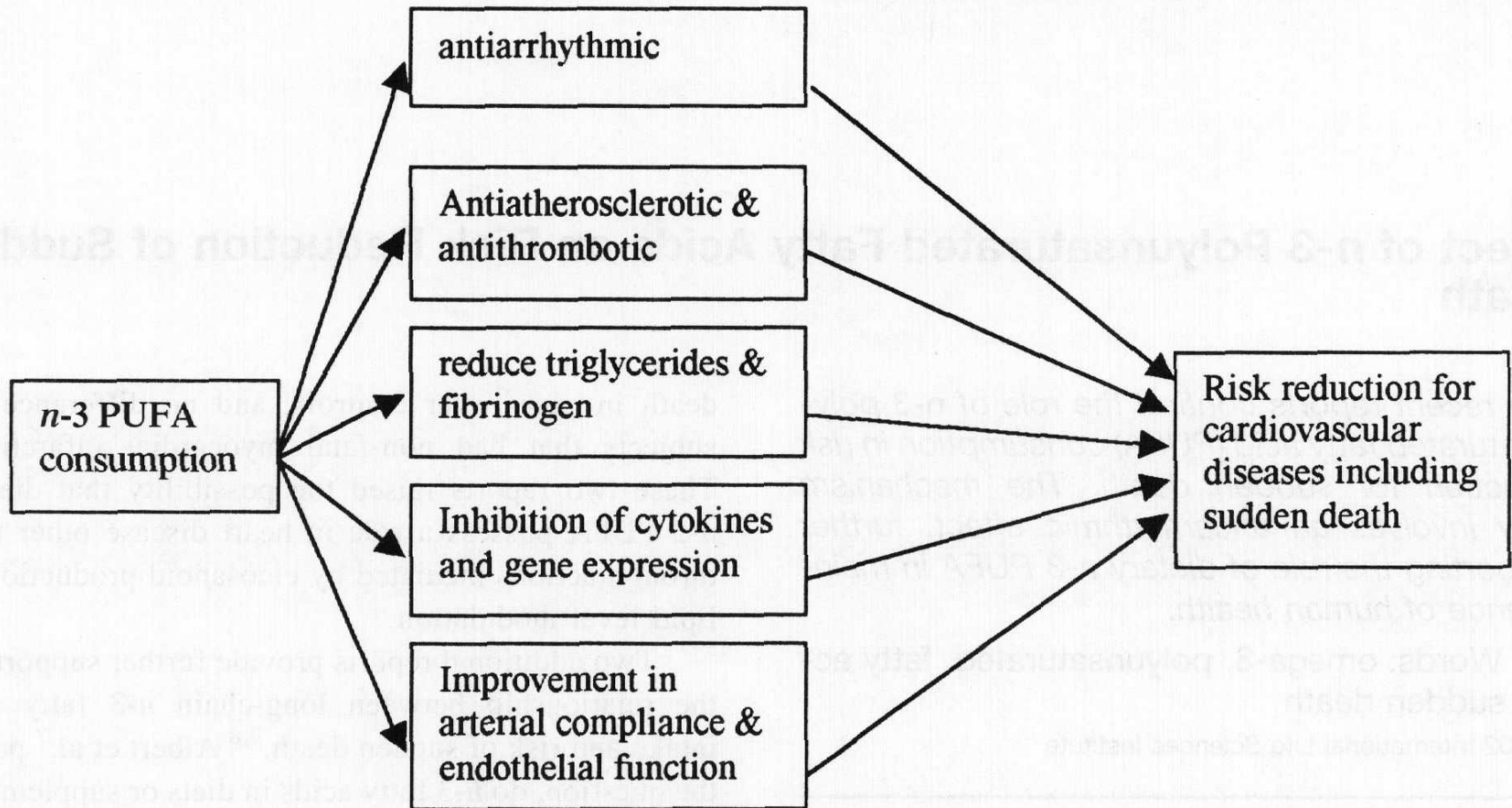
A recent study involving eleven eastern European countries showed that increases in ALA consumption were attributed to reducing CHD mortality (Zatonski et al., 2008).

ALA intake of 0.53 to 2.8 g/d reduced the risk of:

- cardiovascular disease events by 39% (Djousse et al., 2001),
- fatal ischemic heart disease by 45% (Hu et al., 1999),
- all-cause mortality by upper quintile of intake (Dolecek et al., 1992)

ALA intakes of 2.0 - 2.9 g/d reduced the risk of recurrent coronary events by 28%. Beneficial on cardiovascular events in post-myocardial infarct patients. (de Lorgeril et al., 1999).

Possible mechanisms of action by which omega-3 fatty acids may decrease CVD risk



Protective effects of monounsaturated fatty acid on chronic disease

American Heart Association (AHA) dietary guidelines recognize that dietary MUFA when substituted for saturated fatty acids reduce circulating LDL-C levels (NCEP Report).

MUFA favorably affect risk factors for CVD, including plasma lipids and lipoproteins, factors related to thrombogenesis, in vitro LDL oxidative susceptibility and insulin sensitivity and glycemic control.

Protective effects of monounsaturated fatty acids on chronic disease

MUFA decrease platelet aggregation, increase bleeding time, and increase fibrinolysis, thereby protecting against thrombogenesis.

Beneficial in preventing hypertension (Alonso et al., 2006).

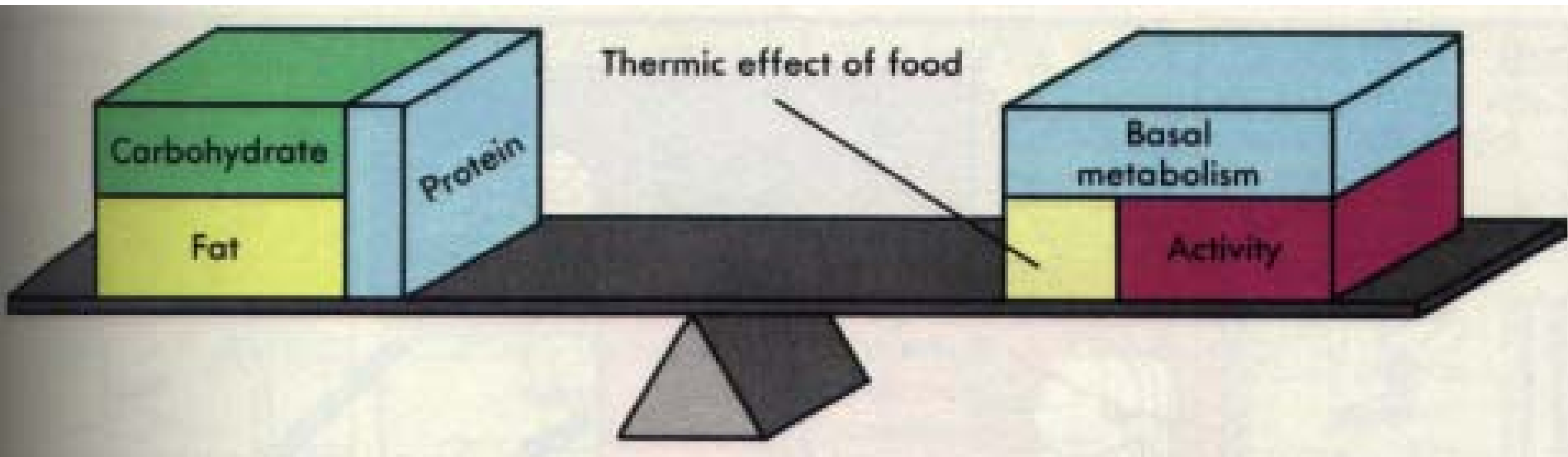
High-MUFA diets influence endothelial cells, improving vasomotor function and decreasing plasma levels of P-selectin, by decreasing LDL cholesterol levels (Perez - Jimenez et al., 2001)

Not all MUFAs are equal ...

- Not all MUFA have the same effect on plasma cholesterol levels and it has been found that olive oil has little to no effect on cholesterol lowering, as compared to PUFA or other MUFA such as low erucic rapeseed oil or high oleic sunflower oil

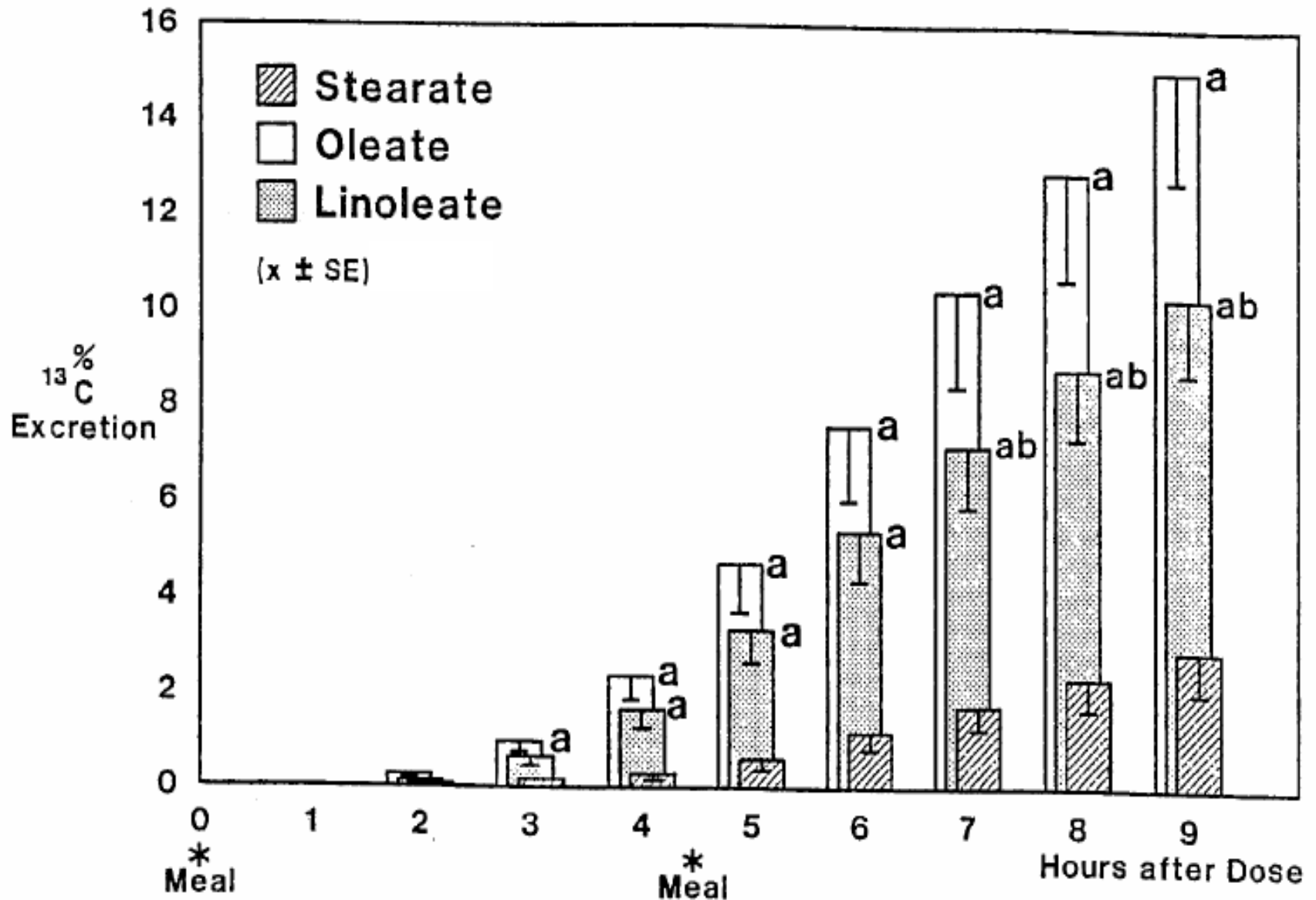
(Truswell 1998)

MUFAs & energy metabolism



Studies suggest that monounsaturated fats are oxidized for energy more rapidly than are saturated fatty acids, resulting in less fat accumulation

Comparative oxidation of ^{13}C -saturated, -monounsaturated and -polyunsaturated fats in healthy humans



Protective effects of plant sterols

Average daily plant sterol intake of adults
150 - 400 mg/day

major source:

- fat and oils (1g/100ml canola oil)
- bread and cereals
- fruits and vegetables
- nuts

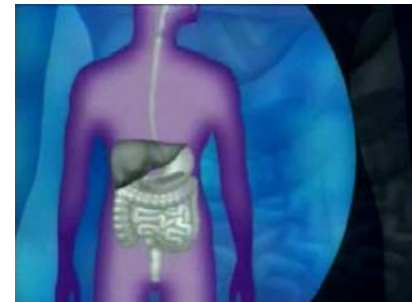
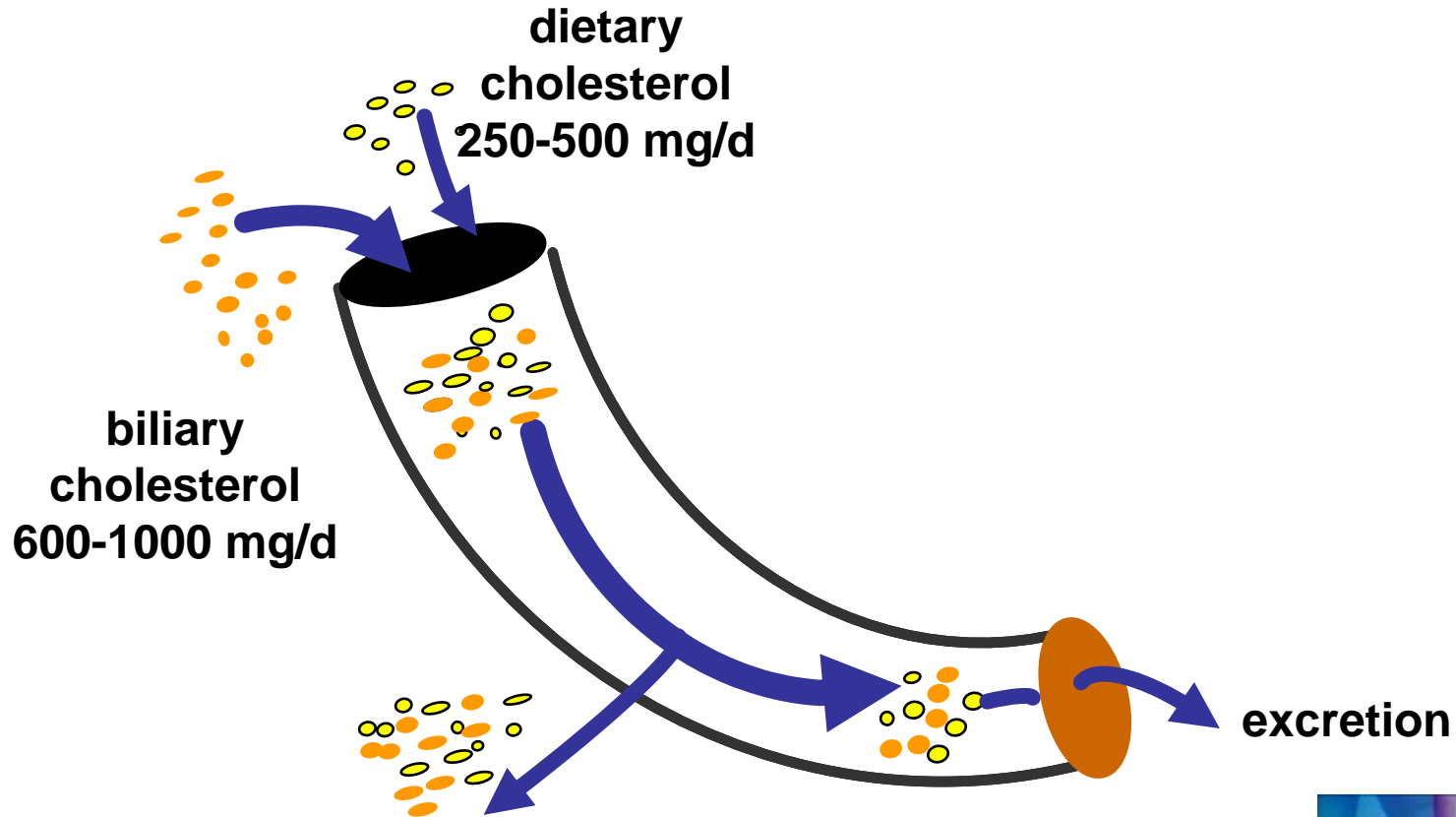


Recommended intake of
plant sterol-enriched foods
for a significant
cholesterol-lowering effect
2 g/day*



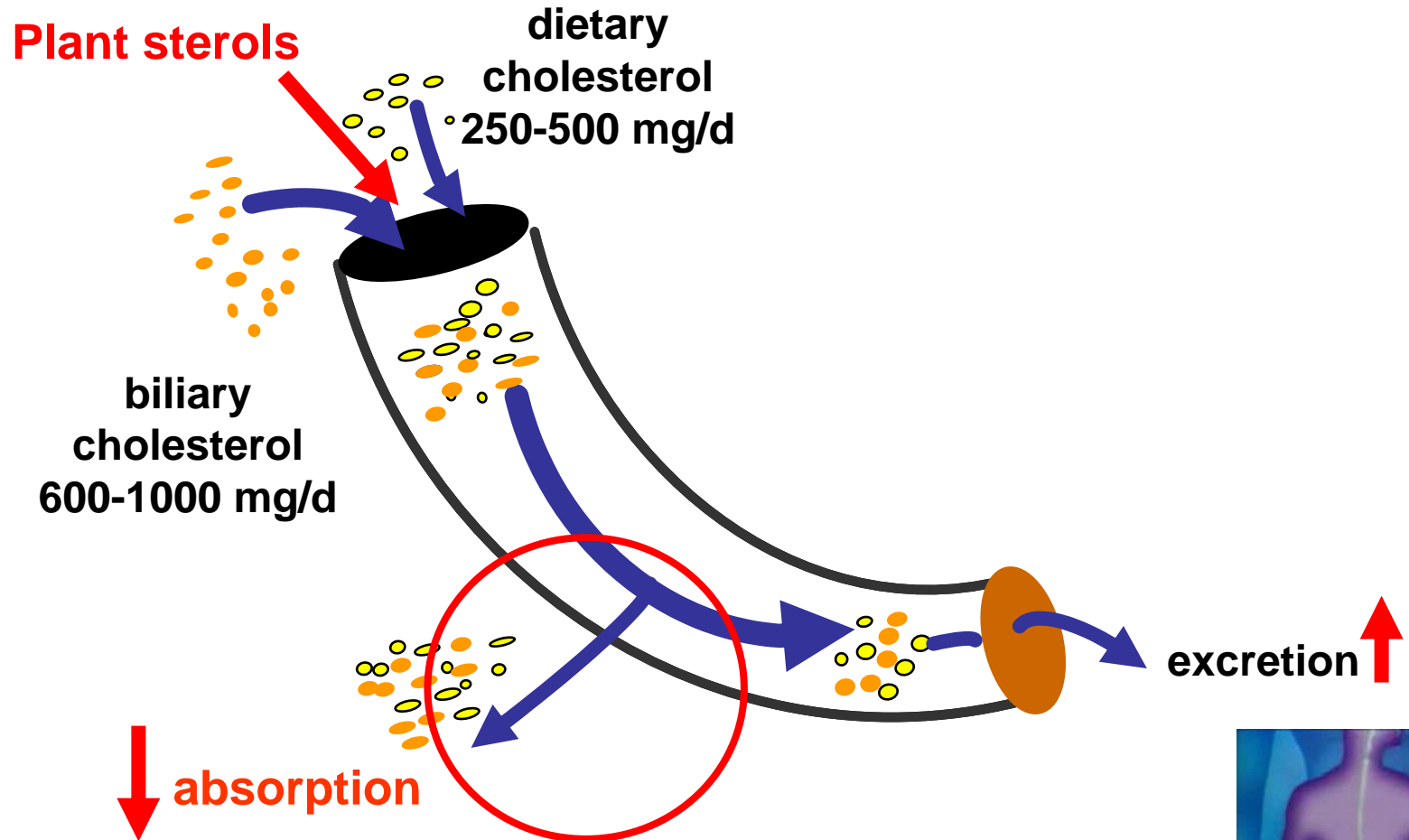
* International Atherosclerosis Society, 2003; NCEP III Expert Panel, JAMA 2001

Cholesterol-lowering effect of plant sterols - mechanism of action

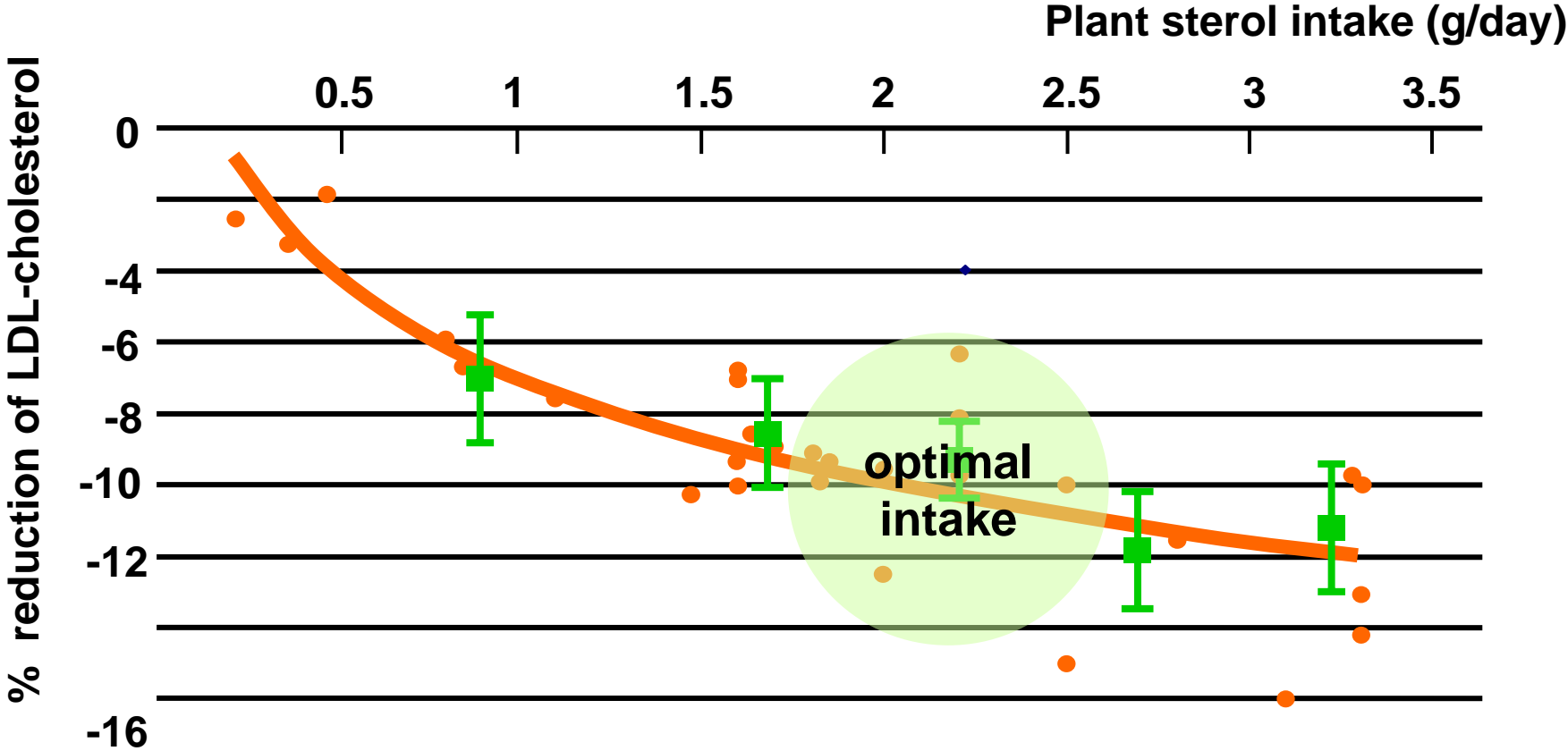


Cholesterol-lowering effect of plant sterols - mechanism of action

Intake of 2 g plant sterols/day → 30-40% reduction in cholesterol absorption



Cholesterol lowering with plant sterols in fat-based foods: dose-response relationship



- data of ~ 30 placebo-controlled Unilever initiated studies with phytosterol-enriched spreads
- data (mean plus 95% confidence interval) from meta-analysis of 41 studies with phytosterols or stanols (Katan, Grundy, Jones et al, Mayo Clin Proc. 2003)

Canola oil and vitamin E



One tablespoon of canola oil provides approximately 2.9 mg of vitamin E, which is equivalent to approximately 1/5 of the recommended daily intake for adults (15 mg ATE*).

*ATE (Alpha tocopherol equivalents)

Vitamin E present in canola oil can be beneficial in the treatment and prevention of diseases related to oxidative stress including cancer, cardiovascular and neurodegenerative disorders (Giugliano, 2000; Pratico and Delanty 2000)

Canola Oil Trial at University of Manitoba

Supported by the Canola Council of
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Manitoba



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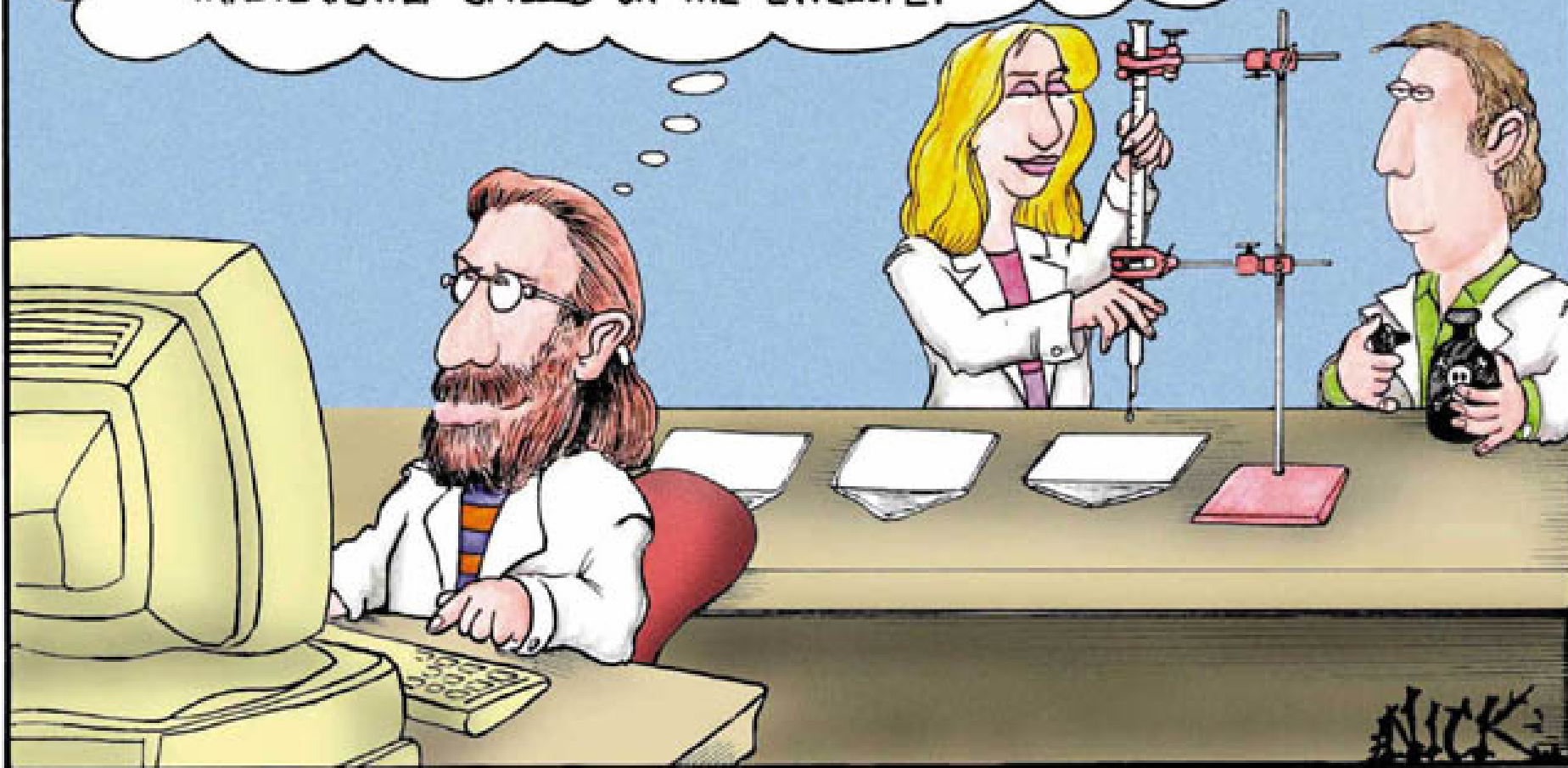


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DEAR SIR,

COULD WE PLEASE HAVE A GRANT OF \$500,000 FROM YOUR CORPORATION TO ALLOW US TO RESEARCH POSSIBLE ANTIDOTES TO A NOVEL NEW COLORLESS, SKIN-ABSORBED AND SLOW-ACTING NERVE TOXIN?

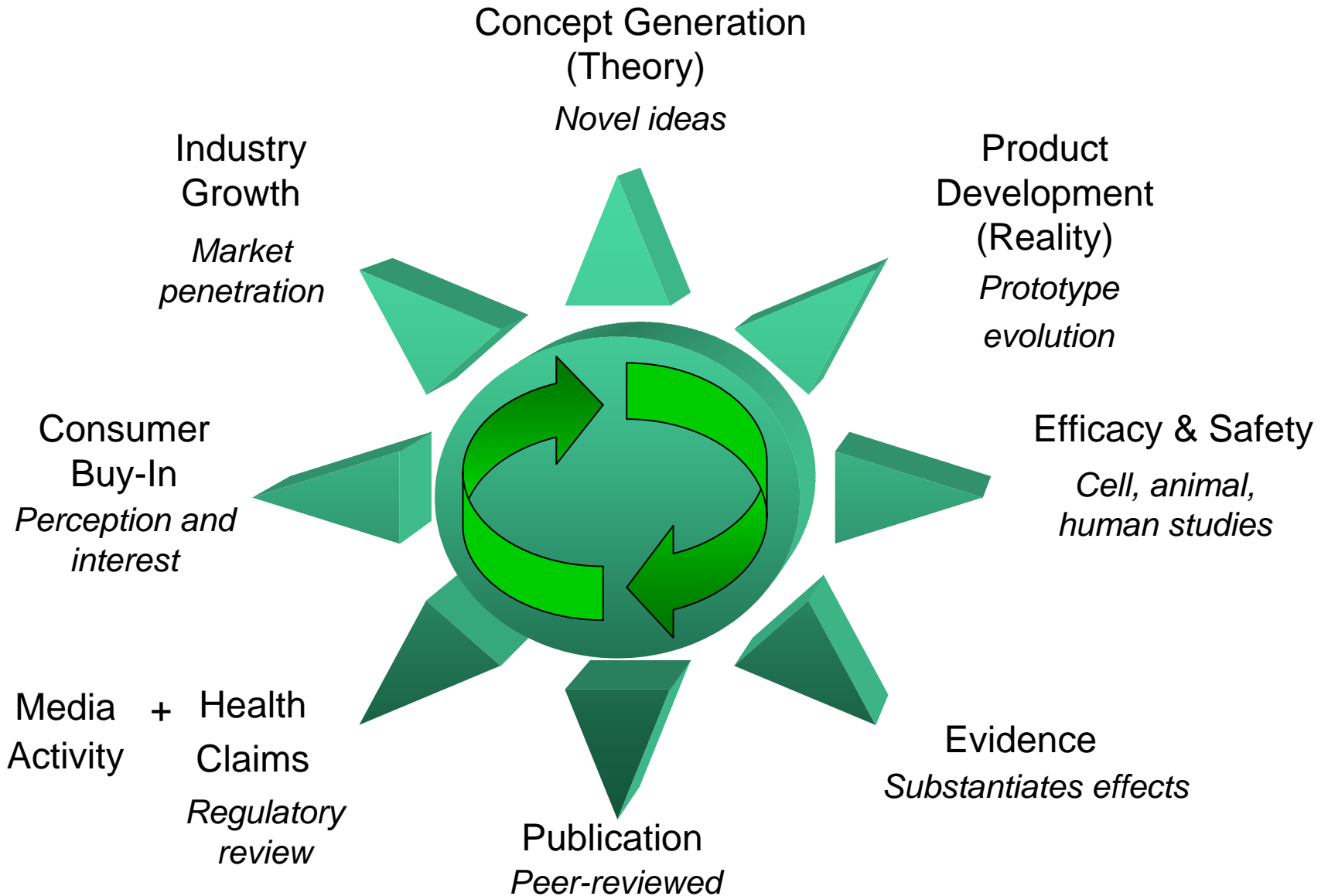
P.S. IT IS POSSIBLE THAT SOME OF THIS TOXIN MAY HAVE BEEN INADVERTENTLY SPILLED ON THE ENVELOPE.





- Richardson Centre for Functional Foods and Nutraceuticals
- SmartPark, University of Manitoba, Winnipeg
- www.rcffn.ca

Role of the Richardson Centre for Functional Foods and Nutraceuticals



Objectives of study

- Demonstrate effects of canola oil on clinically relevant biomarkers of health and wellness in a controlled human feeding context
- Compare effects of canola oil consumption to canola enriched with flax oil to enhance the omega-3 content of the resultant oil mixture

Experimental Design

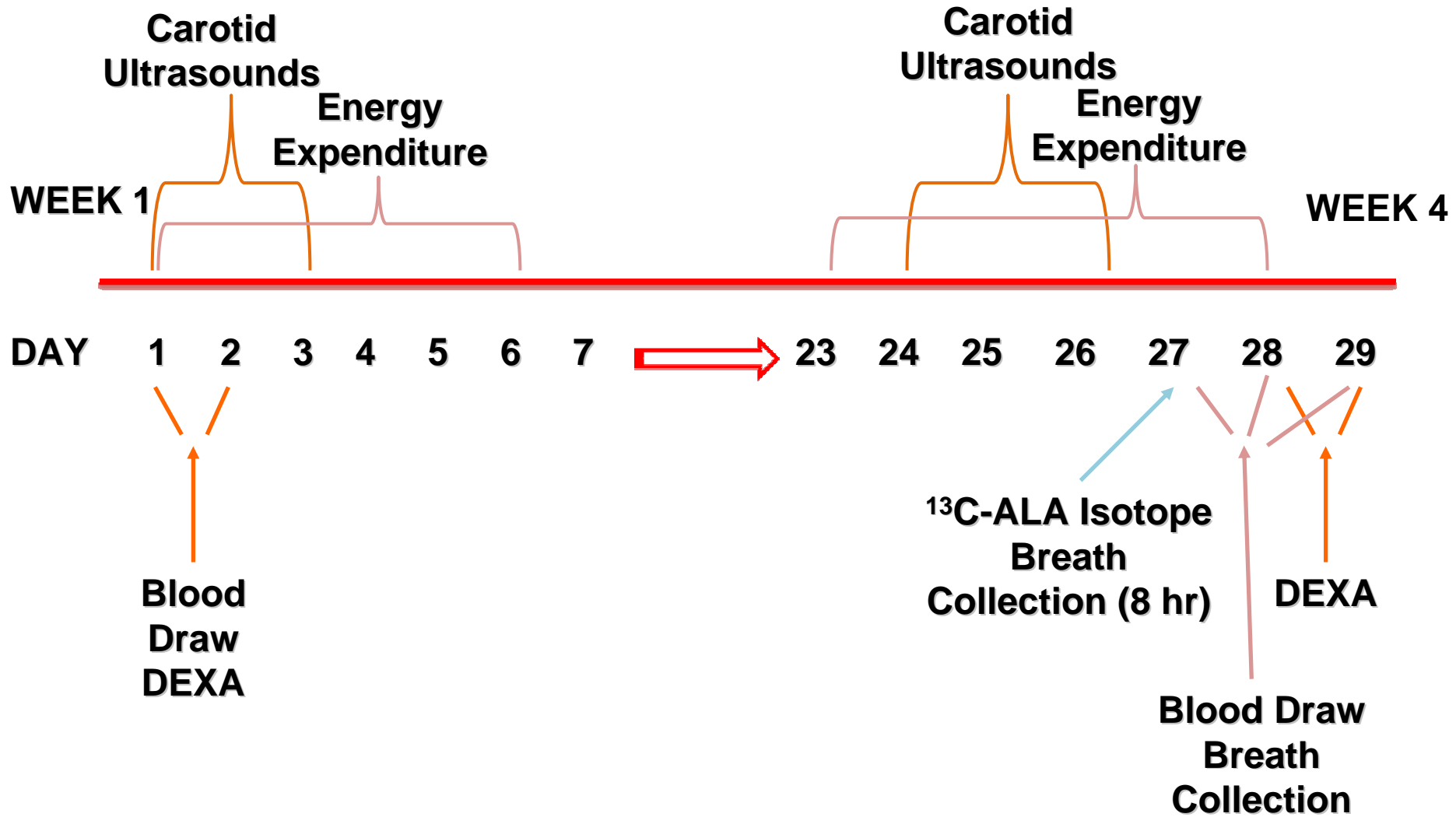
Treatments

- ***Control phase:*** Dietary fat representing higher saturated fat not atypical of current North American intakes. Fat comprises 35% of total energy and is largely saturated fat with substantial levels of omega-6 linoleic acid provided.
 - Butter 12%, Extra Virgin Olive Oil 35%, Lard 35%, Sunflower Oil (>60% LA) 18%
- ***Canola oil phase:*** Dietary fat consumed provides 35% of total energy and is comprised of up to 70% canola oil.
 - High Stability, Hi-Oleic (70%), Non-hydrogenated, Trans-Free
- ***Canola/flax oil blend:*** Dietary fat consumed provides 35% of total energy and is comprised of up to 70% canola and flax oil blend.
 - 1:1 ratio of Canola Oil to Flax Oil

Experimental Design

3 phases (29 days)
2 washouts (4-8 weeks)

Randomized, controlled, single-blinded, crossover study



Diet and Daily Energy Targets

- Typical optimal western diet that meets the Canadian Recommended Nutrient Intake
- Mifflin Equation x 1.7 activity factor
 - Individual caloric needs
 - Adjusted if BW fluctuation during week 1 phase 1
- 3 isocaloric meals/day, 3 day meal cycle
- RCCNU Metabolic Kitchen prepared to nearest 1 g
- Breakfast at RCFFN, Lunch & Dinner packed to go

Treatment Vehicles

- Breakfast
 - Smoothies (3 flavours)
 - Milk, berries, sherbet, Treatment Oil
- Lunch & Dinner
 - Puddings (6 flavours)
 - Instant pudding mix, milk, Treatment Oil

Fatty acid composition of the 3 experimental diets based on 2500 kcal/d (% of energy)

	Average American Diet	Canola Oil Diet	Canola/Flax Oil Diet
Total CHO	48.81	48.79	48.68
Fiber (g/1000 kcal)	8.28	8.28	8.28
Total Protein	14.43	14.42	14.39
Total Fat	36.76	36.79	36.93
SFA	11.22	5.64	6.14
MUFA	16.12	22.86	15.90
PUFA	6.49	5.74	12.27
LA	5.93 (16.8 g/d)	4.17 (11.8 g/d)	4.48 (12.7 g/d)
ALA	0.46 (1.32 g/d)	0.85 (2.4 g/d)	7.4 (21.0 g/d)
n-6:n-3	12.76	4.91	0.61
P:S ratio	0.58	1.02	2.00
Cholesterol (g/1000 kcal)	81.94	69.20	69.20

Progress to Date



Subject Characteristics

- 42 subjects recruited
 - n=39; 14 males and 25 females (7 premenopausal)
 - LDL-Cholesterol : 3.78 ± 0.82 mmol/L
 - BMI: 28.15 ± 4.74 mmol/L
 - 46.49 ± 12.67 years of age
-
- Entrance physical examination by research physician, Dr. E. Kesselman, conducted in first week of study

Summary

- Past research has shown considerable health benefits ascribable to canola oil and its constituents.
- Ongoing studies at University of Manitoba should provide additional data concerning the role in health promotion of canola oil alone and mixed with other functional components.

Acknowledgements

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