Healthy Aging & Nutrition Series

*Presented in collaboration with **Agri-food for Healthy Aging***

Thursday June 11, 2015 | 12:00 – 1:00 pm

Food-first approach to healthy aging

New research exploring functional agri-foods

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Please share **comments** and **questions** into the chat box. For technical assistance, please chat with **NRC Host**

The session will be **recorded**.

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Agri-food for Healthy Aging (A-HA)

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RESEARCH | EDUCATION | PRACTICE

Enhancing the quality of life and care of older adults through partnerships in *research*, *education* and *practice*.

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Agri-food for Healthy Aging (A-HA)

Collaborative research & knowledge translation (KT) group.

Improving the health and well-being of older adults through the innovative use of food.

1 of 10 theme areas within Schlegel-UW Research Institute for Aging (RIA).

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www.aha.the-ria.ca

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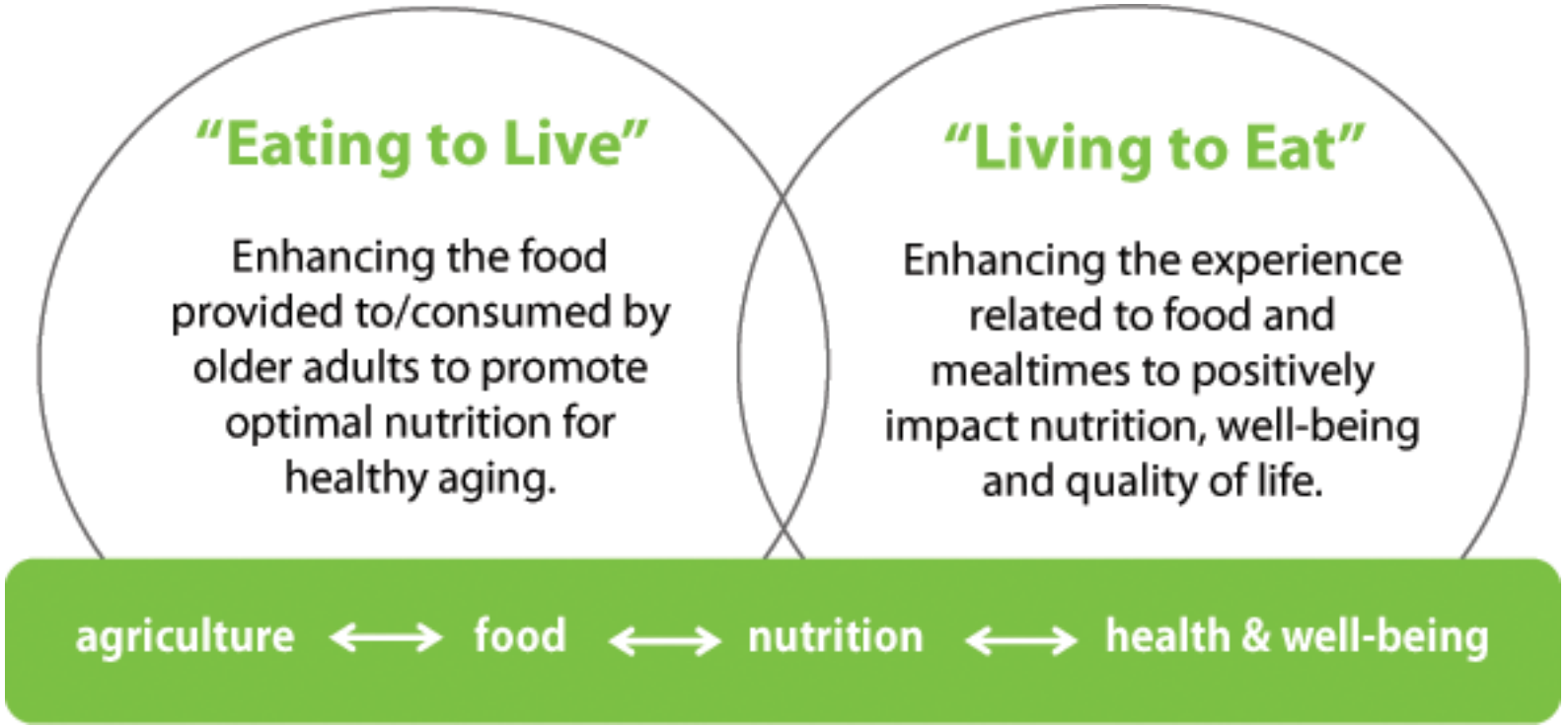
A-HA: Research Activities



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Functional Foods and Healthy Aging: Resistant Starch Bagels for Diabetes

Food First Approach To Healthy Aging WEBINAR June 11, 2015

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Ontario Ministry of Agriculture, Food and Rural Affairs

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Agri-Food and Rural Link
A program of the OMAFRA – U of G Partnership
Mobilizing Agri-Food and Rural Research Knowledge

University of Guelph
Changing Lives Improving Life

Presentation Outline

- Background
  - Aging and Health
  - Functional Foods

- Research Update
  - The Better Bagel Study
  - Methods and Results

- Summary Notes

Aging is Becoming More Common

- Aging of the population will accelerate over the next 3 decades
- The number of Canadian adults >65 years old is projected to increase from 4.2 to 9.8 million between 2005 and 2036
- The “older adults” share of the population will increase from 13.2 to 24.5%

Statistics Canada , Census of Canada

Dr. David Butler Jones' Report: Canadians are living longer

Golden years shining brighter: Canadian seniors living longer, better

BY SHANNON PROUDFOOT, POSTMEDIA NEWS OCTOBER 29, 2010 COMMENTS (21)

STORY PHOTOS (1)

Canada's seniors are living longer and are vastly less likely to struggle with poverty than they were three decades ago, but there's work to be done in areas such as diagnosing and treating mental illness, reducing social isolation and combating the "mythology" of aging, Canada's chief public health officer said. File photo.

Photograph by: Darren Stone/Victoria Times Colonist, Victoria Times Colonist

STORY TOOLS

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RELATED STORIES FROM AROUND THE WEB

Golden years shining brighter: Canadian seniors living longer, better
Ottawa Citizen, Canada
Wednesday, November 10, 2010

B.C. residents living longer, healthier
CBC News, Canada

Canada.com, October 29, 2010

- 2010 report on the State of Public Health in Canada focused on aging and seniors
- By 2050, more than 25% of population will be over 65 years old
- Life expectancy is rising at 78 for men, 83 for women
- Chronic health conditions:
  - 89% have ≥ 1
  - 25% have ≥ 4
- 37% taken steps to improve their health

Healthy Aging: Food, Nutrition and Health

- Relation of nutrients to health has evolved
  - Traditionally prevent deficiency disease
  - Now includes prevention of chronic disease
  - Evolution manifests in numerous policies
- Key example is advance of functional foods
  - Extension of how we relate food and food constituents to health
  - Major influence on research activity in food, nutrition and health

What are Functional Foods?

Simplest definition: Foods that may provide health benefits beyond basic nutrition

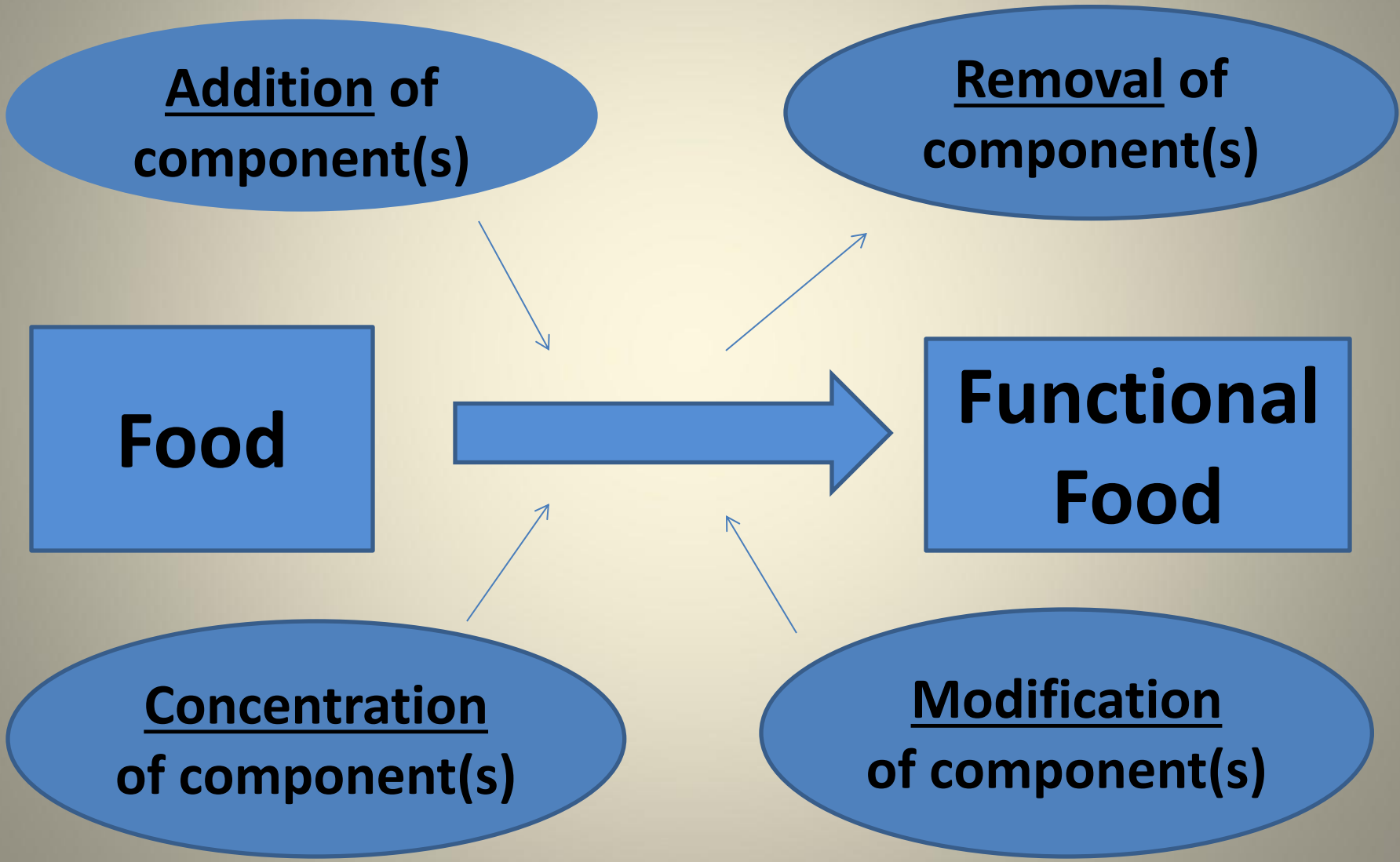
- Conventional food form
- Specific bioactive constituent
  - enhanced content in the food
  - added to the food
- Biological rationale to relate to health

Functional Foods: Health Canada Definition

- A *functional food* is similar in appearance to, or may be, a conventional food that is consumed as part of a usual diet, and is demonstrated to have physiological benefits and/or reduce the risk of chronic disease beyond basic nutritional functions, i.e. they contain bioactive compound

Health Canada, Policy Paper - Nutraceuticals/Functional Foods and Health Claims On Foods, 2002

What are Functional Foods?



Advance of Functional Foods

- Advance of functional foods has created opportunity but also challenges for stakeholders
  - Researchers
  - Government
  - Industry
  - Health Professionals
  - Consumers
- Food and health also relies on BASICS and FUNDAMENTALS of healthy eating

Functional Food Research Example

Resistant Starch Bagels for Diabetes and Satiety

University of Guelph
Changing Lives Improving Life

Maple Leaf

Ontario
Ministry of Agriculture, Food and Rural Affairs

Canada Bread

RESEARCH EXAMPLE

Resistant Starch Bagels for Diabetes and Satiety

Maize high in resistant starch (RS) from Plant Agriculture

Bagels produced by Canada Bread using high-RS corn flour

CANADA BREAD FOODSERVICE

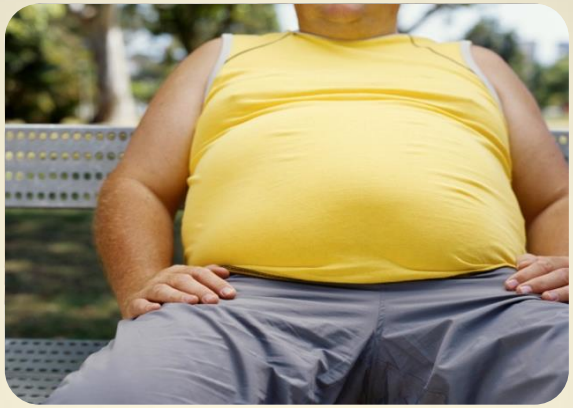
Human study to test effect of bagels on risk factors of diabetes and satiety

Funded by OMAFRA Food Research Program

Background: Type 2 Diabetes

- Type 2 diabetes (T2D) is widespread in Canada
- T2D can be prevented with diet (CDA, 2012)

homewise.co.uk



rochester.edu

beltina.org

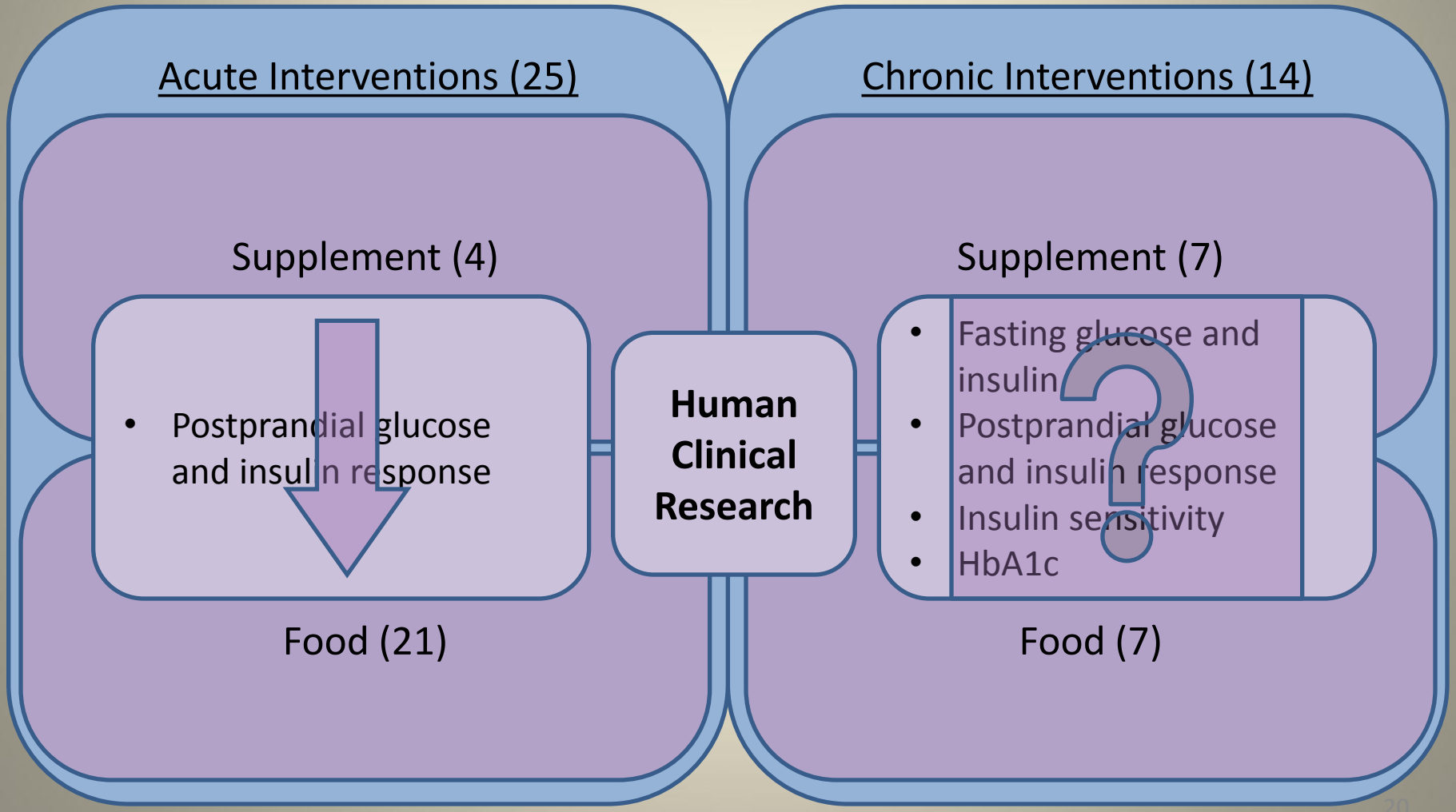
- Increased dietary fibre related to reduced risk of T2D (Schulze et al, 2007)
- Canadians do not consume enough dietary fibre (Health Canada, 2012) which highlights opportunity for functional foods
- Resistant starch is high-fibre ingredient that can be used in functional foods

Resistant Starch

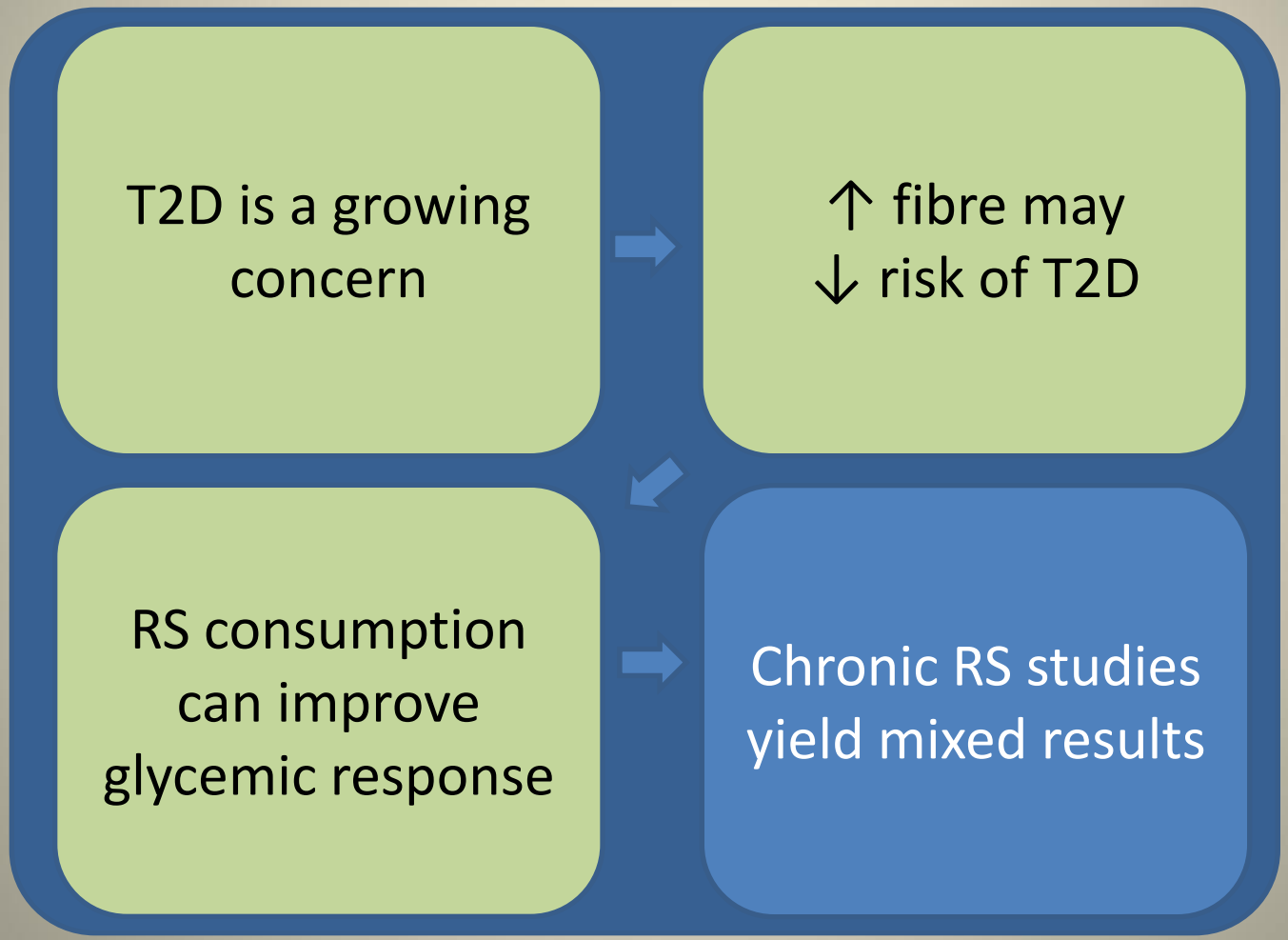
- Resistant starch (RS) is a starch that behaves like a fibre
  - Resistant to digestive enzymes
  - Fermented in the large intestine by bacteria

- 4 Subtypes
  - RS_1 -Starch is protected from digestion by intact cell walls
  - RS_2 -Conformation of starch within granule limits enzyme access
  - RS_3 -Starch is retrograded by repeated heating and cooling
  - RS_4 -Starch is retrograded by chemical processing
- RS_2 occurs naturally in low levels in corn, some legumes and unripe bananas (Fuentes-Zaragoza, 2012)
  - Corn developed that is ↑in RS_2, which can be processed into flour and incorporated into high-fibre baked products
  - Human studies have examined effects of RS-foods on glycemic response

Resistant Starch and Glycemic Response: Human Evidence



Summary of Research Rationale



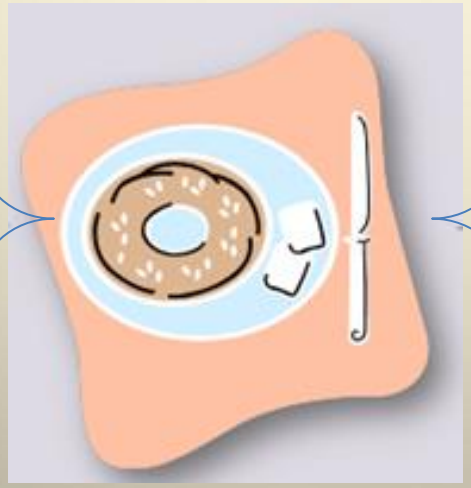
Study Purpose and Hypotheses

- **Purpose**:
  - To determine if 8 weeks of daily consumption of bagels that contain RS will significantly improve markers of T2D in adults at increased risk for T2D
  - To determine RS bagel acceptance and tolerability
- **Hypotheses:**

1 bagel (25 g RS) /day

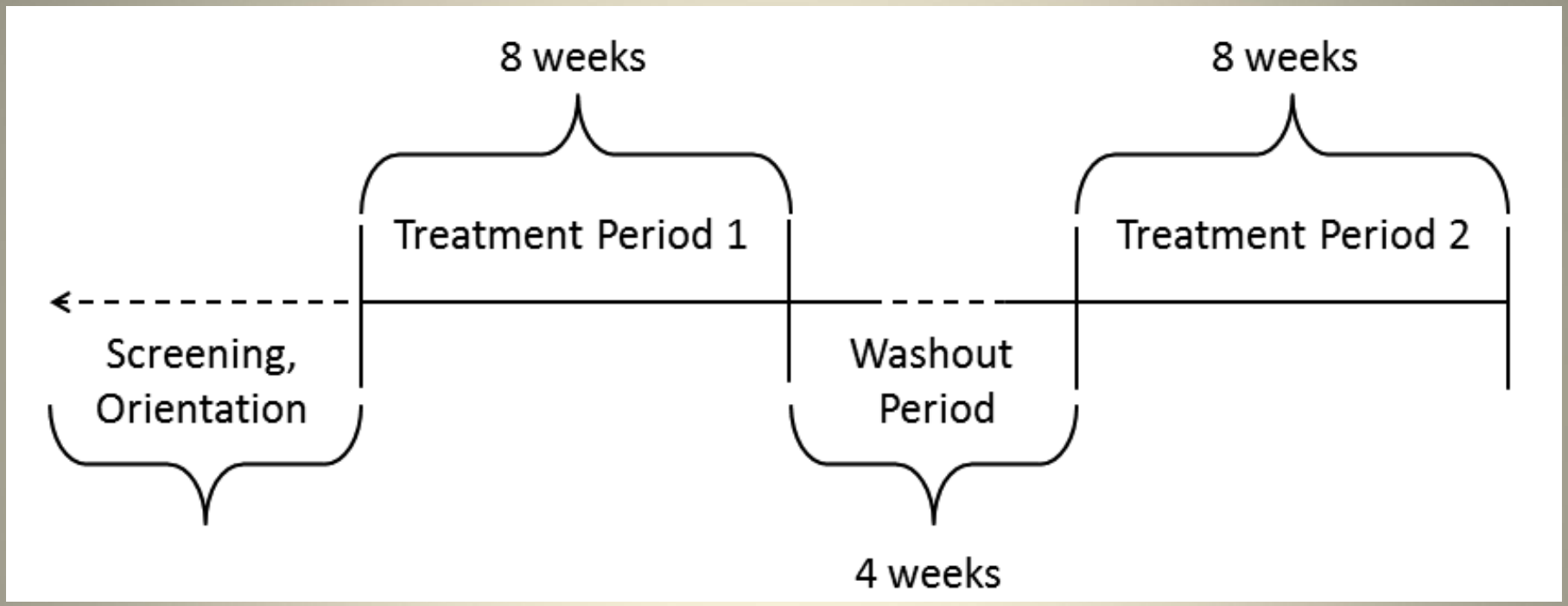
8 weeks

High T2D risk adults



- ↓ fasting glucose and insulin
- ↓ postprandial glucose and insulin
- ↓ HbA1c
- Acceptable and well tolerated

Better Bagel Study: Study Design



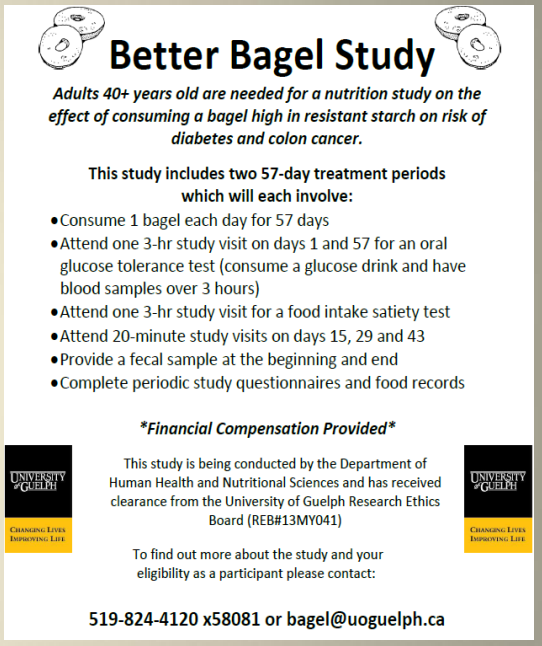
Randomized → **Double-blind** → **Cross-over**

Human Nutraceutical Research Unit
Est. 1998

REB#13MY041
Clinicaltrials.gov NCT ID: NCT02129946

Participant Recruitment and Screening

- Recruitment goal: 25 participants
- Recruitment
  - Newspaper ads
  - Posters
  - Radio ads
  - Online and social media
  - Word of mouth
  - UofG department emails
- Generally healthy, increased risk for T2D
- Screening
  - 3-step process designed to be efficient:
    - 1 - Telephone questionnaire
    - 2 - In-person, in-depth questionnaires, body measurements, CANRISK questionnaire
    - 3 - Fasting blood sample
- 25 participants were enrolled



Better Bagel Study

Adults 40+ years old are needed for a nutrition study on the effect of consuming a bagel high in resistant starch on risk of diabetes and colon cancer.

This study includes two 57-day treatment periods which will each involve:

- Consume 1 bagel each day for 57 days
- Attend one 3-hr study visit on days 1 and 57 for an oral glucose tolerance test (consume a glucose drink and have blood samples over 3 hours)
- Attend one 3-hr study visit for a food intake satiety test
- Attend 20-minute study visits on days 15, 29 and 43
- Provide a fecal sample at the beginning and end
- Complete periodic study questionnaires and food records

Financial Compensation Provided

This study is being conducted by the Department of Human Health and Nutritional Sciences and has received clearance from the University of Guelph Research Ethics Board (REB#13MY041)

To find out more about the study and your eligibility as a participant please contact:

519-824-4120 x58081 or bagel@uoguelph.ca

Study Treatments

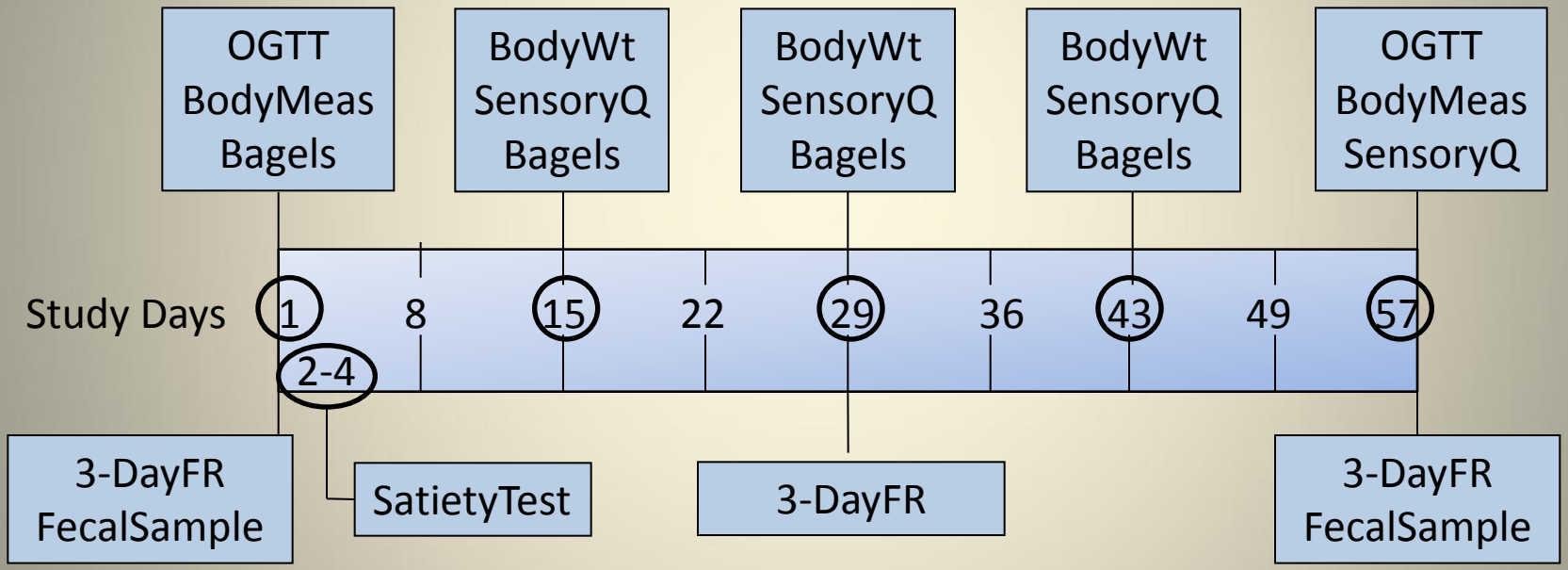
- Bagel recipe based on previous University of Guelph research (MacNeil 2013)
  - 60% flour substituted with Hi-Maize® 260
    - source of RS from high-amylose maize

Study bagel nutritional composition (per bagel)

	Control Bagel (124.2 g)	RS Bagel (119.8 g)
Energy (kcal)	314.2	228.2
Fat (g)	1.99	1.44
Protein (g)	11.4	8.75
Total Carbohydrates (g)	63.9	57.9
Total Dietary Fibre (g)	2.61	25.6
Resistant Starch	6.83	25.4

METHODS: Data Collection

Data Collection Schedule

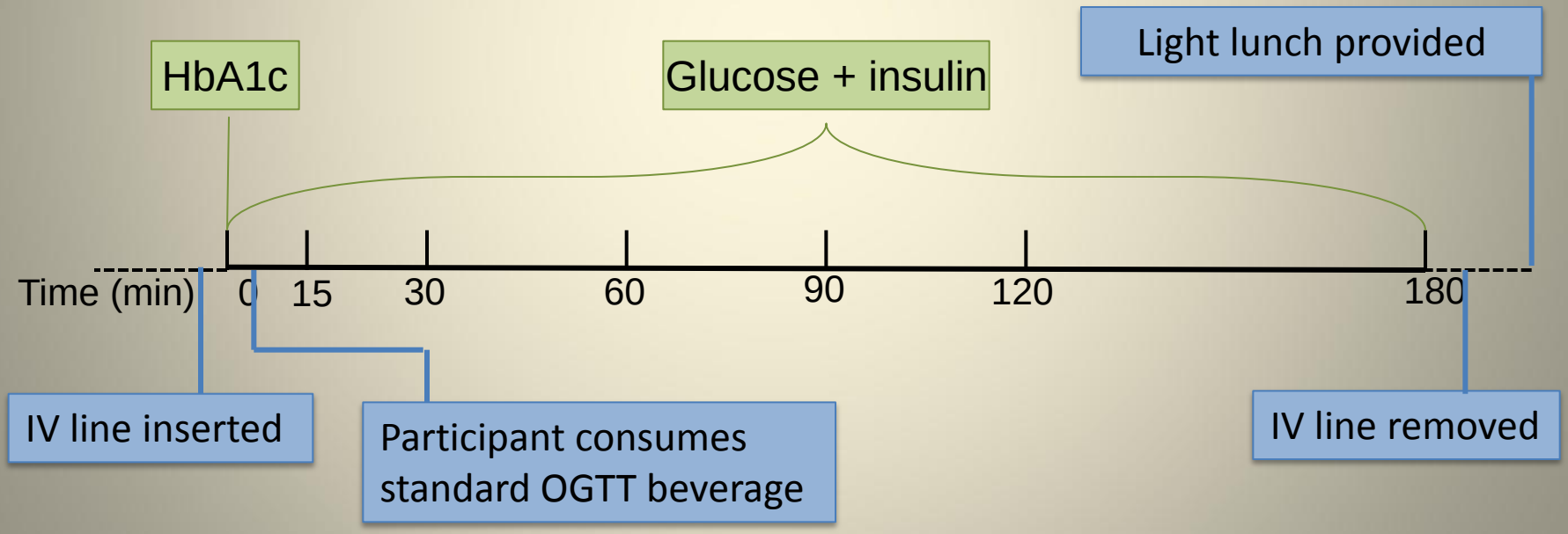


Daily activities: Consume study bagels, record in study diary

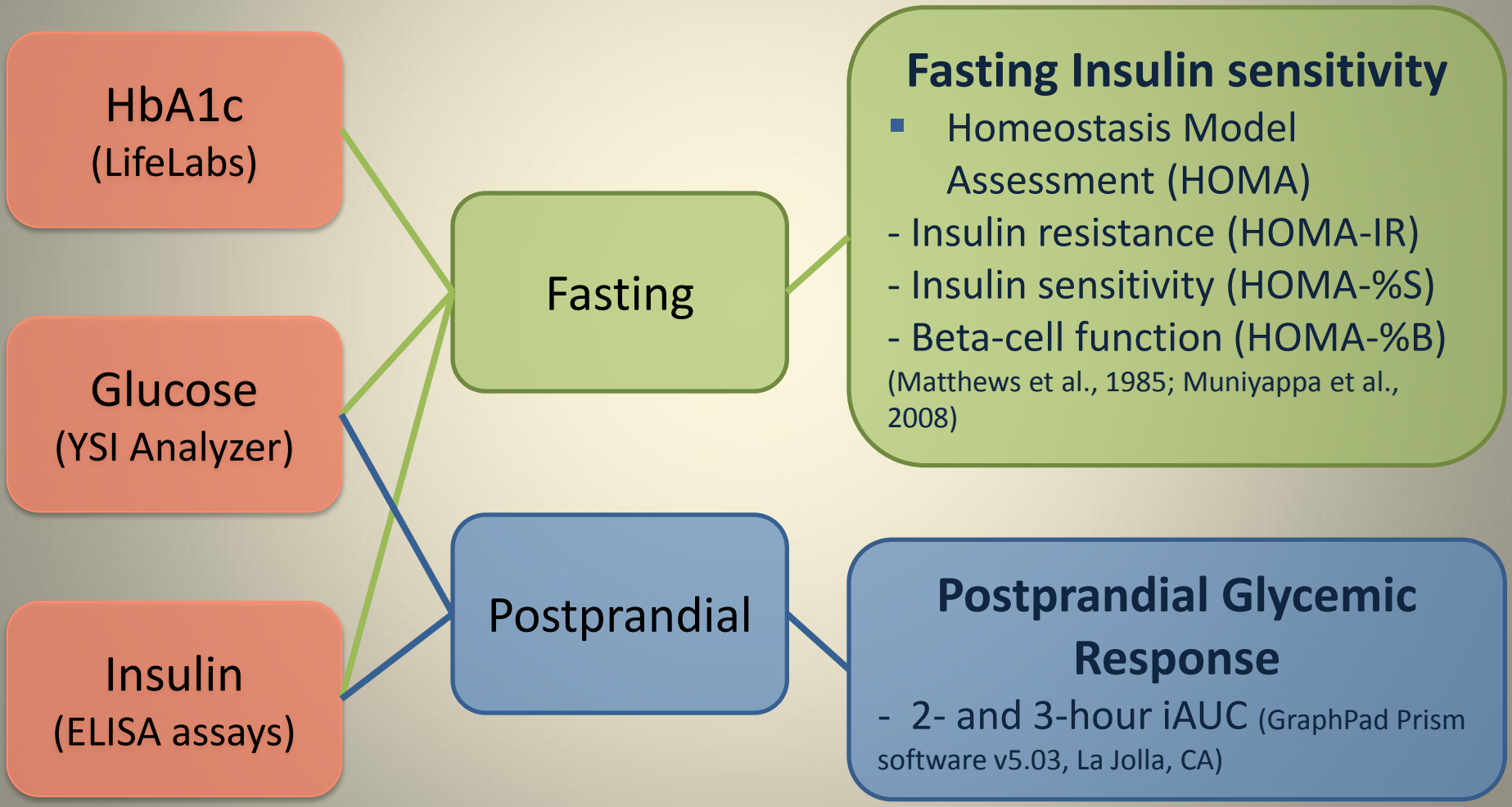
METHODS: Oral Glucose Tolerance Test

OGTT Timeline

Study Days 1 and 57 of each treatment period



METHODS: Blood Sample Analysis



RESULTS:

PARTICIPANT CHARACTERISTICS

Participant characteristics at baseline (n= 24)	
Sex (n)	16 male / 8 female
Age (years)	55.3 ± 1.59
Body weight (kg)	90.4 ± 2.25
BMI (kg/m^2)	30.2 ± 0.57
CANRISK score	31.3 ± 0.96

Data are means ± SE

- No significant changes in body weight during the study

Study Bagels Compliance, Acceptance and Tolderance

Treatment Compliance

- Self-reported (study diary)
- >99% during each treatment period

Bagel Acceptance

- Control bagels preferred over RS bagels
- Control bagels: “like moderately
- RS bagels: “neither like or dislike”

novatusinc.com

Bagel Tolerance

- No serious adverse effects
- Minimal side effects
  - Flatulence reported in <30% of participants during RS bagel treatment period

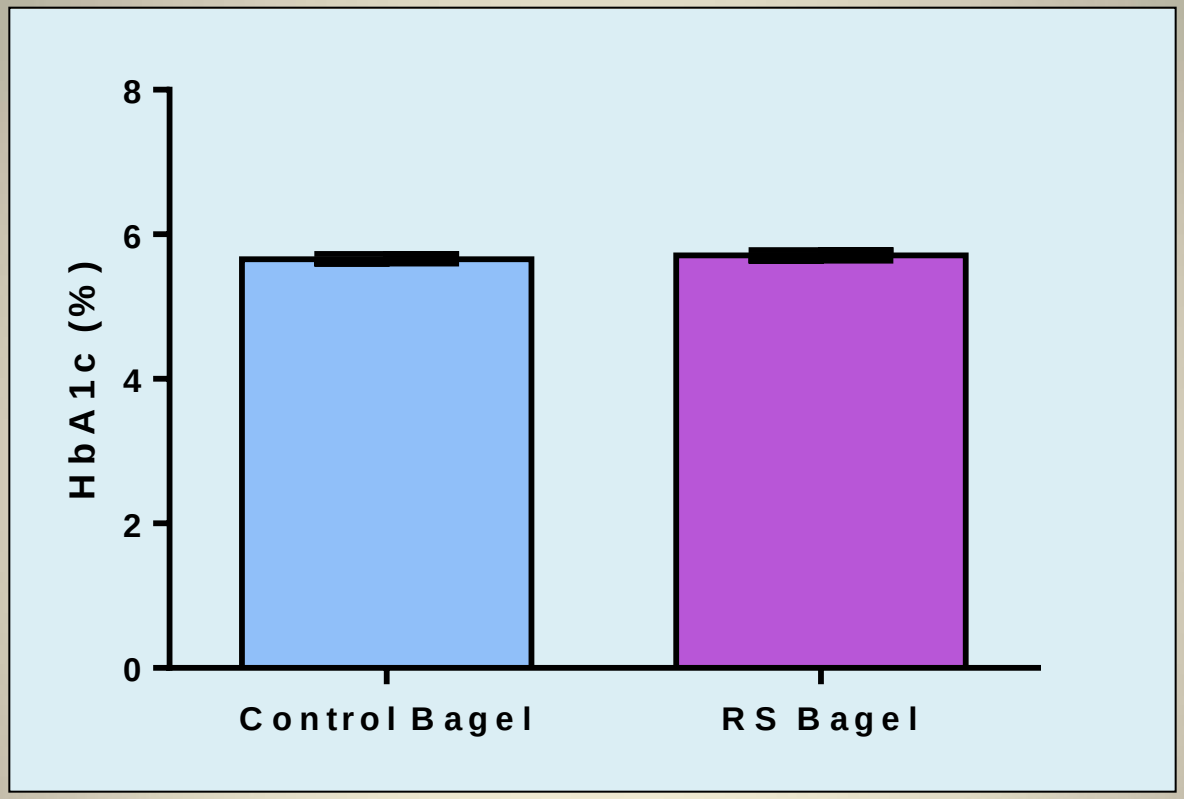
1	2	3	4	5	6	7	8	9
Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like or Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely

Energy and Nutrient Intake

	Pre-study (n=24)	Control Bagel (n=24)	RS Bagel (n=23)
Energy (kcal)	2022 ± 106.5	2060 ± 109.3	2019 ± 112.2
Protein (g)	86.0 ± 6.28	82.9 ± 4.54	87.1 ± 6.66
Fat (g)	79.3 ± 5.40	75.1 ± 5.78	72.4 ± 5.95
Carbohydrates (g)	237.6 ± 17.2	260.9 ±15.2	261.5 ± 14.9
Dietary Fibre (g)	20.3^{a} ± 1.50	20.2^{a} ± 1.39	41.4^{b} ± 1.57

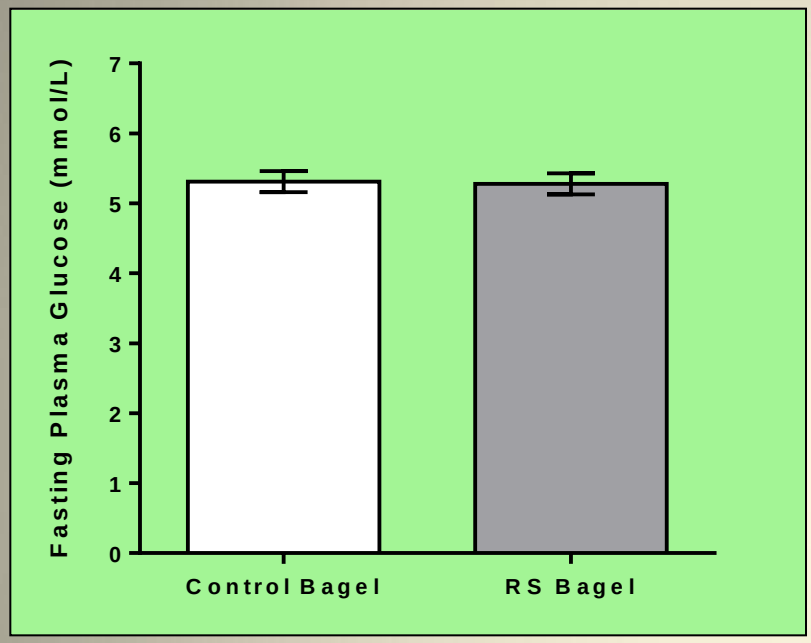
- *Energy and macronutrient intakes did not differ between pre-study and during study*
- *Dietary fibre was significantly greater during the RS treatment period*

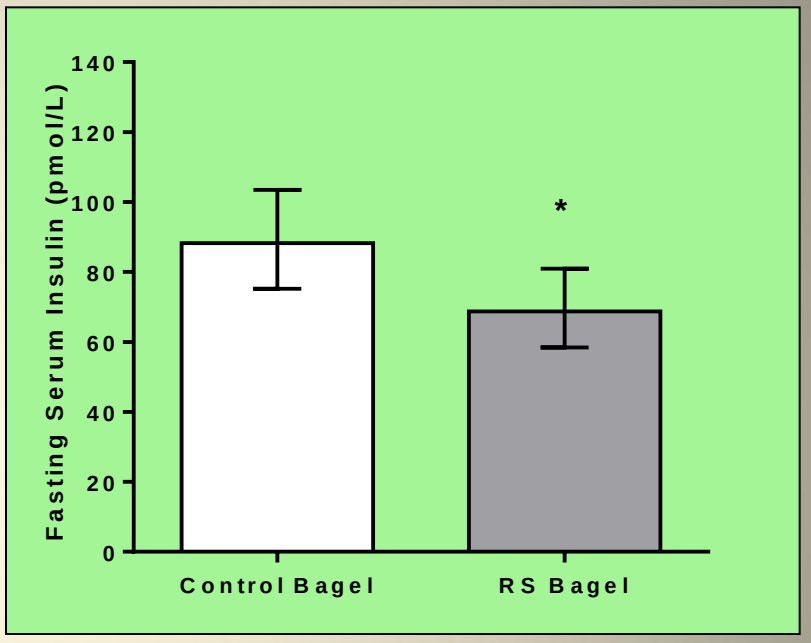
Glycated Hemoglobin (HbA1c)



On study day 57, HbA1c did not significantly differ between the RS and control treatment bagels.

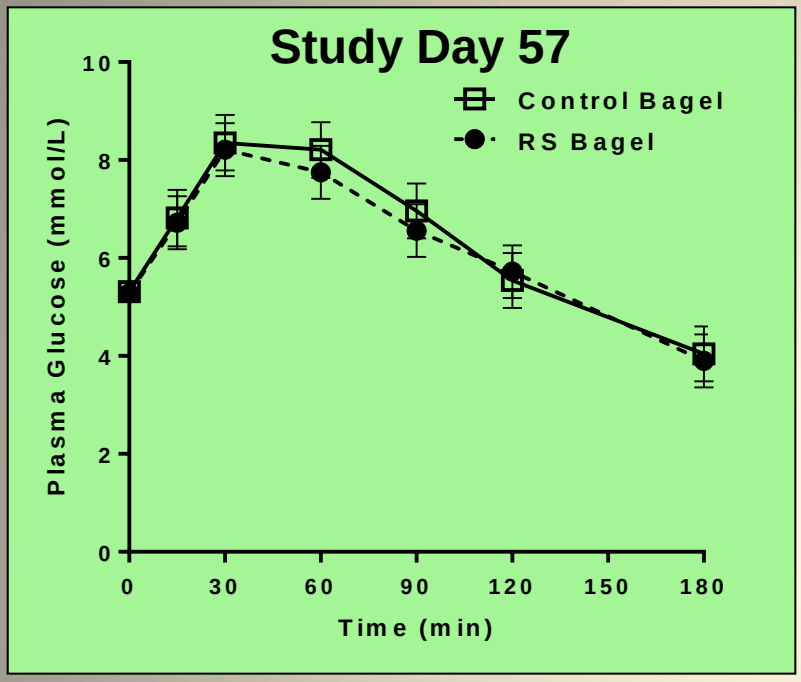
Fasting Glucose and Insulin

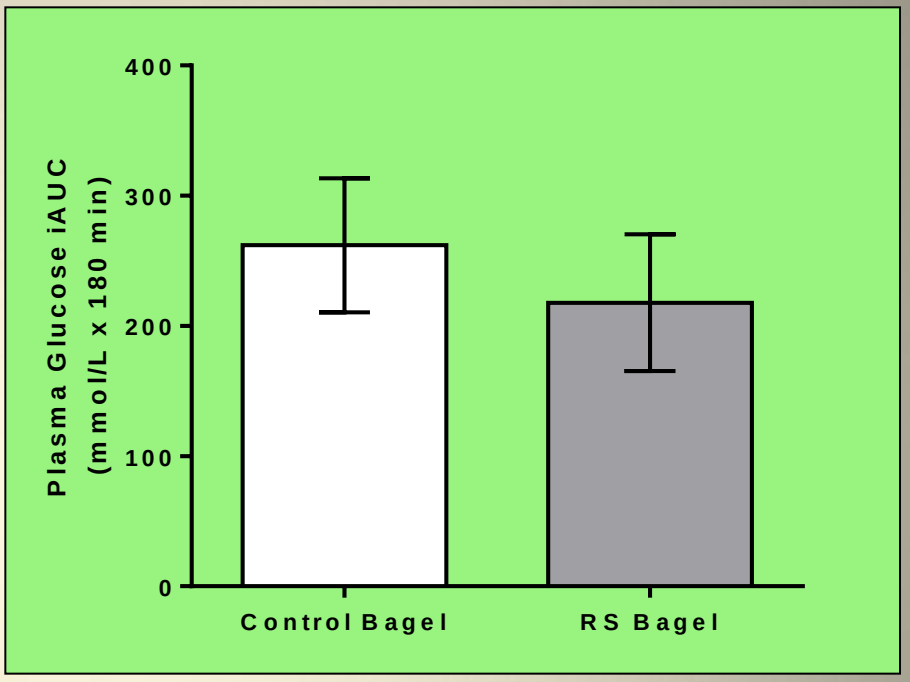




On study day 57, fasting plasma glucose did not significantly differ between the RS and control treatment bagels; however, fasting serum insulin was significantly decreased following consumption of the RS treatment bagel compared to the control treatment bagel (P=0.04).

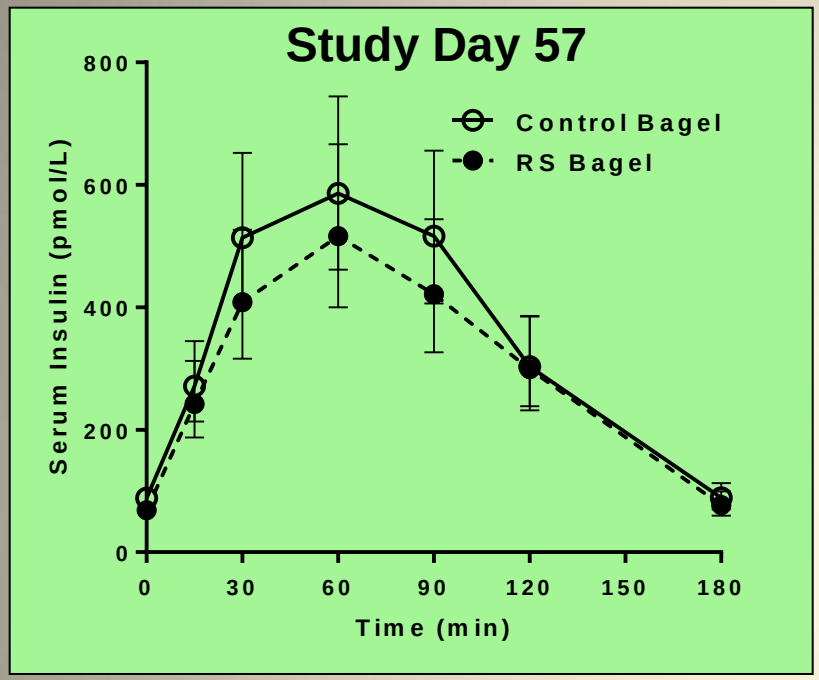
Postprandial Glucose

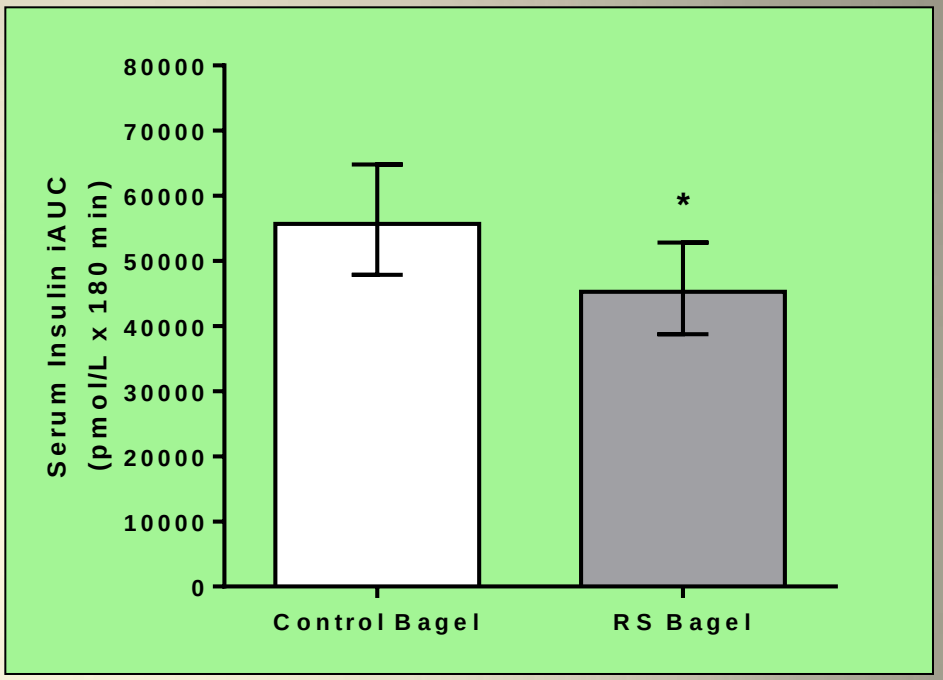




Postprandial OGTT plasma glucose generally significantly increased from time point 0, peaked at time points 30-60 minutes and decreased back to baseline by 120-180 minutes. Plasma glucose iAUC did not significantly differ between the RS and control bagel treatments.

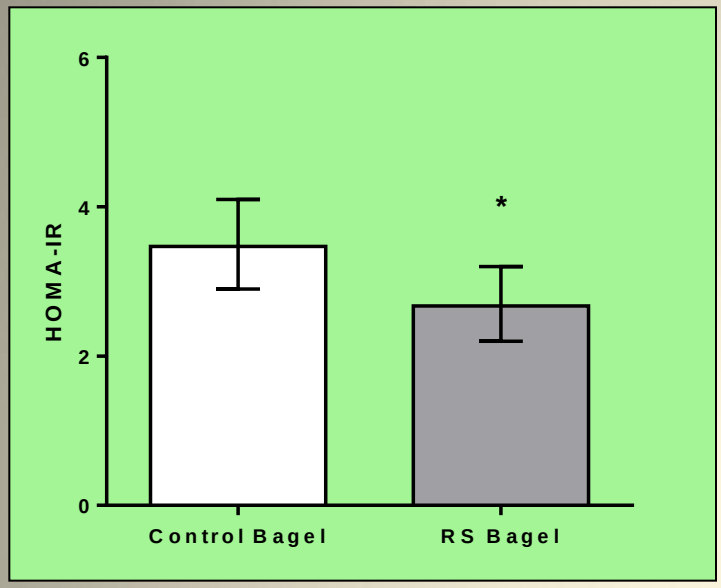
Postprandial Insulin

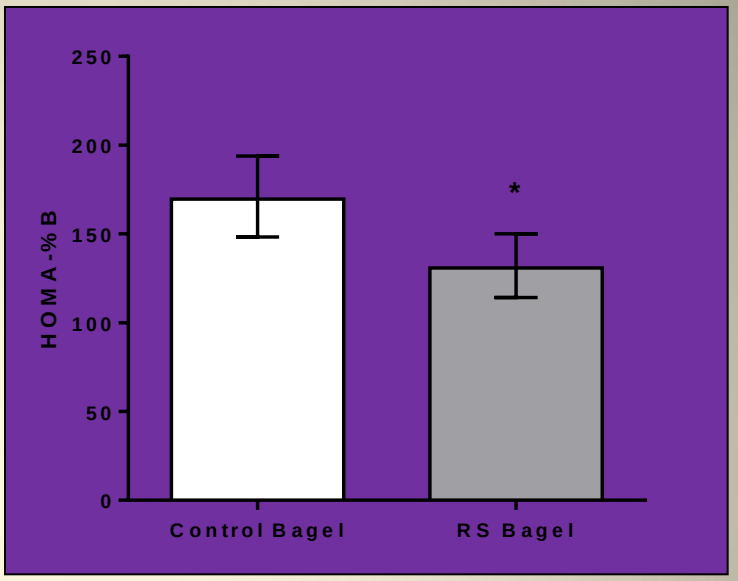


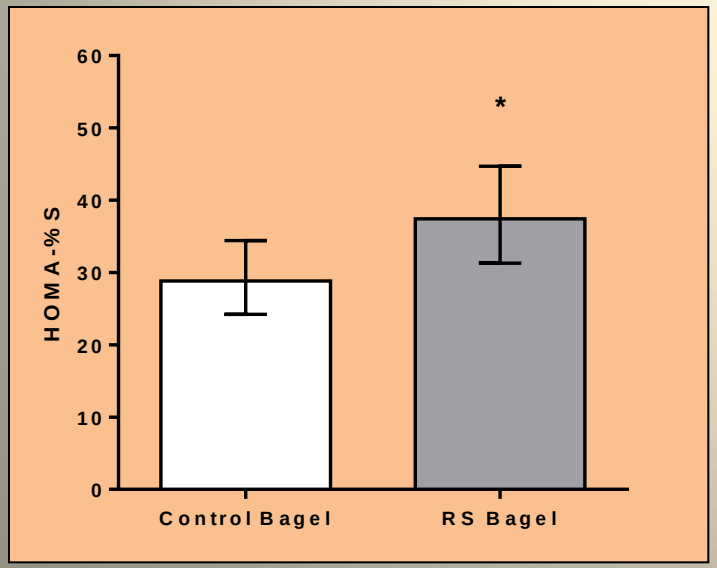


Postprandial OGTT serum insulin generally significantly increased from time point 0, peaked at time points 30-60 minutes and decreased back to baseline by 120-180 minutes. ***Serum insulin iAUC at study day 57 was significantly decreased following consumption of the RS treatment bagel*** *compared to the control treatment bagel (p=0.05).*

Insulin Resistance, Insulin Sensitivity, Beta Cell Function







On study day 57, ***HOMA-IR (p=0.04) and HOMA-%B (p=0.009) were significantly decreased*** *and* ***HOMA-%S (p=0.04) was significantly increased*** *following consumption of the RS treatment bagel compared to the control treatment bagel.*

Results Summary

Glycemic Response Biomarker	Significant Effects
HbA1c	No Δ
Fasting glucose	No Δ
Fasting insulin	↓
Postprandial (OGTT) glucose	No Δ
Postprandial (OGTT) insulin	↓
Fasting insulin resistance (HOMA-IR)	↓
Fasting insulin sensitivity (HOMA-%S)	↑
Beta-cell function (HOMA-%B)	↓

Summary

- Consumption of high-RS bagels for 8 weeks can improve markers of glycemic response in adults at risk of T2D
- Further research is needed to clarify the mechanism behind theses effects, and improve RS-bagel palatability

This evidence supports the use of high-RS foods as a feasible strategy to improve glycemic markers of T2D

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- Human Nutraceutical Research Unit

New spearmint tea shows potential in managing osteoarthritis

A. Erin Connelly, Ph.D.

Department of Human Health and Nutritional Sciences, University of Guelph

June 11th 2015

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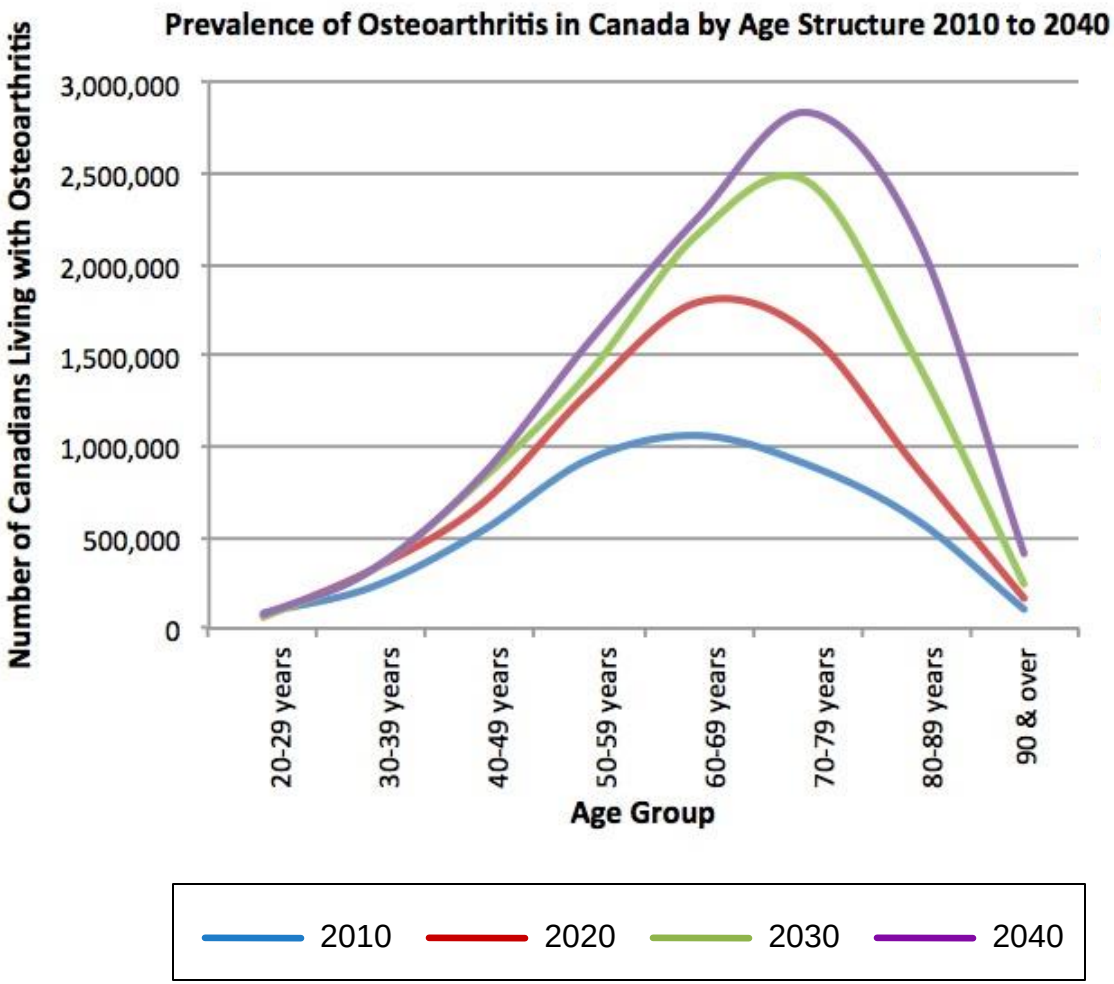
Osteoarthritis



- Most common form of arthritis
- Affects about 4.4 million Canadians
- In 2010, direct & indirect costs were approx. $27 Billion

Arthritis Alliance of Canada 2011

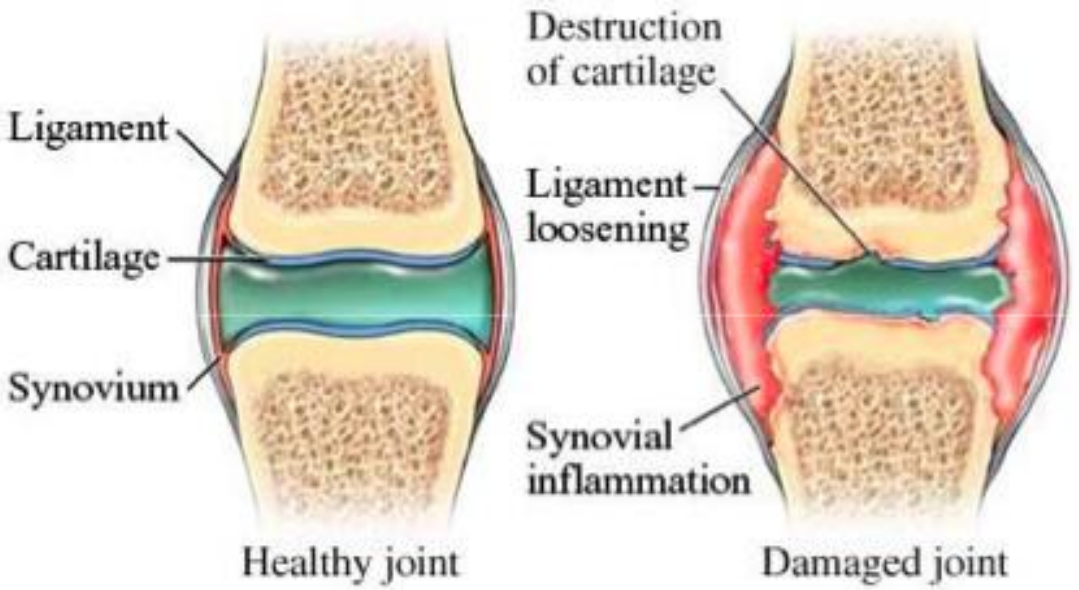
Osteoarthritis

- Progressive joint disorder involving the degeneration of joint tissue and articular cartilage.

- Results in: joint space narrowing, pain, stiffness, loss of function, and disability.

- Most common in the hands, hips, knees and spine.

- Knee OA results in the most severe disability.



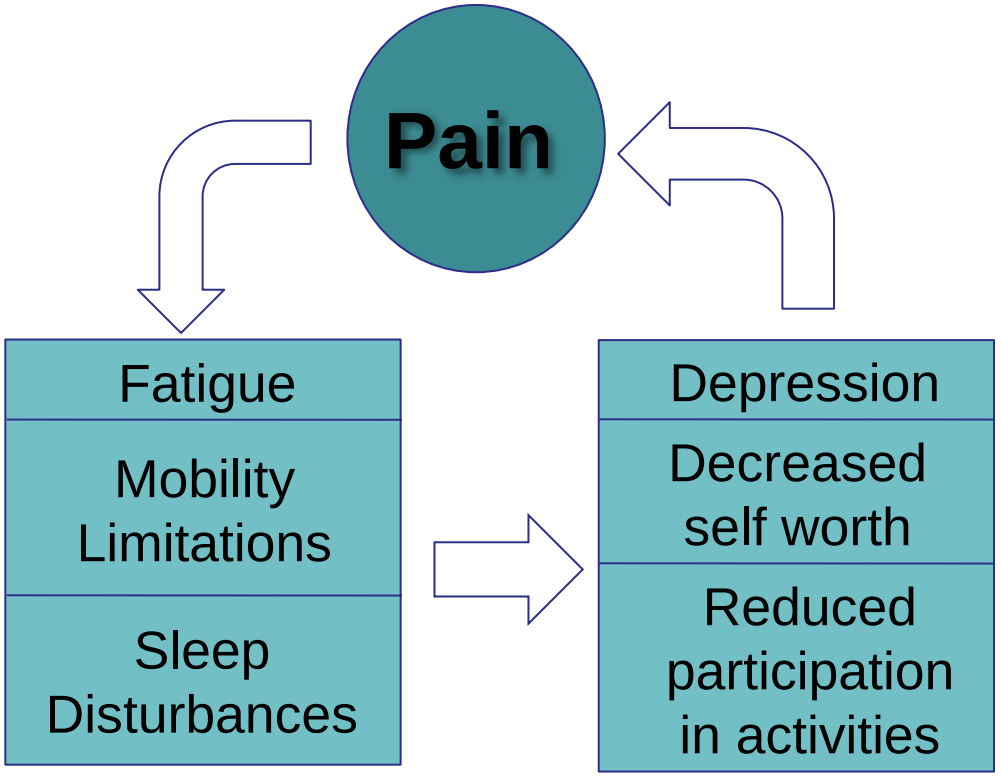
Hunter et al 2013, Loser et al 2010

Pain in Osteoarthritis

- Pain is the main clinical symptom in OA.

- Patients with OA have lower quality of life scores when compared to patients with other chronic conditions.

- There is no cure for OA and many live in daily pain and with disability.



Hawker et al 2011, Maly & Krupa 2007, Martell-Pelliter and Pelliter 2010, Alonso et al 2004

Treatment Options

Exercise

Weight loss

Knee braces or canes

Physical Therapy

Supplements

Medications

Hunter 2009, Monsournia et al 2012, Cao et al 2013, Sale et al 2006, Wang et al 2012

Medication Use

- Associated with adverse health effects:
  - Gastrointestinal
  - Cardiac
  - Renal
- Increased risk in older, chronic users
- People don’t like taking pills, makes them feel “sick” and “old”.

Sale et al 2002, Davis et al 2003, Hooper et al 2004, Schnitzer et al 2004

Dietary Constituents

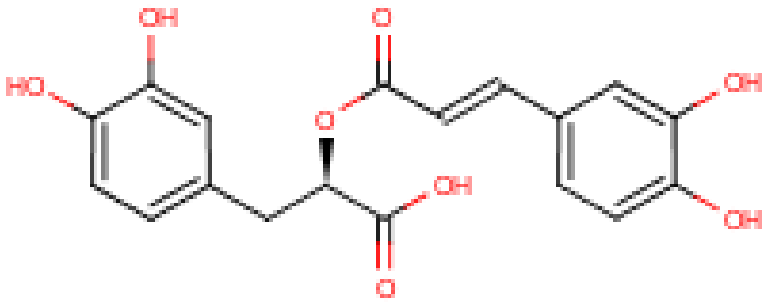
- Glucosamine & Chondroitin
  - Management guidelines recommend against use

- Promising effects:
  - Rosehip powder
  - Avocado/soybean unsaponifiables
  - Boswellia serrata extract

McAlindon et al 2014, Clegg et al 2006, Mason et al 2004, Christensen et al 2008

Rosmarinic Acid

- Plant polyphenol
- Naturally present in spearmint, peppermint, fennel and other herbs
- Strong anti-inflammatory and antioxidant activities



Fletcher et al 2005, Youn et al 2010

High-rosmarinic acid (RosA) spearmint plant developed via selective breeding

High-RosA spearmint reduces joint inflammation in horses

Human study to test high-RosA spearmint tea in patients with knee osteoarthritis

Plant Agriculture

Ontario Veterinary College
CLINICAL STUDIES

Human Nutraceutical Research Unit

Fletcher et al 2005, Pearson et al 2010

Methods

- Double-blind, randomized, controlled clinical trial
- 16 Weeks

High-RosA

N=25

~ 300 mg rosA/day

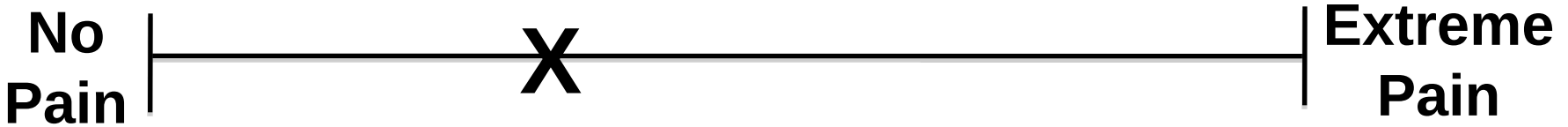
Control

N=25

~ 30 mg rosA/day

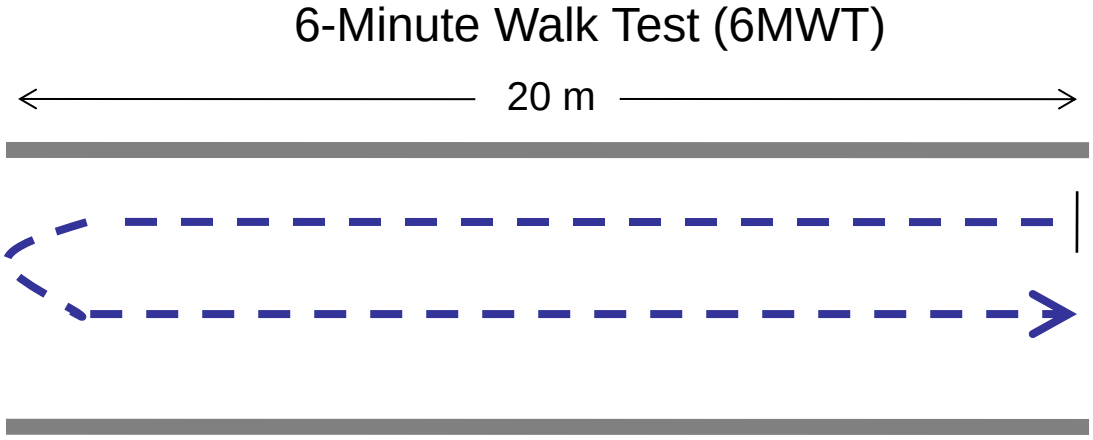
Methods

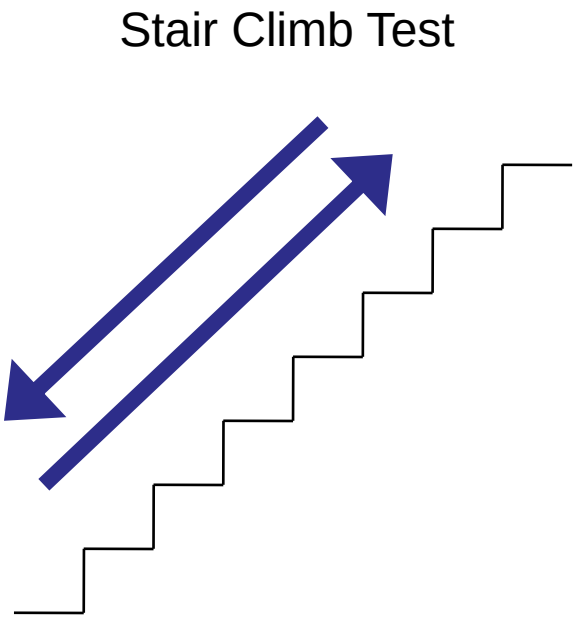
- Pain, stiffness, and physical function were assessed with the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC).
  - 24-item standardized questionnaire
  - Most commonly used tool to assess symptoms in OA research
  - 100 mm visual analog scale



Methods

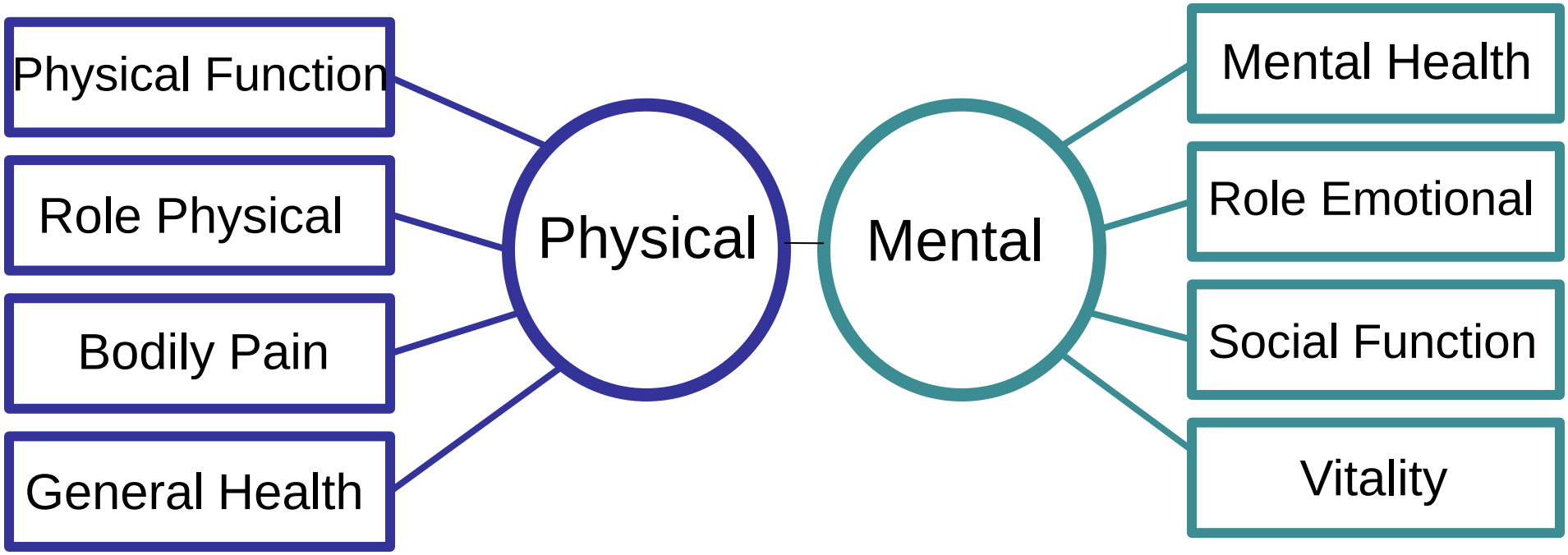
- Physical function was assessed with a 6-minute walk test (6MWT) and stair climb test.

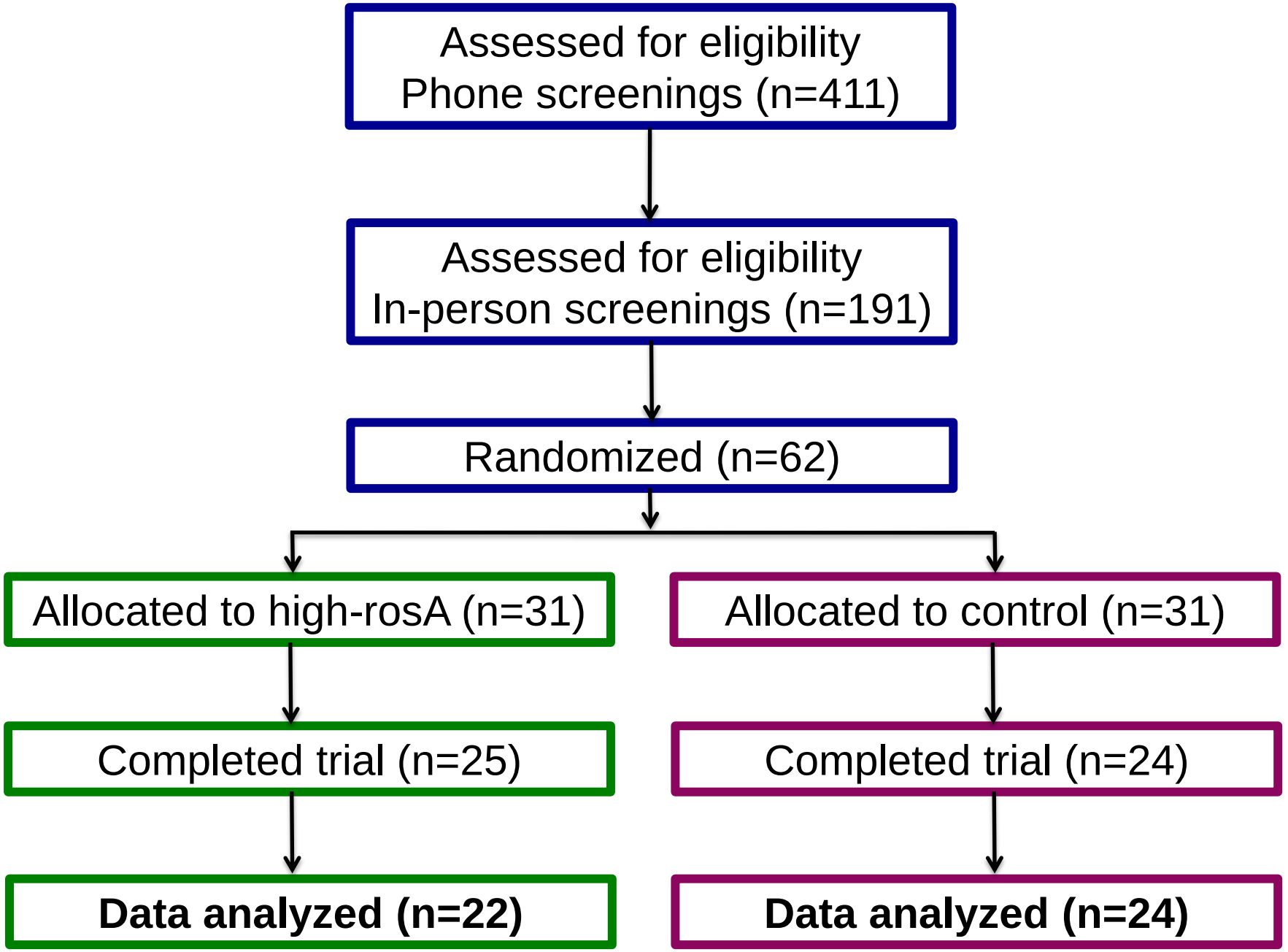




Methods

- Quality of Life: Medical Outcomes 36 – item Short Form General Health Survey (SF-36)




Assessed for eligibility
Phone screenings (n=411)
Assessed for eligibility
In-person screenings (n=191)
Randomized (n=62)
Allocated to high-rosA (n=31)
Allocated to control (n=31)
Completed trial (n=25)
Completed trial (n=24)
Data analyzed (n=22)
Data analyzed (n=24)

Results

Participant Characteristics at Baseline		
Characteristic	**High-RosA (n=22)**	**Control (n=24)**
Age (years): mean ± SD	60.5 ± 11.1	60.8 ± 12.1
BMI (kg/m^2): mean ± SD	34.3 ± 8.6	31.5 ± 6.9
Men/Women: N	8/14	6/18

Results

- Tea consumption compliance:
  - High-rosA: 96.8%
  - Control: 94.8 %

- No serious adverse events reported
- Few mild, transient adverse events reported in both groups
  - Mild GI upsets
  - Headache
  - Staining of dentures

WOMAC Scores

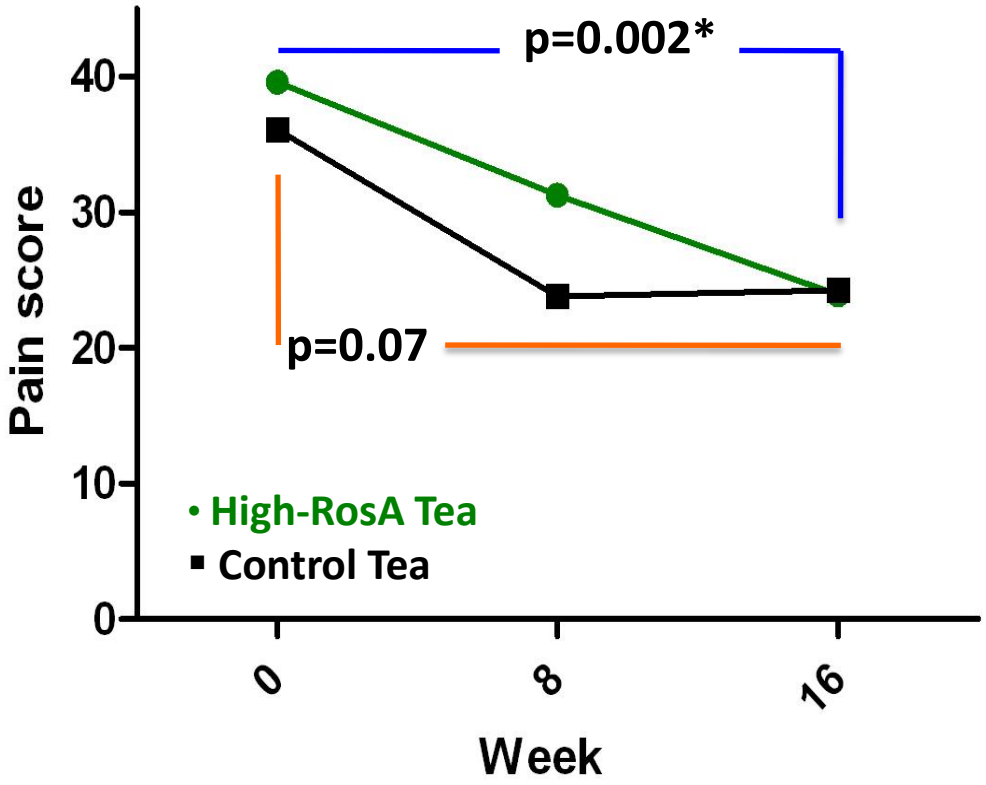


Figure 1. Pain Scores as Assessed by The Western Ontario and McMaster Universities OA Index (WOMAC).

- No significant difference between groups.
- Stiffness and physical function scores decreased over time in both groups.
- Pain scores also decreased in both groups, with the change only being significant in the high-rosA tea group.

6-Minute Walk Test

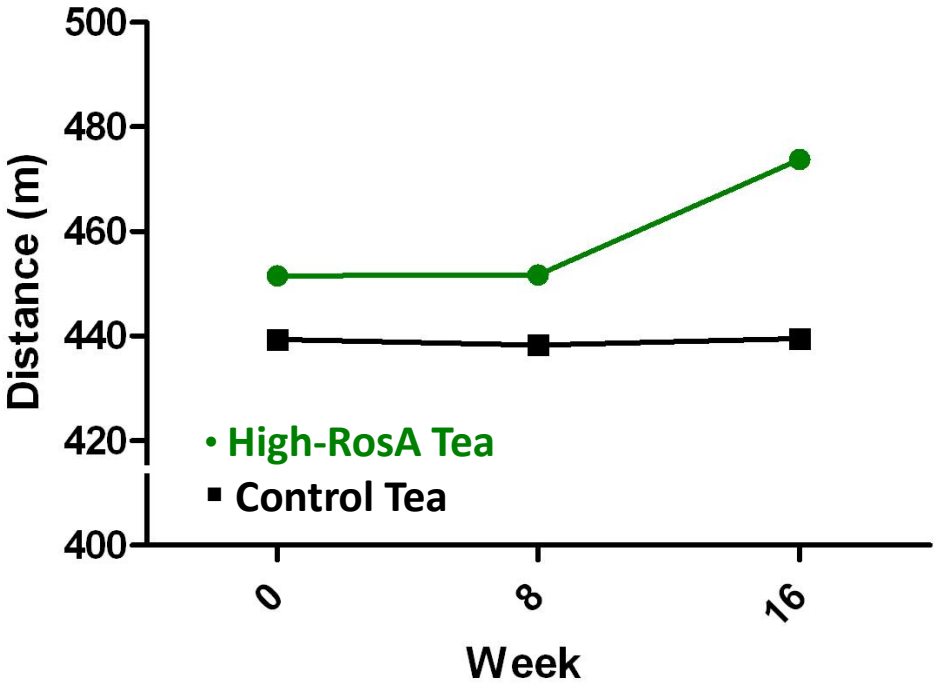
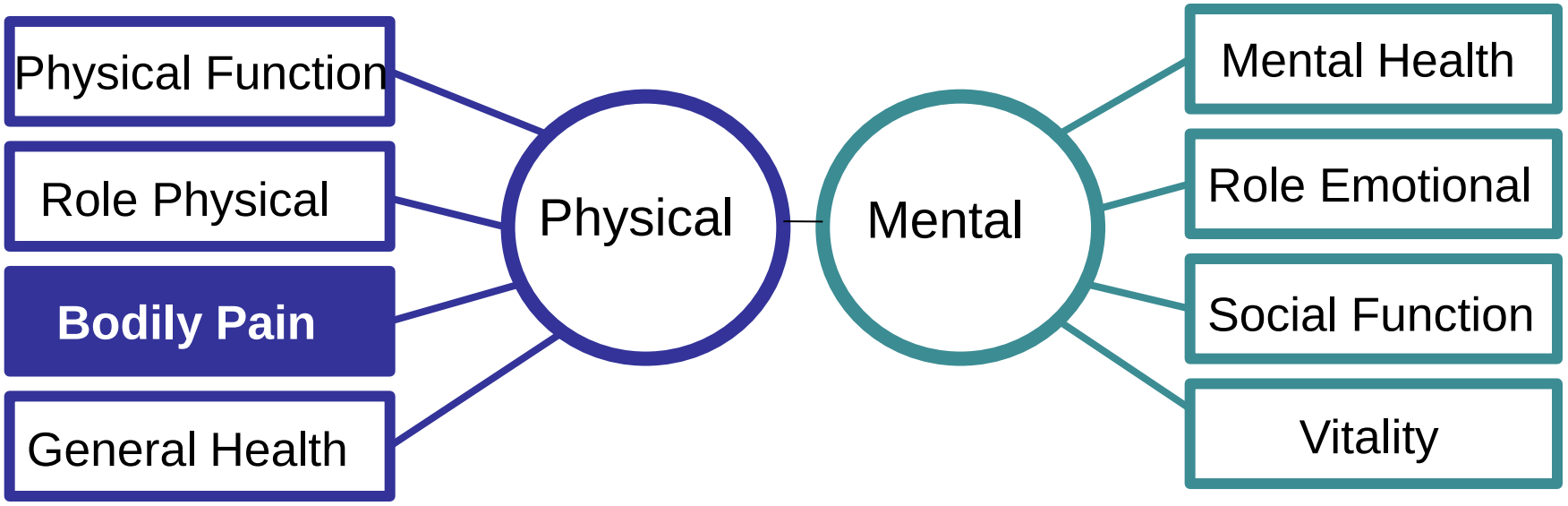


Figure 2. Physical Function was assessed with a 6-minute walk test at Weeks 0, 8 and 16

- Although not significant, the high-rosA tea group walked 22 m further at Week 16.
- There was no significant changes for the stair climb test.

Quality of Life – SF36 Scores

- No significant differences between groups at any time
- Significant increase in QoL - Bodily Pain within the high-rosA group from Week 0 to Week 16 (p=0.03)



Conclusions

- Daily consumption of 2 cups of high-rosA spearmint tea for 16 weeks decreased pain in adults with knee OA.

- This novel dietary strategy warrants further examination as a complementary strategy to manage pain in knee OA.

For more information

- Full publication:
  - Connelly et al. High-rosmarninic acid spearmint tea in the management of knee osteoarthritis symptoms. J Med Food. 2014, 17(12):1361-1367.

Acknowledgements

- Study participants
- Master and undergraduate research students
- Dr. Laima Kott
- Dr. Amy Tucker
- Dr. Alison Duncan
- Dr. Amanda Wright

Questions?

NUTRITION RESOURCE CENTRE
CENTRE DE RESSOURCES EN NUTRITION

NRC Grand Rounds Webinar Series presents

Digital diagnosis of population nutrition

Understanding consumer food choices are important to promoting healthier diets and preventing obesity and chronic diseases such as diabetes and heart disease. However, currently available methods (ex. diet surveys) to track population-level eating behaviors are resource intensive and subject to significant measurement error and bias, and therefore not practical for routine public health use. In this webinar, you will learn about a novel approach to tracking consumer food choices - using digital food purchasing data from grocery stores - and how this information can be used to develop more targeted strategies to promote healthy eating and monitor the effectiveness of such efforts.

David Buckeridge, MD, PhD
Associate Professor
Epidemiology and biostatistics
McGill University

Thursday June 18, 2015
12:00 pm – 1:00 pm

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