College of Biological Science
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Strategic Research Directions in Food and Health

**Themes**

Health – Nutrition, Wellness

Applied Genomics - Crop Biotechnology, Nutrigenomics DNA bar-coding

**People**

100 faculty - 34 new in the last 7 yrs

10 CRCs - 4 new in the last 3 yrs

320 Graduate students + >4000 Undergrads
College of Biological Science
Research Directions in Food and Health

**Infrastructure**

AAC / Phytotron, Animal Holding

Biodiversity Institute of Ontario

*Human Nutraceutical Research Unit*

*Human subject trials*

**Funding**

$28.5 M p.a.

- $10 M Tri-council
- $1M OMAFRA
CBS Departments

Human Health and Nutritional Science

Molecular and Cellular Biology

CBS

Integrative Biology

Biodiversity Institute of Ontario
Biodiversity Institute of Ontario

60+ dedicated specimen and molecular technicians and postdoctoral fellows.

2 Biomek FX robotic systems for extraction and reagent preparation.

454 and ABI 3730xl sequencers.

~ 500 K specimens bi-directionally sequenced / year.
Fish supply chain open to abuses

The rampant mislabeling of fish that consumers buy can be largely traced to this: the lack of anything like the regulations imposed on meat suppliers.

By Beth Daley and Jenn Abelson | GLOBE STAFF | OCTOBER 24, 2011

The Globe found that tilapia (right), an inexpensive farmed fish, was substituted for wild red snapper (left).
Food Contamination:
Mouse head found in microwave dinner
Human Health:

Obesity (600 genes) → Diabetes → Cardiovascular Disease

- T2D - 1 in 10 in Ontario
- 366M Worldwide by 2030
- ↑↑ in ♀ 20-44
- $15B p.a.

- 3M cases per year
- $22B p.a. Canadian economy

Healthcare costs - $$Billions

Prevention better than cure
HEALTH FOR LIFE - WELLNESS, DISEASE PREVENTION

Chronic diseases
\textit{diabetes, cardiovascular, obesity, cancer}

- 4 recent hires HHNS, CRC – Wright, Sharom

Lifestyle and Nutrition
(e.g. nutrition, biomechanics, aging)

- 7 recent hires HHNS
- New partnerships with Guelph Humber
- Expansion of the HNRU

Infectious disease
(e.g. virulence, resistance, drug discovery)

- 4 recent hires-MCB
- CRCs-Whitfield, Lam
- CFI Investments- Membranes and surfaces

Genetics
(e.g. developmental predispositions to disease, epigenetics)

- 2 recent hires- HHNS
- 2 recent hires- MCB
- CRCs- Jones, Harauz, Sharom
- New partnerships - GRYPH

More than 60 faculty
Examples of Food for Health projects:

A. Duncan: Soy – LDL cholesterol

D. Mutch: Nutrigenomics, fat cells and insulin signalling

D. Dyck: Conjugated linoleic acid (CLA) Cow’s milk – impact on insulin sensitivity

D. Ma: Omega-3 fatty acids, cholesterol, cancer

E. Allen-Vercoe & C. Khursigara: Probiotics and biofilms on the human gut, Gut microbiota

M. Emes et. al: Resistant starch – T2D and colon cancer
Human Nutraceutical Research Unit (HNRU):

- Spearmint Tea – Rosmarinic Acid – osteoarthritis
- Evaluation of commercial products with satiety claims

A. Wright - Director

- KTT – Agri-Food for Healthy Aging

A Duncan
Human health benefits associated with consumption of resistant starches

- Resistant starches have a low glycemic index (GI)
  - increased insulin sensitivity
  - reduced risk of type-2 diabetes

- Resistant starches promote gut health
  - act as a dietary fibre
  - reduce risk of colorectal cancer
Integrative Research:  *Resistant Starch*

- Crop production
- Starch chemistry
- Food Science (Canada Bread)
- Human Subject Trial
  - Type 2 Diabetes
  - Gut microbiota, Colon health
Challenges and Opportunities

• Chronic diseases – 70% healthcare costs
• Consumer – desire for healthier food
• Time-lines from research to products on shelf
• Realistic expectations
• $$
Resistant Starch - Metabolic Mechanisms

Topping et al, 2003
Resistant Starch – Baked bagels (Canada Bread)
Type 2 Diabetes, human subject cohort trial

Glucose

- Treatment A
- Treatment B
- Treatment C
- Treatment D