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<https://metabolismmlab.com/>



Changing Portion Sizes

1954
Burger King



2.8 oz
202 calories

2004



4.3 oz
310 calories

1955
McDonald's



2.4 oz
210 calories

2004



7 oz
610 calories

1900
Hershey's



2 oz
297 calories

2004



7 oz
1,000 calories

1916
Coca-Cola



6.5 fluid oz
79 calories

2004



16 fluid oz
194 calories

1950s
Movie popcorn



3 cups
174 calories

2004



21 cups (buttered)
1,700 calories

The Abundance of Foods to Choose From

All foods once looked like this...

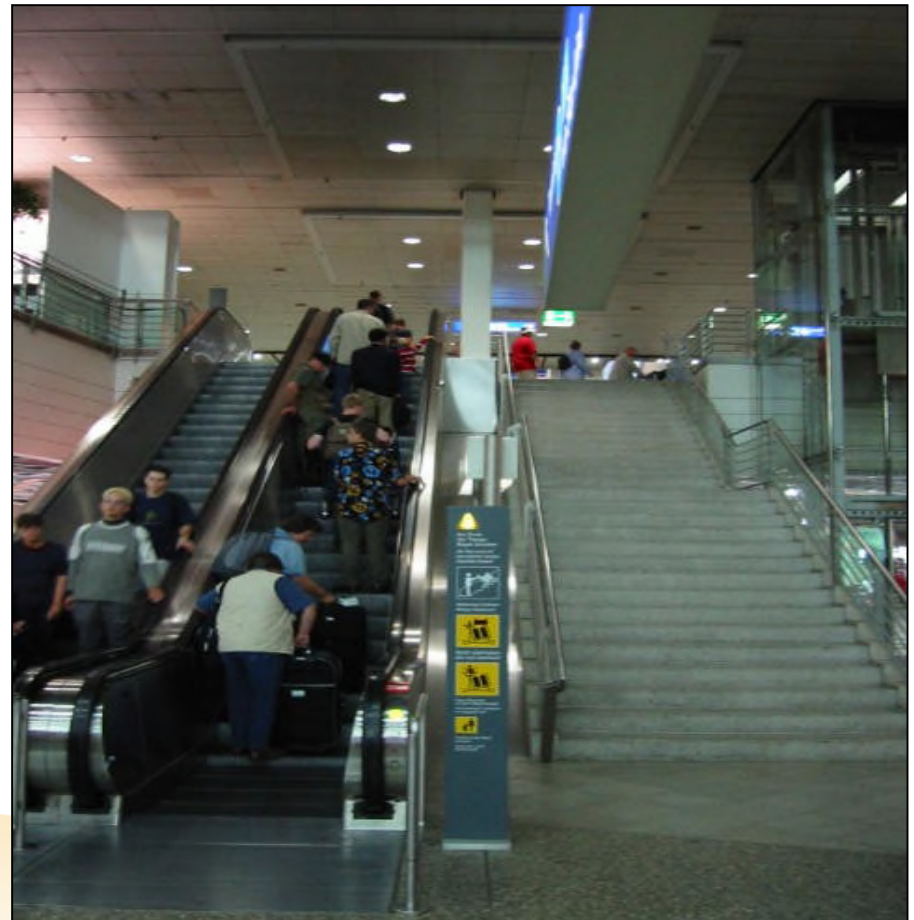


The Challenge of Choosing Foods

...but now many foods look like this.



Lack of Physical Activity

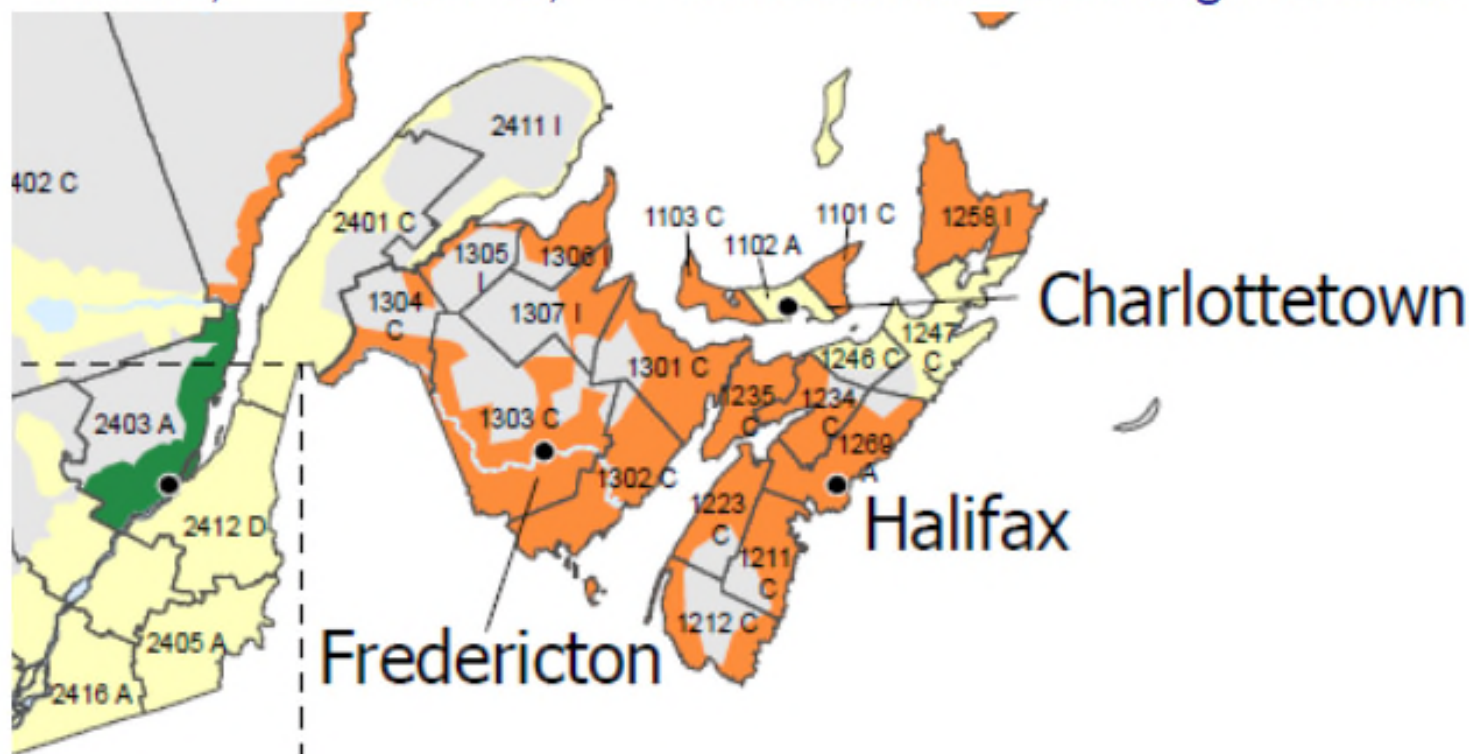


Health Care Spending > Exceeding GDP Income

Overweight and Obesity in Maritimes

Adults who are overweight or obese 2009/2010

Orange Above, Yellow similar to, Green below national average of 52%



Source: Statistics Canada

Source: *Blended Account, Health Care Satellite Account, Bureau of Economic Analysis*





Getting to the Heart of a Solution: **Vulnerable Patients**



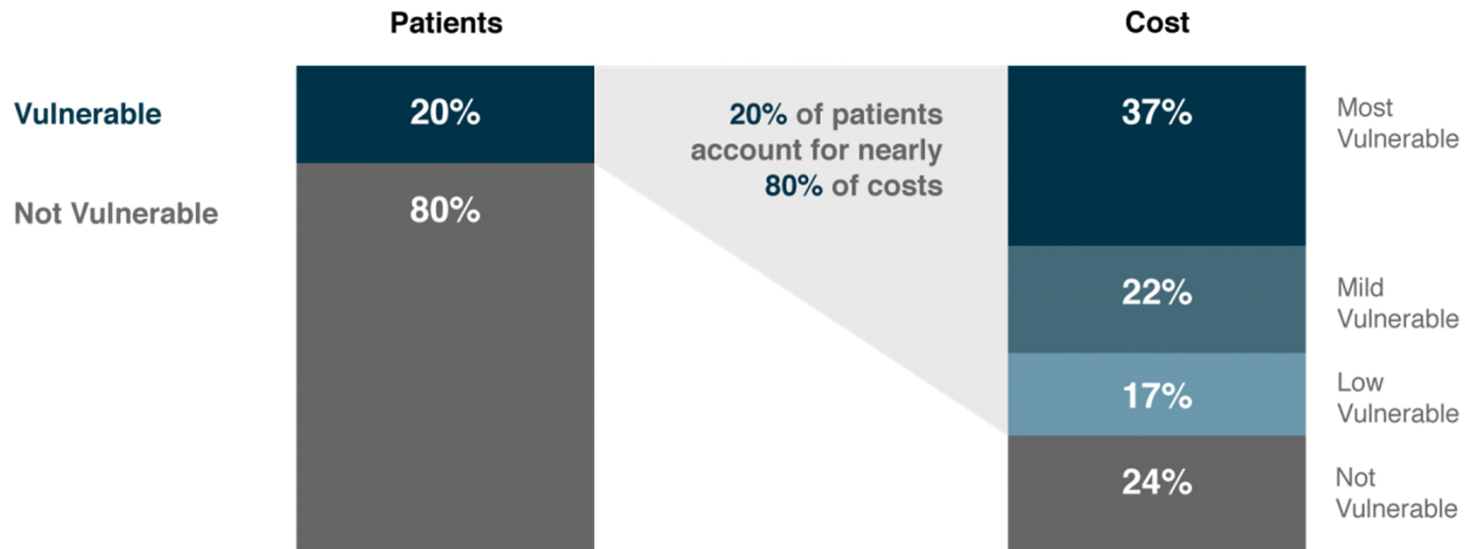
Pregnant mothers and
Developing fetuses



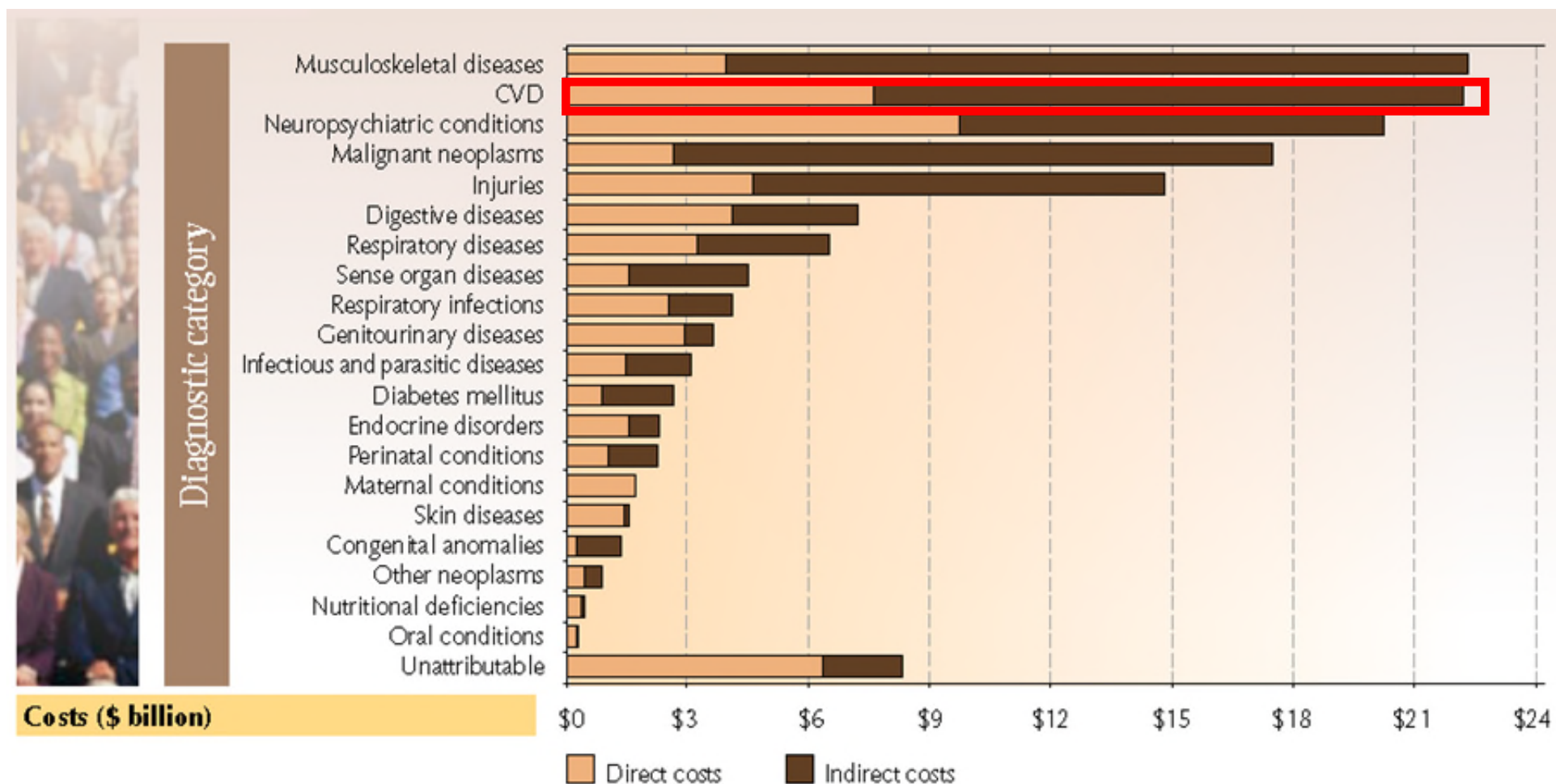
Infants and
developing children



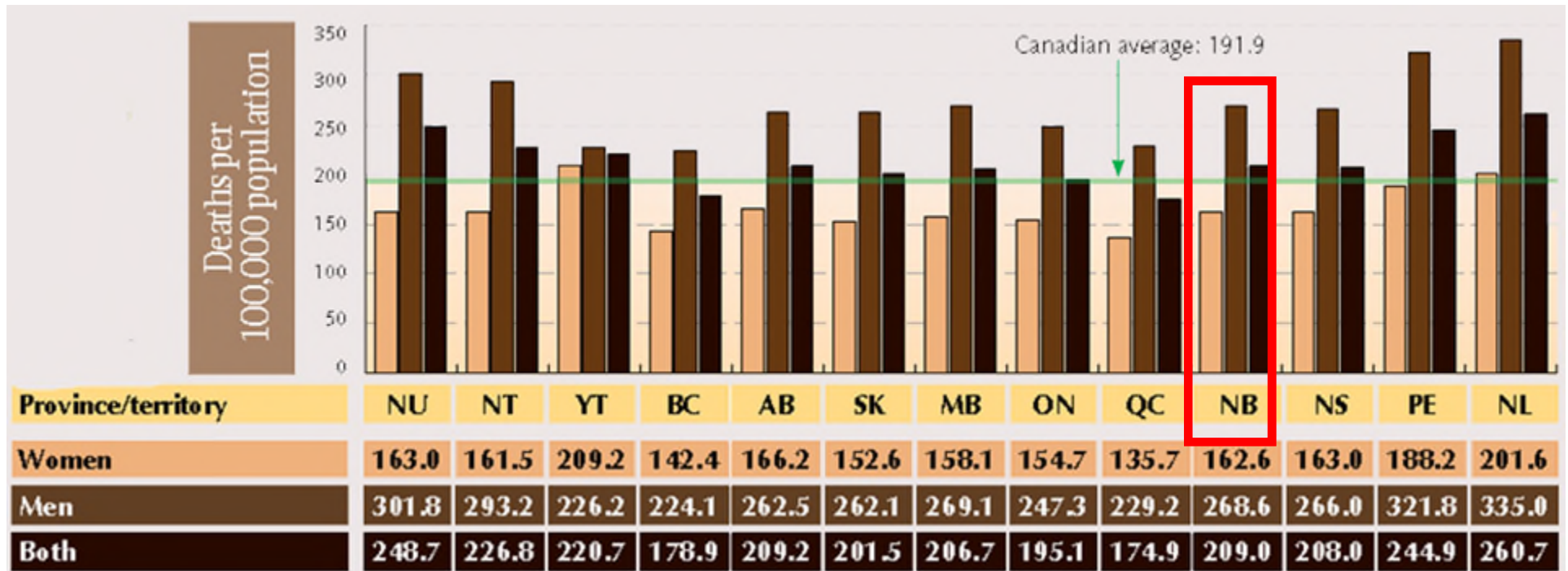
Elderly



Economic Burden of Cardiovascular Disease



Cardiovascular Disease in Canada

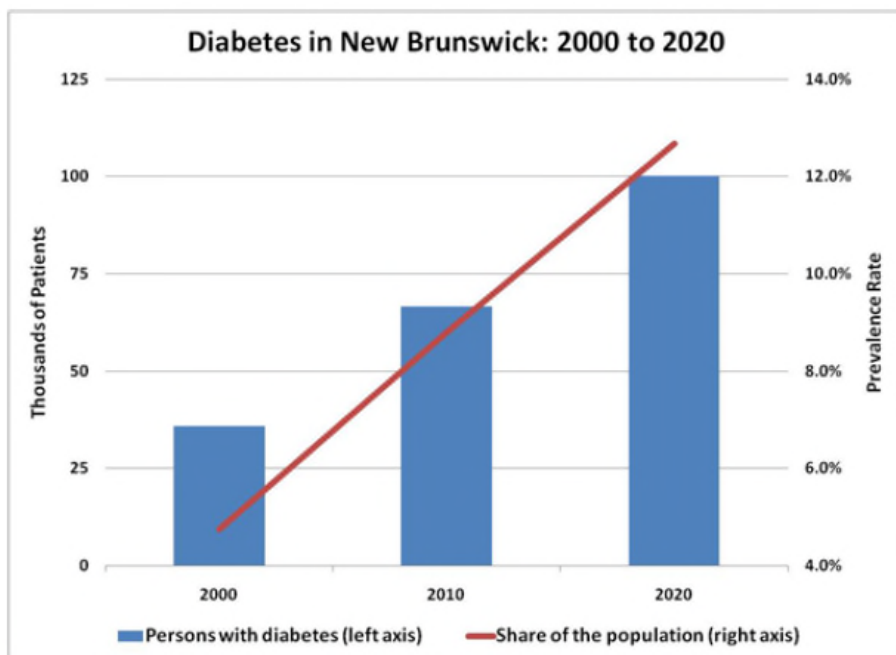


One out of five deaths in New Brunswick are from cardiovascular disease

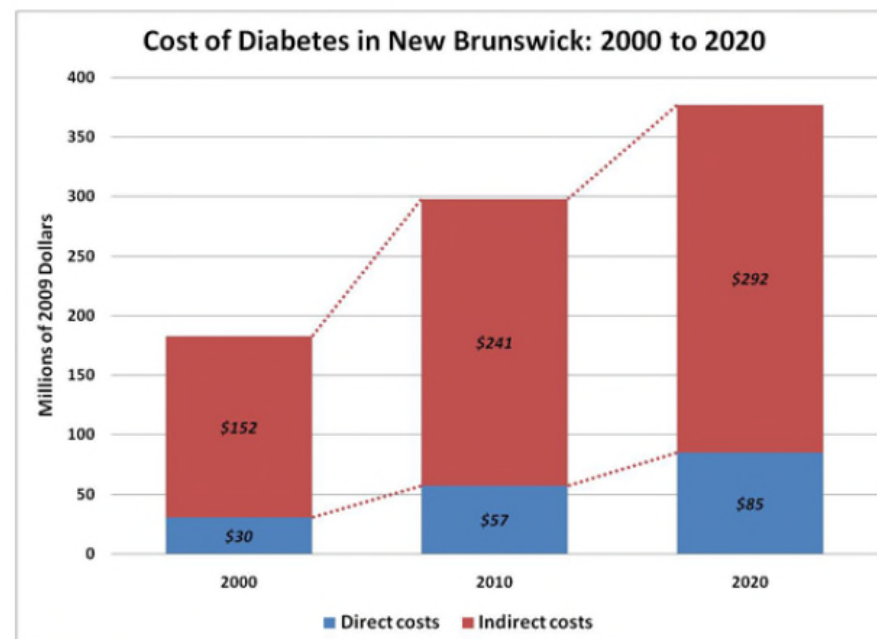
A close-up photograph of a healthcare professional's hand, wearing blue scrubs, gently holding a patient's hand. The patient's hand is resting on the professional's hand, and a gold ring is visible on the patient's finger. The background is blurred, showing more of the professional's scrubs and the patient's arm.

Why is research so vital to health?

Research Enables Trend Reversal & Innovation Supports Transitions



Source: New Brunswick Diabetes Cost Model



Source: New Brunswick Diabetes Cost Model

Diabetes in New Brunswick (Table 1)

	2000	2010	2020
Persons with diabetes (left axis)	36	67	100
Share of the population (right axis)	4.7%	8.8%	12.7%

Cost of Diabetes in New Brunswick in Millions of 2009 Dollars (Table 2)

	2000	2010	2020
Direct costs	30	57	85
Indirect costs	152	241	292



In 2012 We Had a **Mission**



Build a Nationally Competitive BioMedical
Research Program **in Saint John, NB**
. . . from scratch



Benefits of a medical school program



People

Attract, Engage,
Retain and
Develop the
World's Best
People



Biomedical Discovery

Become the
Exemplary Model
for Biomedical
Research by
Advancing and
Integrating
Discovery,
Innovation,
Translation and
Dissemination



Patient- and Family- Centered Care

Be the National
Leader in the
Safety, Science,
Teaching and
Provision of
Patient and
Family Centered
Care



Education

Lead the World
in the Education
and Training of
Physicians and
Biomedical
Scientists



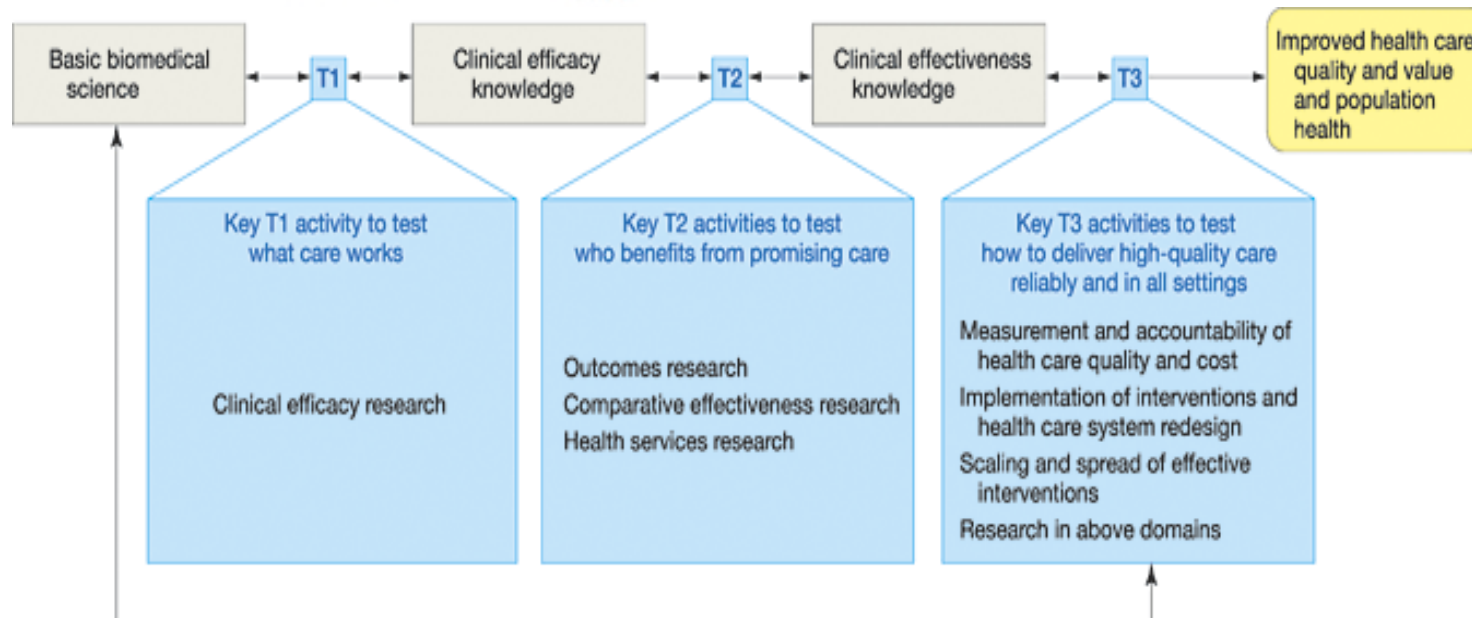
Integration

Become the
Model for an
Academically
Based,
Integrated
Health Care
Delivery and
Financing
System



Performance

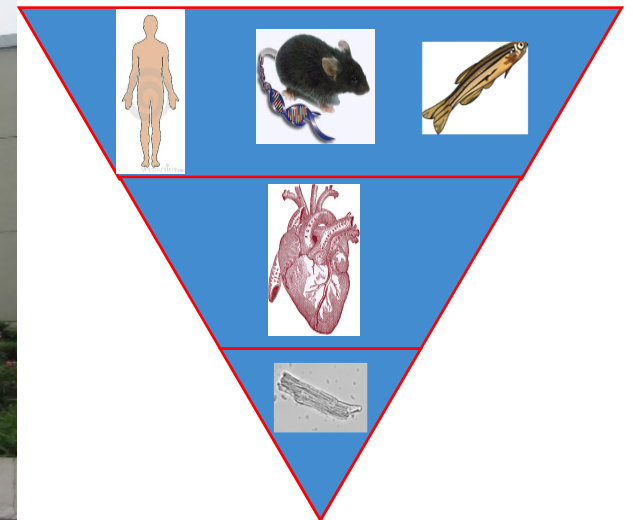
Create
Sustainable
Financial
Success and
Implement
Continuous
Performance
Improvement



Dalhousie Medicine New Brunswick

**First Centre in NB for Discovery & Translational Research
in Cardiovascular & Metabolic Sciences**

- *Accelerating pace of discoveries in biology and disease research*
- *Translating discoveries into effective therapies*



Quick Facts for DMNB Biomedical Research Facility

~6000 Sq. Ft. Lab Space



Funding partners

- ACOA
- PETL NB Govt
- Dalhousie Capital Health
- CFI
- Private Donors
- HLSNB
- NBHRF
- NSERC
- SJRHF

- Official lab opening Oct 24, 2013
- 4 Faculty Researchers
- 6 Research technicians
- 6 Postdoctoral fellow
- 10 Graduate students
- 20 Summer UGME students
- 4 Research Administrators

IMPART Science: 54 Published Scientific Articles; 10 Clinical Trials
IMPART Funding: \$1 M Operation, \$148K Equipment, \$50K Scholarship, \$60K Industry
IMPART Infrastructure: BioBank (2015), Website (2017)
<http://www.impart.team>
IMPART Translation: 1 Service; 2 Patents; 1 Spin-Out Company

Research Platforms and Capabilities at DMNB

ChemiDoc



FACS



Ultracentrifuge



FPLC



Oxygraph



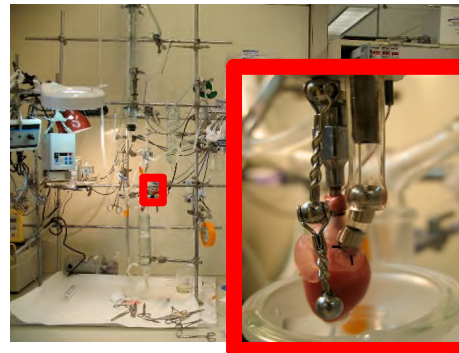
QPCR



Myocyte
Contractility



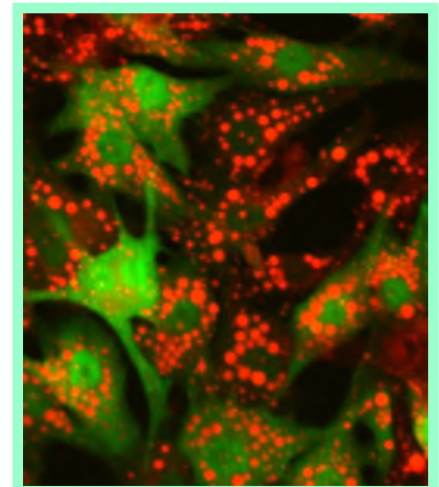
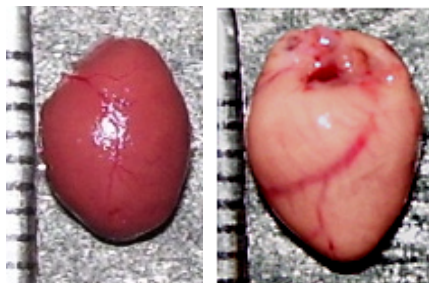
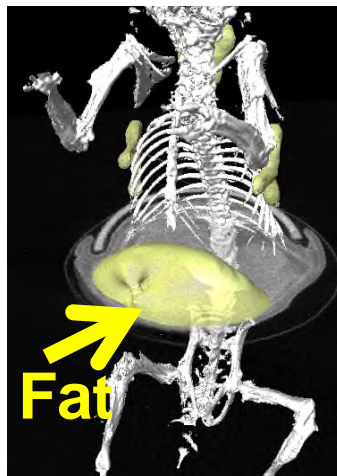
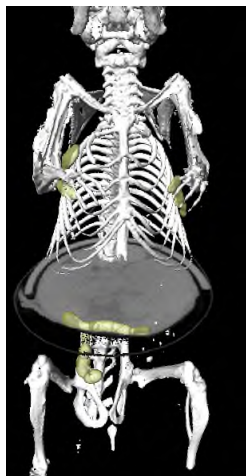
Heart Perfusion Unit



Microscope



Animal
Imager



Funding Success at DMNB since 2014

Pulinilkunnil Lab:

- Role of nutrients in cardio-metabolic health and disease (Obesity & Diabetes)
- Integrative physiology and metabolism-Maternal/Paternal Imprinting
- Cardiotoxicity of anti-cancer drugs
- Novel preclinical models of cardiac diseases (zebrafish and yeast)

Kienesberger Lab:

- Study of lipid signaling and metabolism in the heart
- Endocrine regulation of heart function
- Metabolic heart disease (obesity & diabetes)

Brunt Lab:

- Stem cell biology and cardiac regeneration
- Nanoparticles targeting cardiac tissue
- Heme Metabolism

Reiman Lab:

- Myeloma Pathogenesis
- SNPs in Cancer

<u>Type</u>	<u>Agency</u>	<u>Funds</u>
Federal	NSERC	\$675,000
Federal	CFI	\$1,125,000
Federal	Diabetes Canada	\$750,000
Federal	CCS/CIHR/Ter.Fox	\$5,440,000
Federal	CIHR	\$700,000
Federal/Provincial	Mitacs/Vanier	\$282,700
Federal/Regional	ACOA	\$625,000
Provincial	NBHRF	\$328,850
Provincial	NBIF	\$150,000
Provincial	HLSNB	\$110,000
Regional	SJRH	\$43,000
Regional	DMRF	\$500,000
Regional	Chesley Foundn.	\$150,000
Regional	BHCRI	\$27,500
Industry	Soricimed Inc.	\$25,000
Industry	BioSign Inc.	\$60,000
Industry	NB-BioMatrix Inc.	\$30,000
	Federal	\$10,060,950
	Extra-Provincial (NB)	\$338,376
	Intra-Provincial (NB)	\$568,850
	Total	\$10,086,176

Diseases are like **Dragons**.



Yeah We Can Slay Dragons!!!

2017 = \$575,000; 3 Staff & SuperResolution

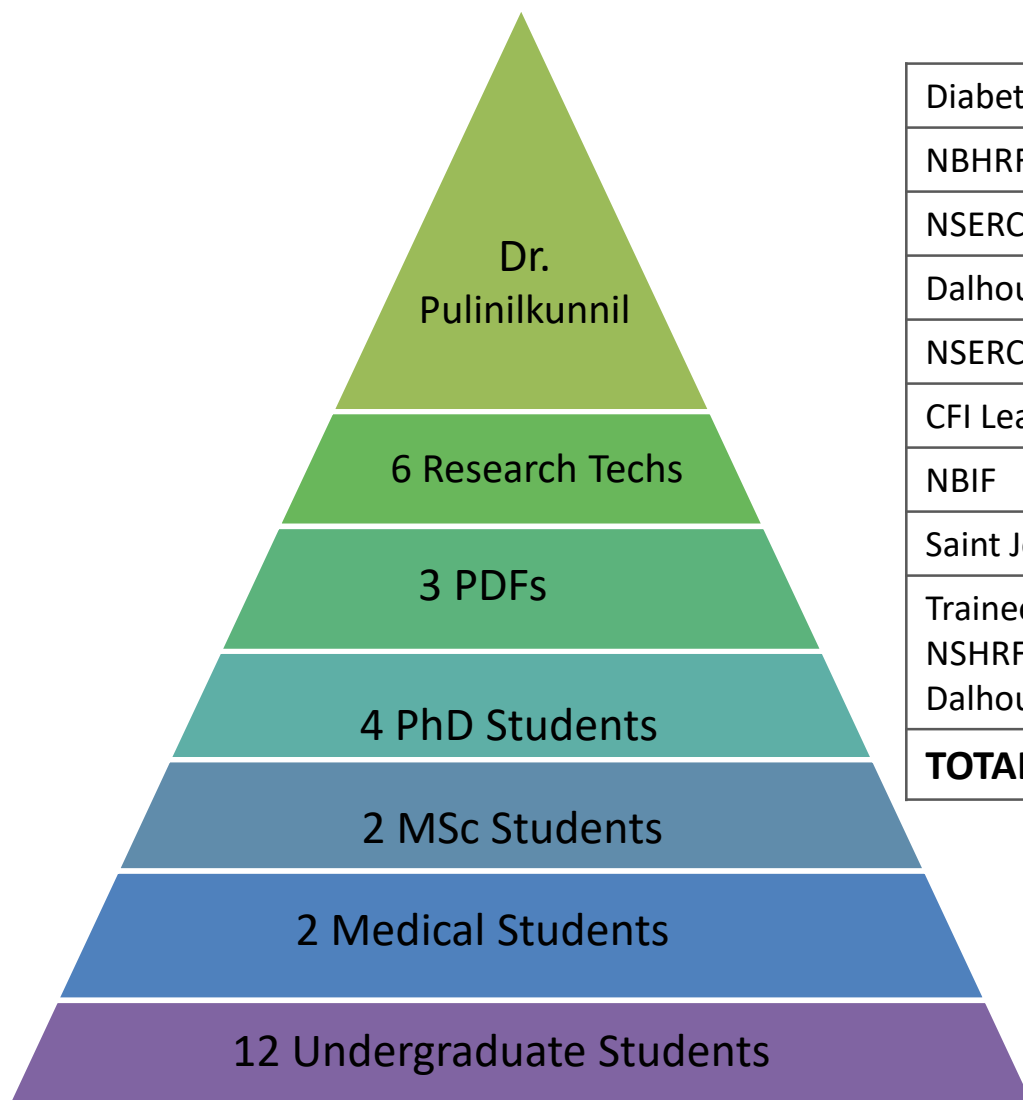


What Happens When We Work Together?



What Happens When We Succeed?

Dr. Thomas Pulinilkunnil (Saint John)



Diabetes Canada	\$750,000
NBHRF	\$100,000
NSERC Discovery & Engage	\$250,000
Dalhousie Medical Research Foundation	\$100,000
NSERC RTI & NBIF	\$221,000
CFI Leaders Opportunity Fund	\$350,000
NBIF	\$100,000
Saint John Regional Hospital Foundation	\$50,000
Trainee Scholarships & Fellowships (NSHealth, NSHRF, GNB-PETL, NBHRF, CIHR-MSSU, Mitacs, Dalhousie)	\$200,000
TOTAL (2014 – 2019)	\$2,504,000

Patient-Centered Research is a Resource & Health Innovation is our Future Enterprise

HEALTHCARE MARKET REVENUE FORECASTS

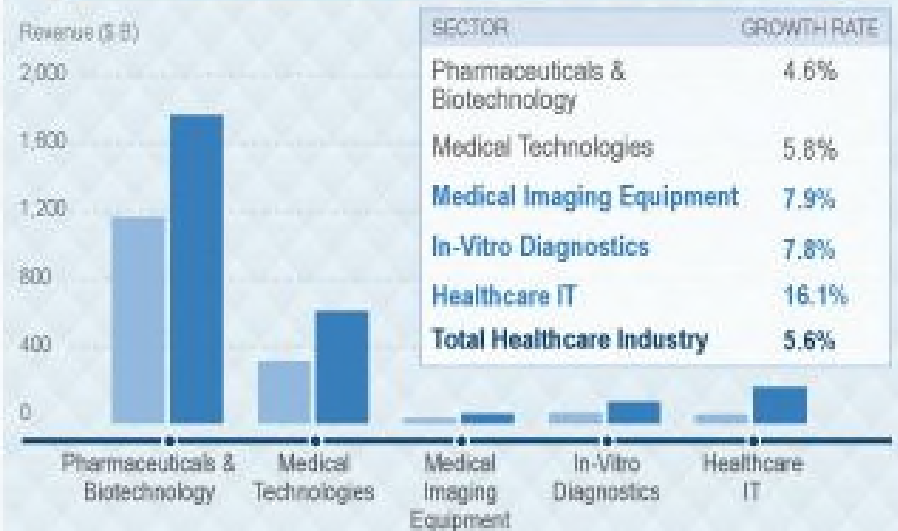
HEALTHCARE INDUSTRY REVENUE FORECAST, GLOBAL, 2016-2025



Growing at a **CAGR of 5.6%**, the global healthcare industry is likely to reach a size of \$2.69 trillion by 2025.

Note: All figures are rounded. The base year is 2016. Source: Frost & Sullivan.

HEALTHCARE REVENUE BY SECTOR IN 2016 AND 2025



■ 2016 ■ 2025

Note: All figures are rounded. The base year is 2016. Source: Frost & Sullivan.



Today **Research** Celebrates **5-years** of Growth

53

Original Research Articles Communicated

\$15,700,252

In Direct Funding & Infrastructure Acquired

For Saint John!!!





We need *YOU* to
IMPART a better
future with us!!!



Acknowledgments

Pulinilkunnil Lab:

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University of North Carolina:

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Dr. Duncan Webster

St.FX University:

Prof. Dan Kane



University of Washington:

Prof. Abhinav Diwan

University of Texas/TIGEM Italy:

Prof. Andrea Ballabio

Moncton University:

Prof. Mohamed Touaibia
Prof. Marc Surette

UBC:

Prof. Brian Rodrigues
Prof. Cory Neslow



New Brunswick
Health Research
Foundation



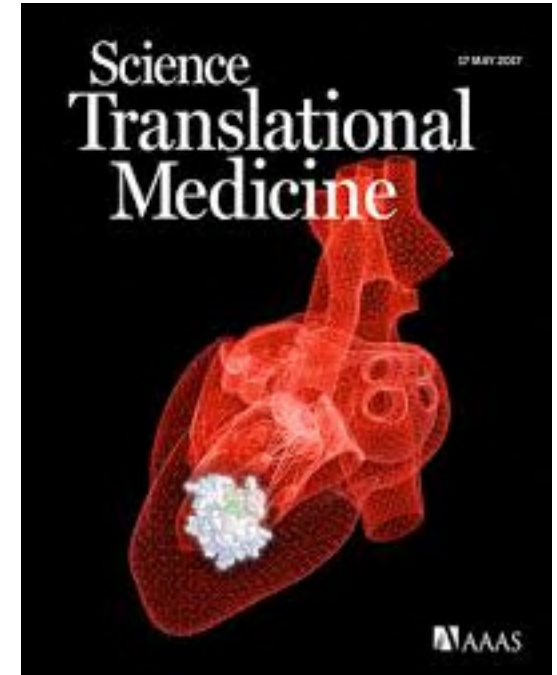
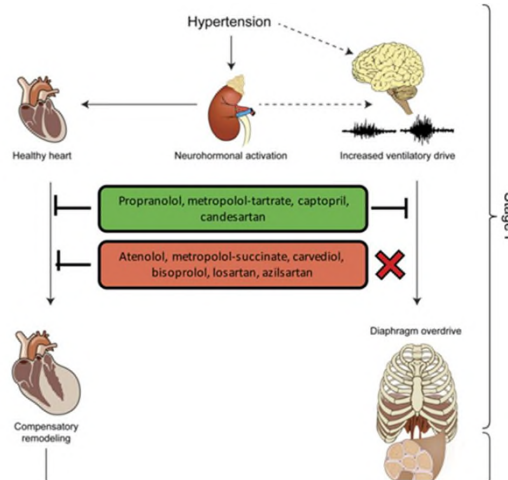
Fondation de la
recherche en santé
du Nouveau-Brunswick



Extra Slides



Dr. Keith “*Sexy-Pants*” Brunt



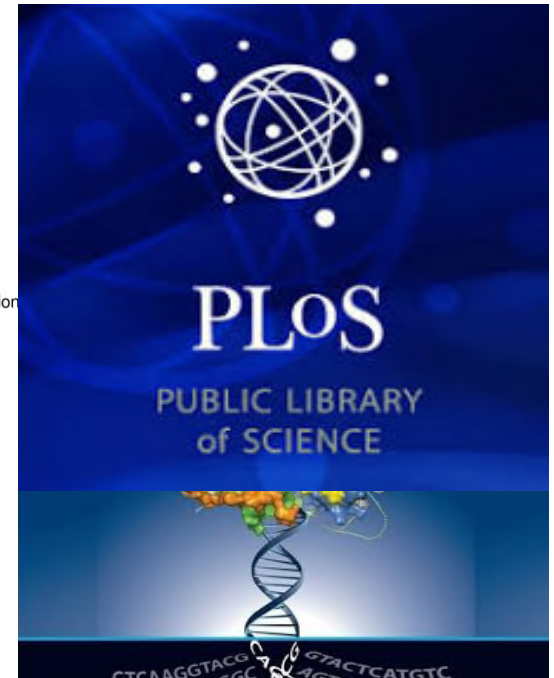
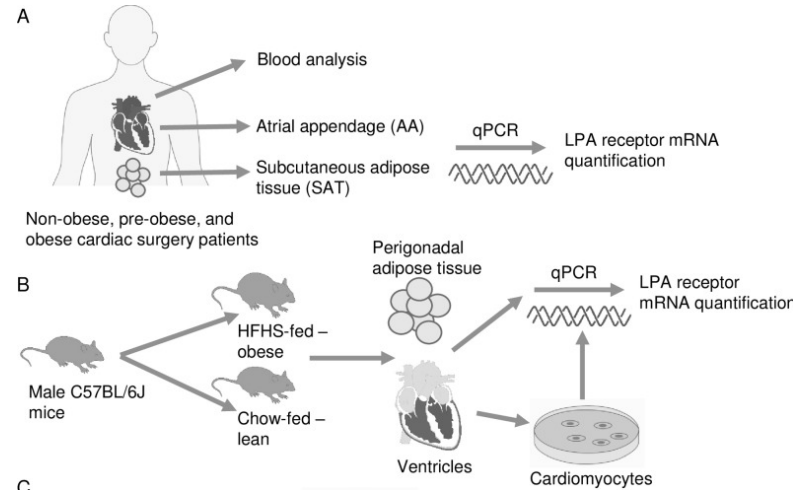
Identified Drugs to Treat Dyspnea in Heart Failure – New Guidelines in Development for Dyspnea Treatment in Heart Failure, Pulmonary Hypertension & Menopause

2017 = \$727,136; 4 Trainees & 3 Staff



What Are “*The Right*” Drugs for Everyone?

Dr. Petra “Wonder-Woman” Kienesberger



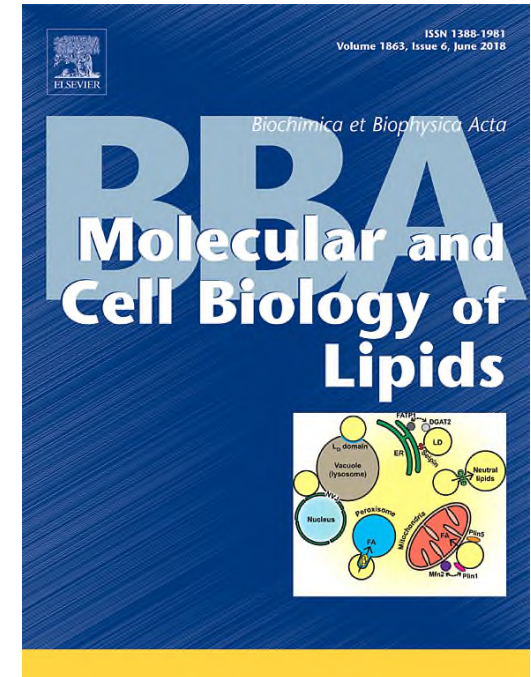
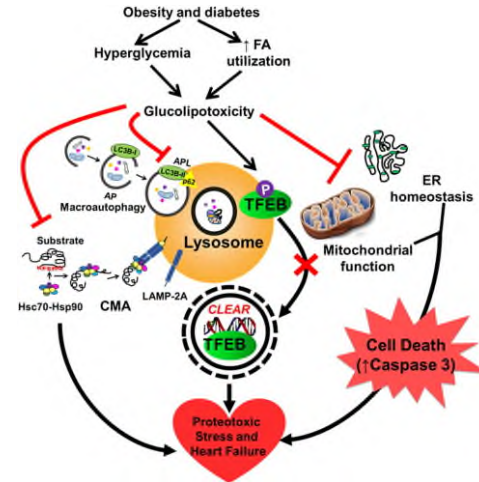
Identified the LPA receptors associated with poor clinical outcomes – New Drugs in Development for Pre-Clinical & Phase-1 Clinical Trials to turn fat healthy.

2017 = \$1,060,315; 4 Trainees & 2 Staff



What if I could make fat cells healthy again?

Dr. Thomas “*Fire-Ball*” Pulinilkunnil



Discovered how Diabetes Causes Heart-Damage from Saturated Fat – Improving Nutrition Guidelines & New Ways to Protect the Heart of Diabetic & Cancer Patients.

2017 = \$810,000; 6 Trainees & 3 Staff

**DIABETES
CANADA**

New Brunswick
Health Research
Foundation



BEATRICE HUNTER
Cancer Research Institute
Evolving Cancer Research in Atlantic Canada



Why do diabetic heart cells stop recycling?



How is research going to help?

The Future in Focus

Market – Push & Market - Pull



Technology



People



Outcomes



Give Access to Leverage

Market - Pull



Cloud-Dx Inc. (Can./USA)
Auscultsciences Inc. (Can.)
Health Parametrics Inc. (Can.)
Ovensa Therapeutics Inc. (Can)
Advanced Bifurcation Systems Inc. (USA/Can.)

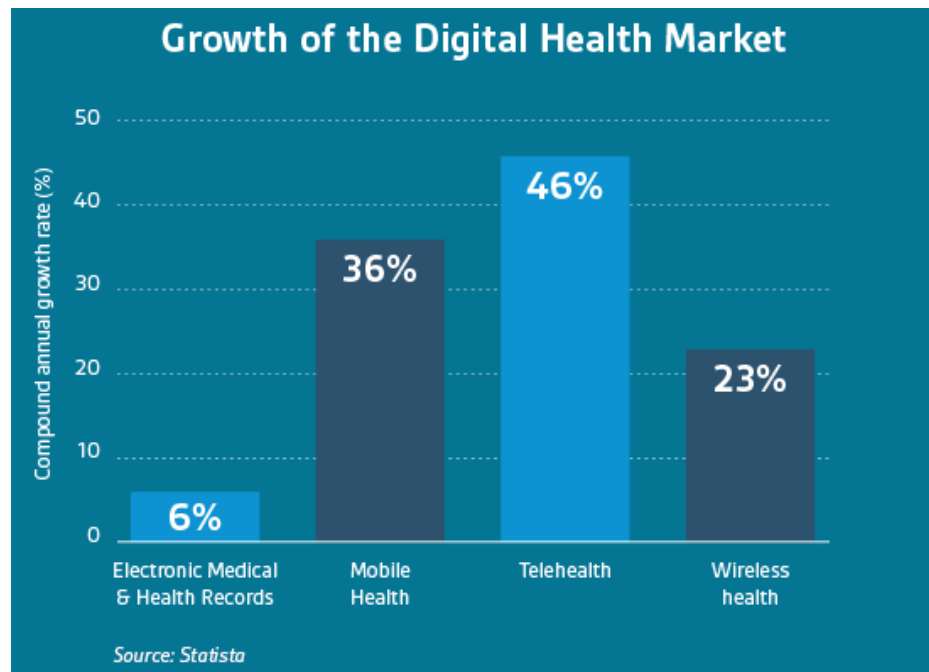
Health Sector Economic **Gain** estimated at
\$50-100Million over the next 5-10years
in New Brunswick **Revenue & Cost Deferral**



Patients are an Asset not a Liability

Develop Health Sector Exports

Market - Push



- Medical-ICT Security
- Real World Evidence Big Data
- Home Health Systems Integration
- Medical Supply Chain Management & Industrial Engineering



Health Sector Economic **Gain** projected
\$3-7 Billion over the next 10years
in New Brunswick **GDP**



Government sets Expectations & Focus

Give permission for research & innovation to find the right path & capitalize from small-scale mistakes



Technology:

Set Mandate Health Authorities for First Adoption of Health Innovations

People:

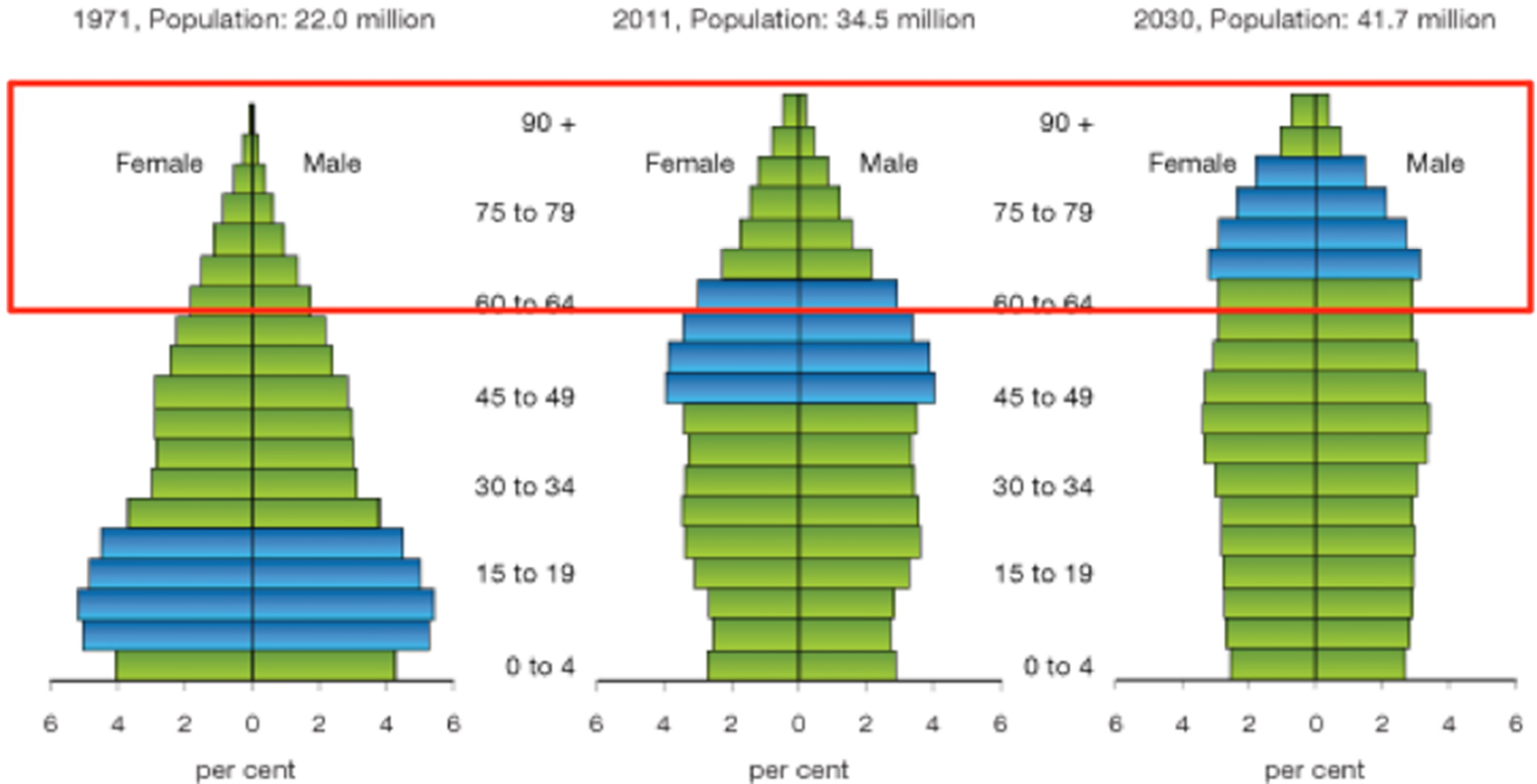
Invest in Graduate Training
Both Foreign & Domestic
Create Med-IT & Med-Entrepreneur programs

Outcomes:

Set Policy to end bad practices (#FaxFree2023) & Reward Innovation
(eRx, eVisits, eConsults & Health Care Teams)



A System of the 70's, unprepared for the 30's



We are here to help!!!