

**INTERNATIONAL LIPOPROTEIN
STANDARDIZATION FORUM**

***Fasting Time and Lipid Levels in a
Community-Based Population: A Cross-
sectional Study.***

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Services

Disclosure - COIs

I participate in laboratory research sponsored by Abbott Laboratories Ltd and The Binding Site

Speakers Bureau/Honoraria:

- Abbott Laboratories
 - University of Alberta
 - University of Calgary
 - Alberta Society of Clinical Chemists
 - Ontario Society of Clinical Chemists
 - LifeLabs
 - McGill University
 - University of Toronto
 - Alberta Society of Pharmacists
 - Canadian Association of Medical Microbiologists
- Other: Stock in Merus Labs, Tekmira

Objectives

- Review pathology informatics opportunities to perform case-control and cohort studies
- Review international guidelines on lipid testing
- Describe the retrospective cohort study my group performed

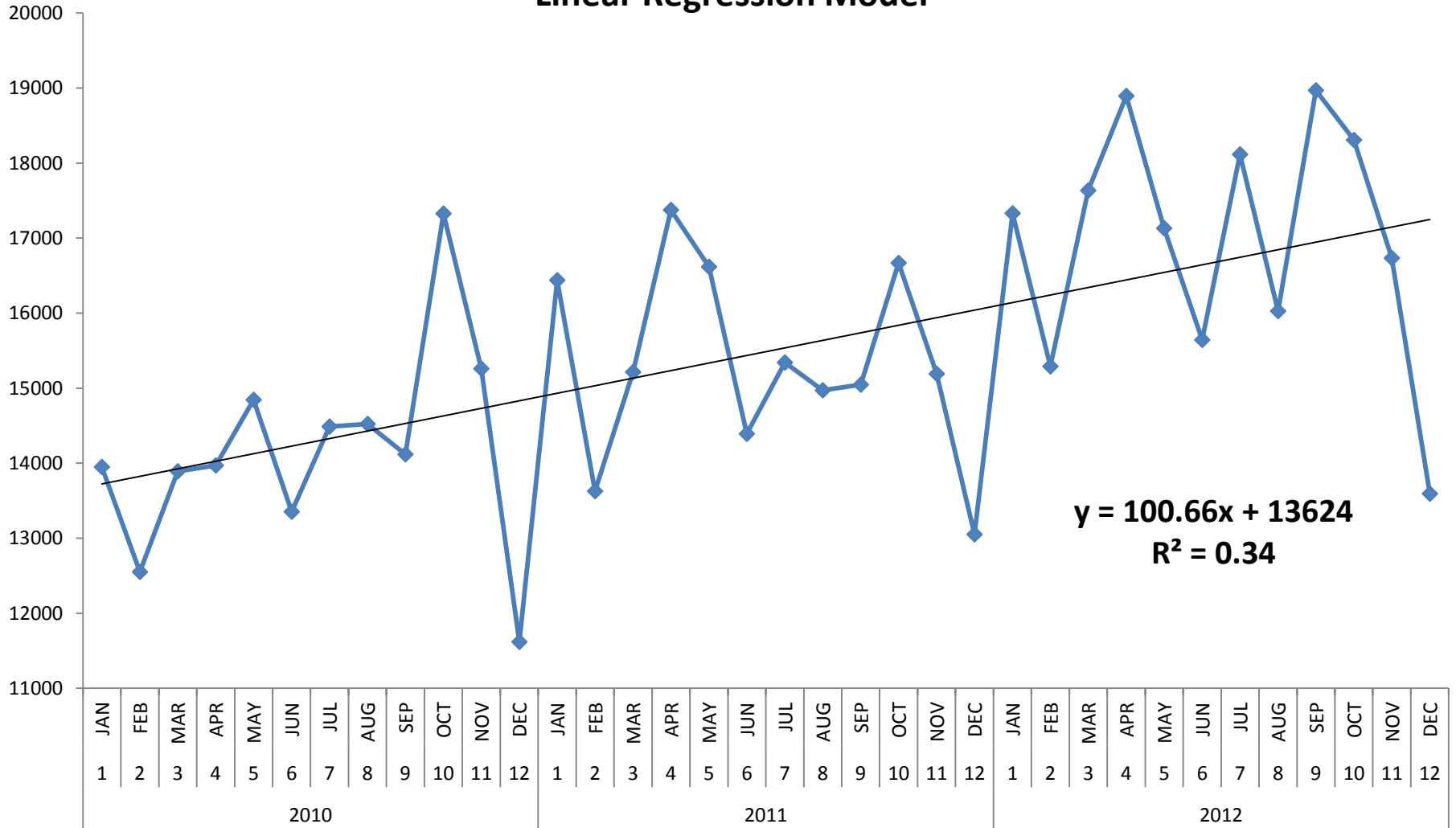
Pathology Informatics Research

- Laboratory utilization
- Clinical epidemiology
- Big data analytics
- Clinical utility of testing
- Effect of pre-analytic variables
- Case-control studies
- Retrospective cohort studies
- Linkage with external datasets

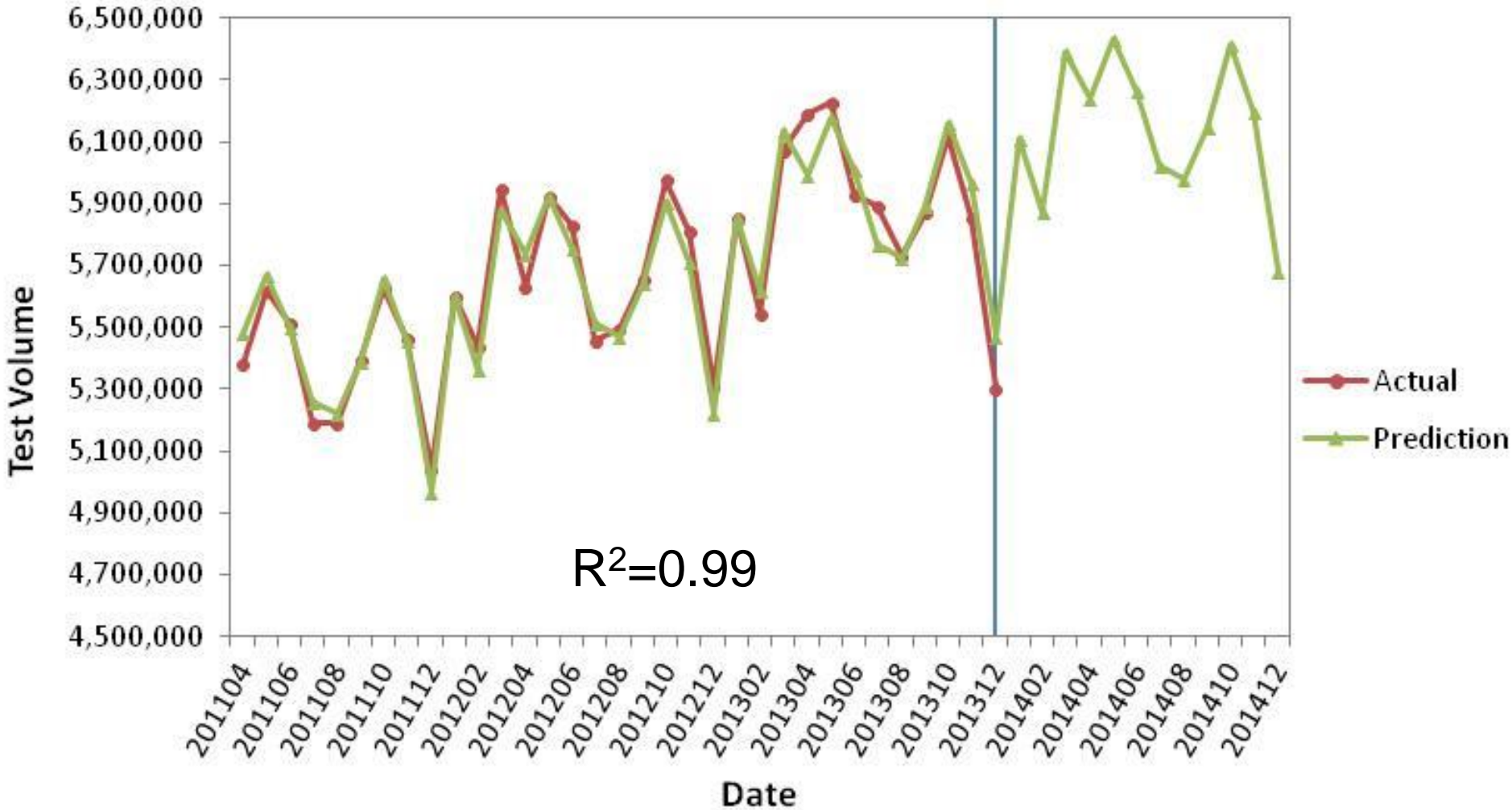
Calgary Laboratory Services

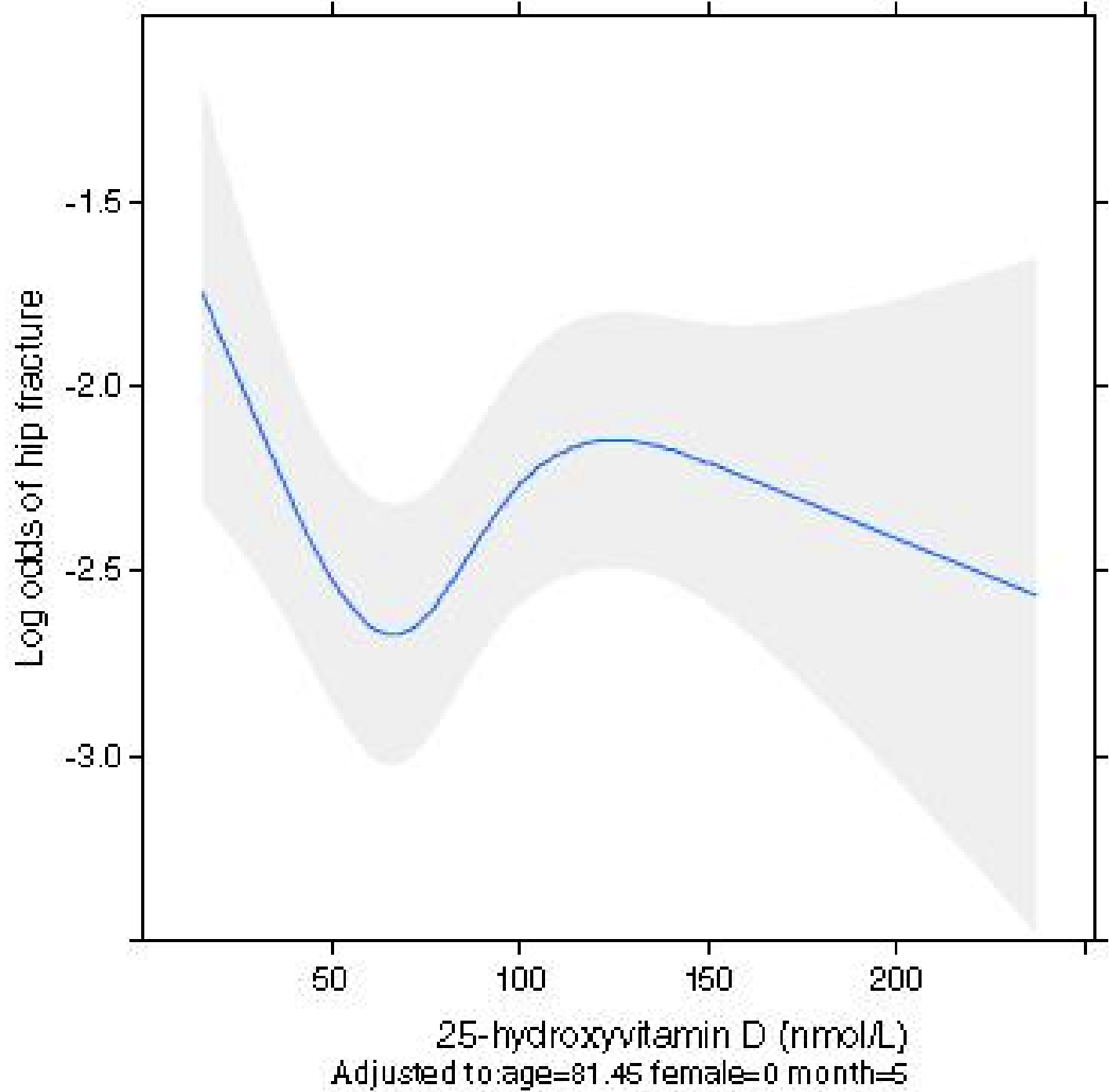
- Sole provider of laboratory testing for south/central Alberta (Canada)
- >25 million tests/year
- 19 laboratories
- 2000 staff

Linear Regression Model



Provincial Test Volume Prediction





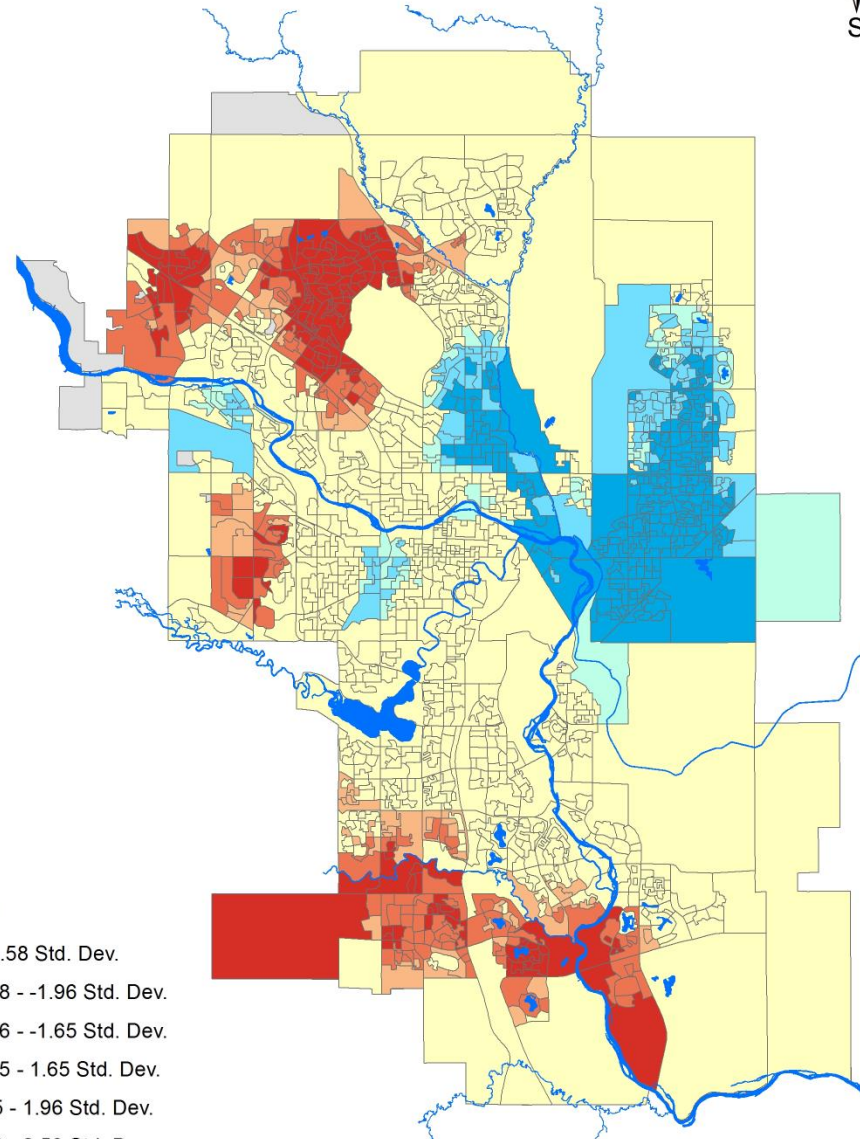
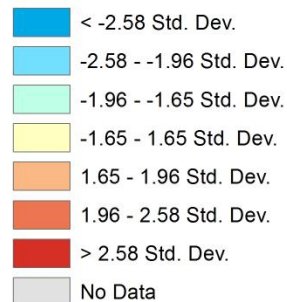
Age Group 50-59 2011



PSA testing in the city of Calgary

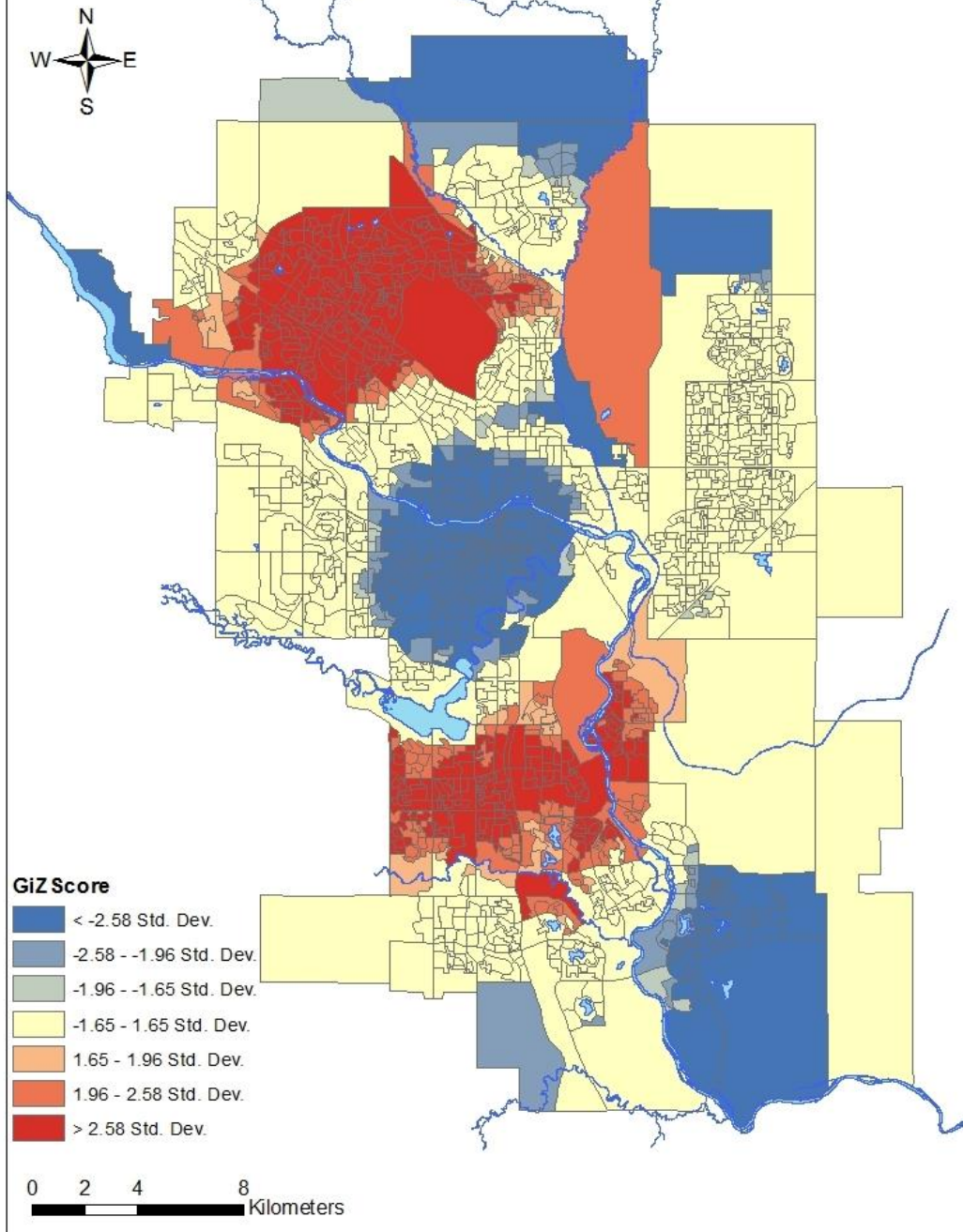
Gorday, W, Sadzradeh H, de Koning L, Naugler C.
Sociodemographic variables associated with PSA testing.
Clin Biochem 2014;47:164-169.

Legend



0 2.5 5 10 Kilometers

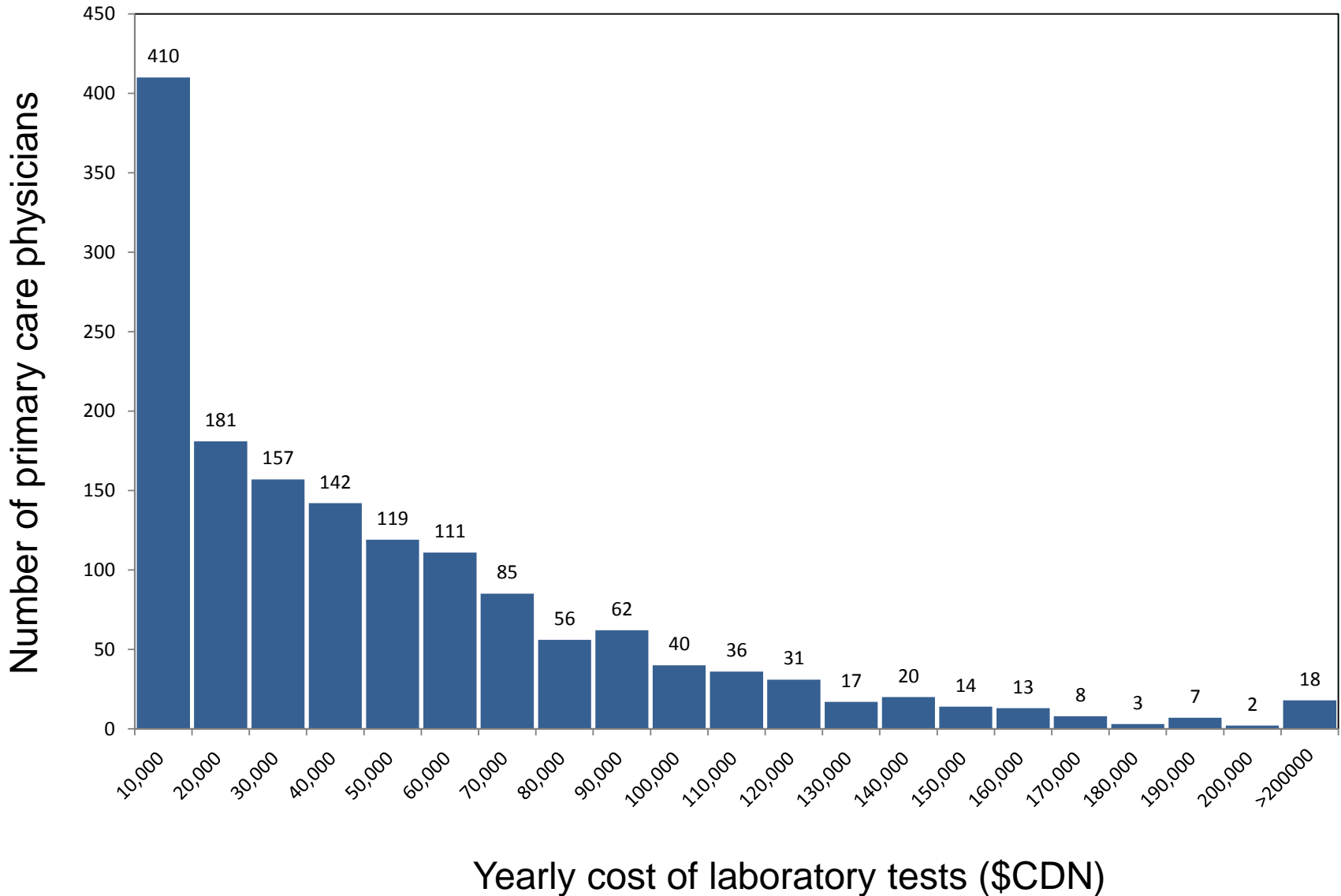
FIT Test Rate



Colon Cancer Screening

- There is marked variation in screening rates throughout Calgary, related to a number of sociodemographic factors
- Crouse AL, Sadrzadeh H, de Koning L, Naugler C. Clin Biochem 2015;48:105-109.

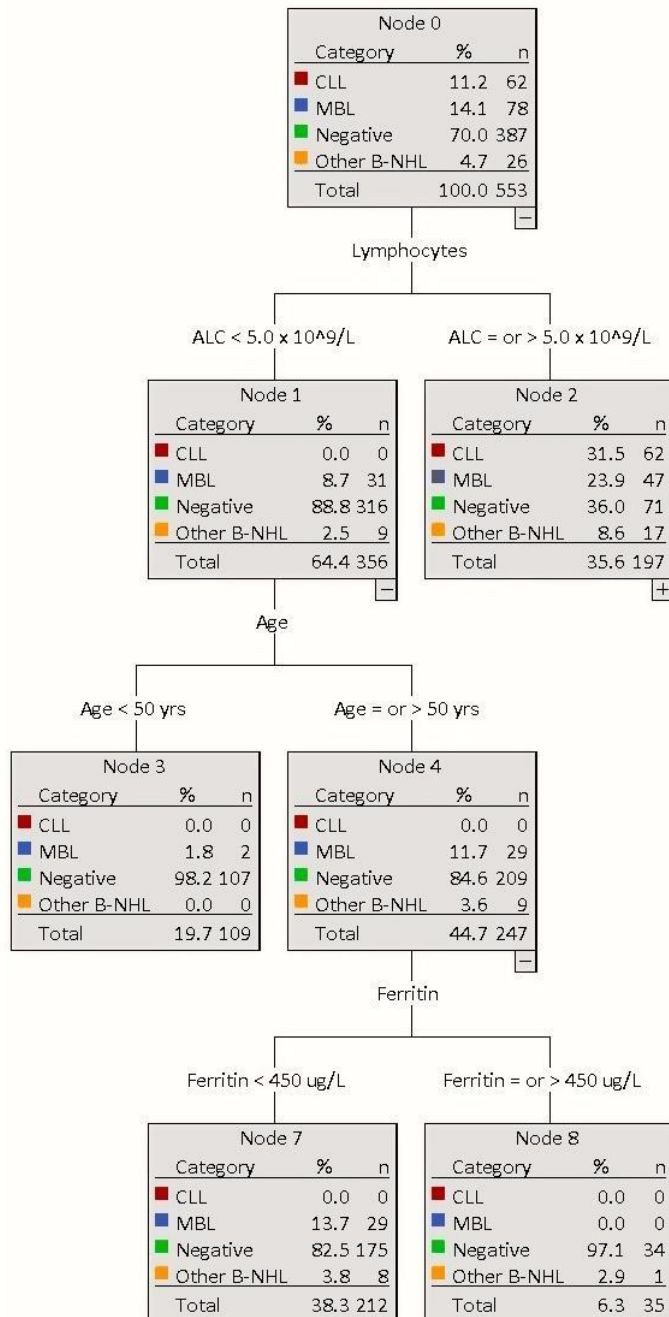
Laboratory testing costs by physician



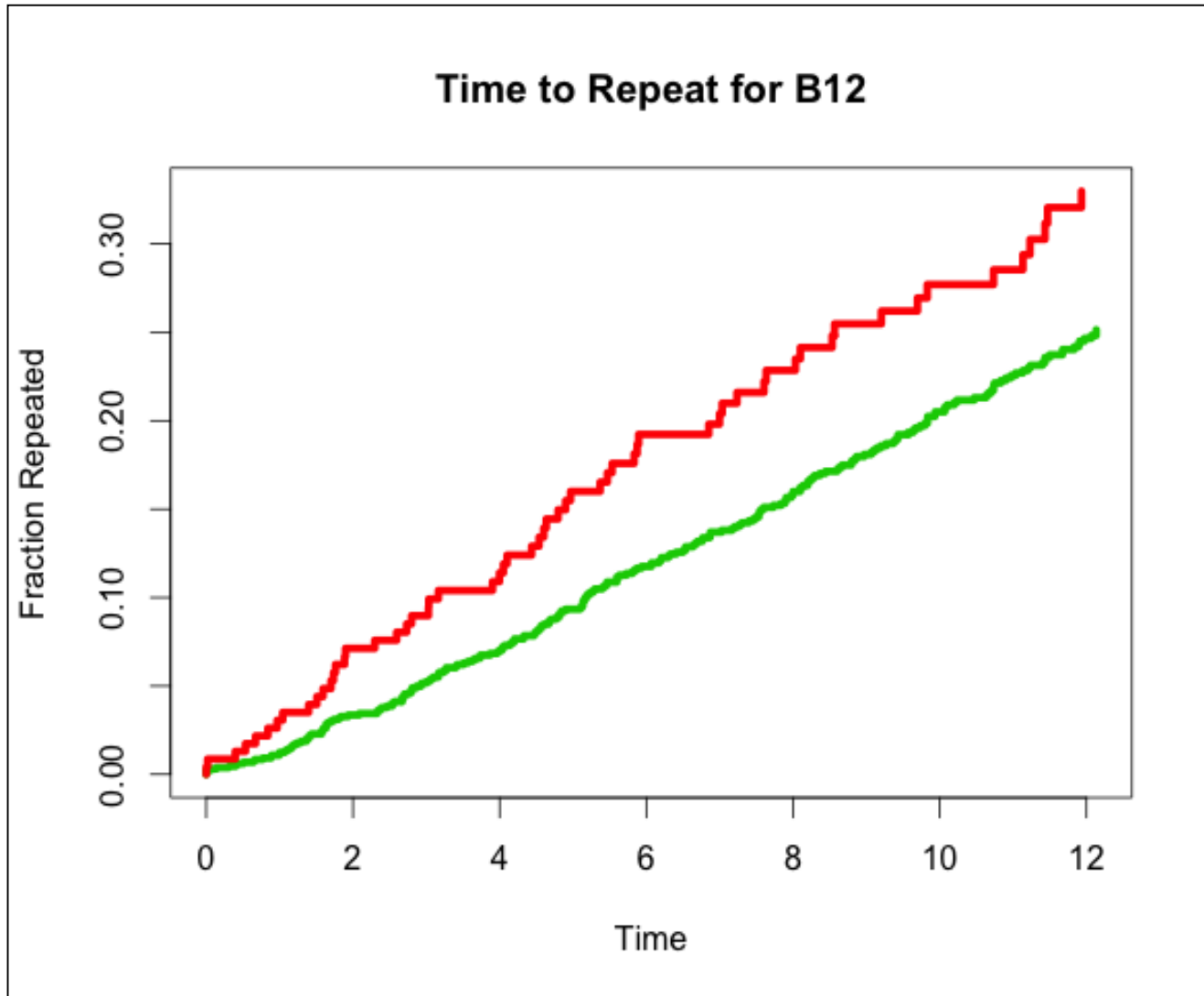
INITIAL

Flow cytometry optimization

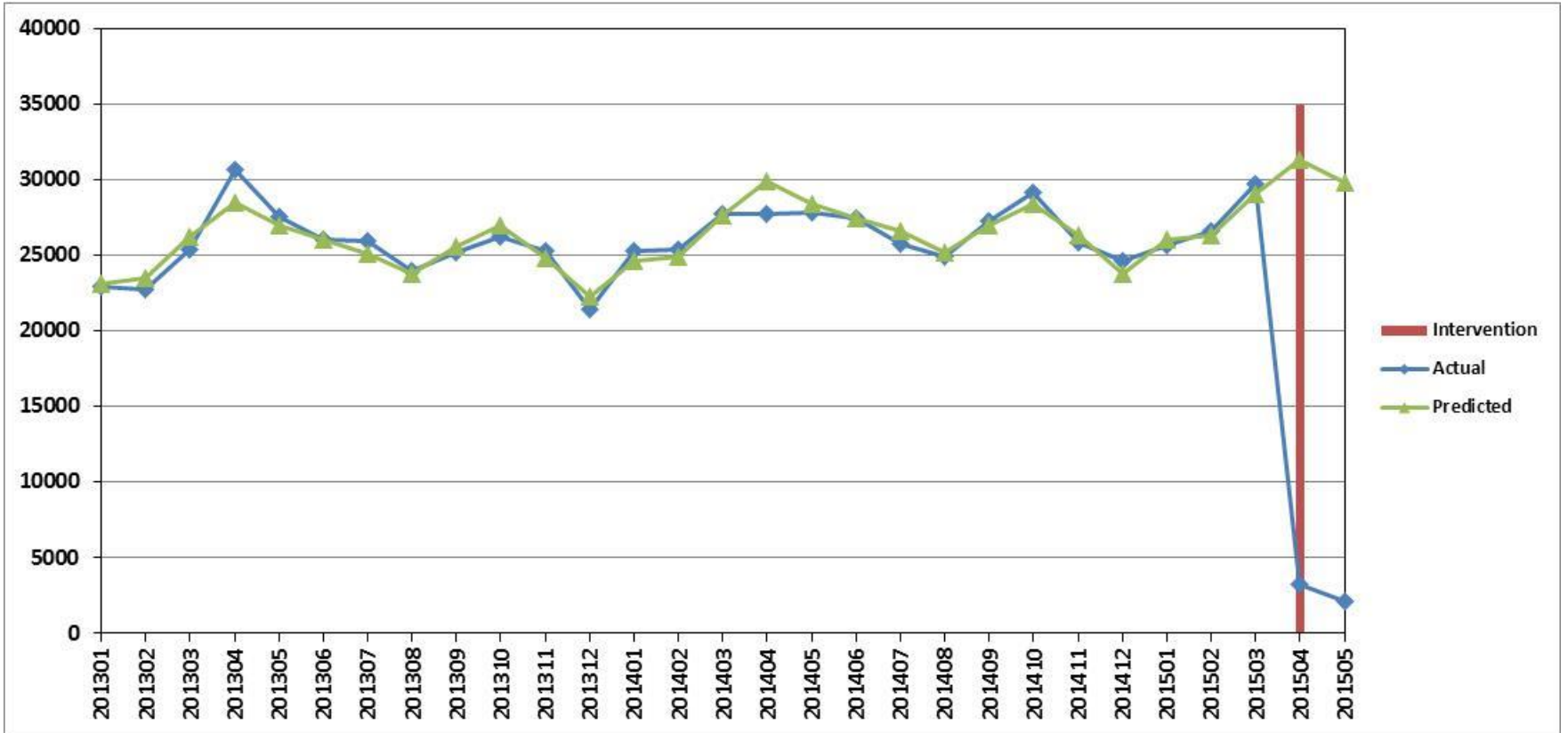
- >1000 flow cytometry tests on peripheral blood for lymphocytosis
- An algorithm incorporating Age, CBC and Ferritin can eliminate 25% of flow cytometry tests with >97% specificity
- Healey R, Naugler C, De Koning L, Patel J. Leuk Lymphoma, in press



Repeat B12 tests



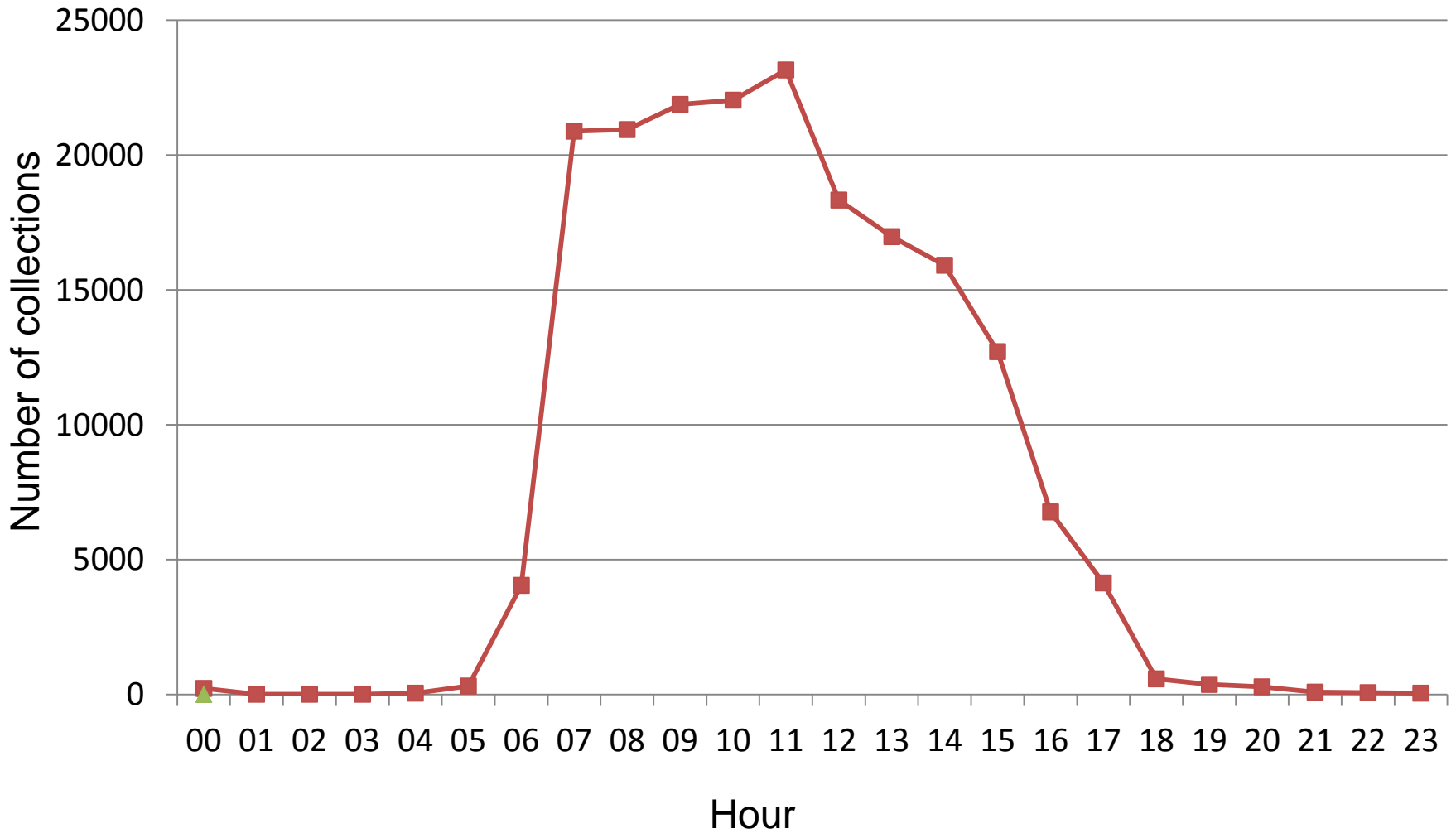
Alberta Vitamin D Test



The problems with fasting

- Inconvenient for patients
 - Patients lie about it anyway
- Problematic for diabetics
- Operationally challenging for labs
- Does fasting really affect lipid levels?
- Is non-fasting a better measure anyway?

189,861 collections over 1 month



Recent International Guidelines

- National Cholesterol Education Program
- International Atherosclerosis Society
- European Society of Cardiology
- Canadian Cardiovascular Society
- American Association of Clinical Endocrinologists
- American Diabetes Association/American Heart Association Statement on Cardiometabolic Risk
- American Diabetes Association: Standards of Medical Care in Diabetes

National Cholesterol Education Program

- JAMA 2001;285:2486-97.
- Fasting lipid panel
- Calculation of non-HDL-C when TG>200 mg/dL

International Atherosclerosis Society

- Atherosclerosis 2014;232:410-413
- Fasting lipid panel with calculation of **non-HDL-C**

European Society of Cardiology

- Eur Heart J 2011;32:1769-818.
- Fasting lipid panel with calculation of non-HDL-C and TC/HDL-C ratio
- Alternative markers apoB or apoB/apoA1

Canadian Cardiovascular Society

- Can J Cardiol 2013;29:151-67.
- Fasting lipid panel with calculation of **non-HDL-C**
- **Alternative marker: apoB**

American Association of Clinical Endocrinologists

- Endocr Pract 2012;18 Suppl 1:S1-78
- Fasting lipid panel
- Calculation of non-HDL-C if TG 200-500 mg/dL, diabetes insulin resistance, established CAD

American Diabetes Association/American Heart Association Statement on Cardiometabolic Risk

- Diabetes Care 2008;31:811-822
- Non-HDL-C, apoB, LDL-P

American Diabetes Association: Standards of Medical Care in Diabetes

- Diabetes Care 2014;37 Suppl 1:S14-80
- Fasting lipid panel

ONLINE FIRST

Fasting Time and Lipid Levels in a Community-Based Population

A Cross-sectional Study

Davinder Sidhu, MD, LLB; Christopher Naugler, MSc, MD, CCFP, FCFP, FRCPC

Background: Although current guidelines recommend measuring lipid levels in a fasting state, recent studies suggest that nonfasting lipid profiles change minimally in response to food intake and may be superior to fasting levels in predicting adverse cardiovascular outcomes. The objective of this study was to investigate the association between fasting times and lipid levels.

Methods: Cross-sectional examination of laboratory data, including fasting duration (in hours) and lipid results, was performed over a 6-month period in 2011 in a large community-based cohort. Data were obtained from Calgary Laboratory Services, Calgary, Alberta,

to estimate the mean levels of cholesterol subclasses at different fasting times.

Results: A total of 209 180 individuals (111 048 females and 98 132 males) were included in the study. The mean levels of total cholesterol and high-density lipoprotein cholesterol differed little among individuals with various fasting times. The mean calculated low-density lipoprotein cholesterol levels showed slightly greater variations of up to 10% among groups of patients with different fasting intervals, and the mean triglyceride levels showed variations of up to 20%.

Our fasting time study

- Cross-sectional community-based cohort
- Fasting time and lipid results over a 6-month period in 2011
- Following institutional change
- 209,180 individuals
- Fasting time: 1 to 16 hours based on patient self-report.

Our fasting time study

- Linear regression controlling for age
- Male and female analyzed separately
- Estimated marginal means:
 - Total cholesterol 2%
 - HDL cholesterol 2%
 - LDL cholesterol 10%
 - Triglycerides 20%

Non-fasting lipids

- Alberta and Ontario have removed the requirement for fasting
- A number of new studies suggest that non-fasting lipids are better predictors of cardiovascular events than fasting lipids

Alberta Guidelines (2015)

- Fasting for lipid tests is NOT required
- Calculate a baseline CVD risk using the principles of shared, informed decision-making
- Advise patients a statin can be expected to lower that risk by 25-35%

Alberta Guidelines (2015)

- DO NOT target specific lipid levels
- DO NOT repeat lipid level testing for a patient on a statin
- Recommend lifestyle changes for all patients

Alberta Guidelines (2015)

- Lipid testing is part of global CVD risk estimation in men > 40 years and women > 50 years of age
- Lipid testing is part of a global CVD risk estimation performed no more than every five years

Alberta Guidelines (2015)

- For patients with a 10-year CVD risk of <10% re-test lipids in five years with risk estimation
- For patients with a 10-year risk of 10-19% discuss and offer statins (preferably moderate intensity)
- For patients with a 10-year CVD risk of > 20% discuss and strongly encourage statins (preferably high intensity)

Alberta Guidelines (2015)

- RCTs showing a benefit in CVD outcomes with statin use have compared fixed-dose statin therapy to placebo or high-versus low-dose statin therapy
- No RCT data exists to show a significant benefit between particular lipid targets and CVD outcomes.

What would it take to change practice?

- Inclusion of non-fasting recommendations in clinical practice guidelines.
 - Alberta has already done this
- Laboratories to accept non-fasting lipid collections
 - Many in Canada now do

Take home messages

- Non-fasting collections can have significant benefits for patients in terms of:
 - Compliance
 - Safety (i.e. avoidance of hypoglycemia in diabetics)
 - Convenience
- Significant benefits for labs in terms of the early morning work flow

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