



COPE WEBINAR SERIES FOR HEALTH PROFESSIONALS

November 13, 2019

Using genetic information to predict and treat obesity:
Are we ready for precision medicine ?




Moderator: Lisa Diewald, MS, RD, LDN
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MacDonald Center for Obesity Prevention and Education
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M. LOUISE FITZPATRICK COLLEGE OF NURSING
MacDonald CENTER FOR OBESITY PREVENTION AND EDUCATION

Nursing Education Continuing Education Programming Research

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OBJECTIVES


- Discuss genetic testing directly-to-consumers (DTC) services, advertised as providing genetically matched diets based on genotype data.
- Explain the basic principles of prediction and the limitations of using genetic information in personalizing diet and exercise prescriptions.
- Identify other opportunities for personalizing health related behaviors.

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CE DETAILS



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SOURCE FOR CREDIT
INTERVENTION AND EDUCATION

Villanova University College of Nursing is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center Commission on Accreditation

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NUTRITION FUTURE FORWARD: ARE WE READY FOR OUT OF THE BOX THINKING?

March 6, 2020
9 AM-4 PM
Driscoll Hall Auditorium
Villanova University

RNs: 6 contact hours
RD/RDN/DTR: 6 CPEUs

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CE CREDITS

- This webinar awards 1 contact hour for nurses and 1 CPEU for dietitians
- Suggested CDR Learning Need Codes: 2000, 2050, 5370, and 9020
- Level 2
- CDR Performance Indicators: 6.2.5, 8.3.6, 8.3.7

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Using genetic information to predict and treat obesity: Are we ready for precision medicine?



Ruth Loos, PhD.
 Charles Bronfman Professor in Personalized Medicine
 Icahn School of Medicine
 Wednesday, November 13, 2019
 12-1 PM EST

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DISCLOSURE

The planners and presenter of this program have no conflicts of interest to disclose.

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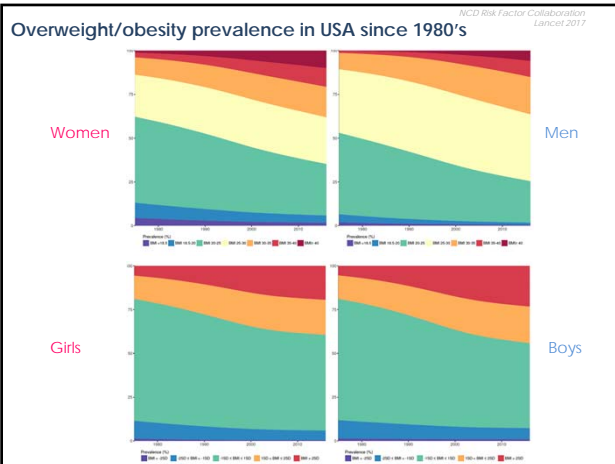
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Using genetic information to predict and treat obesity:
Are we ready for precision medicine ?

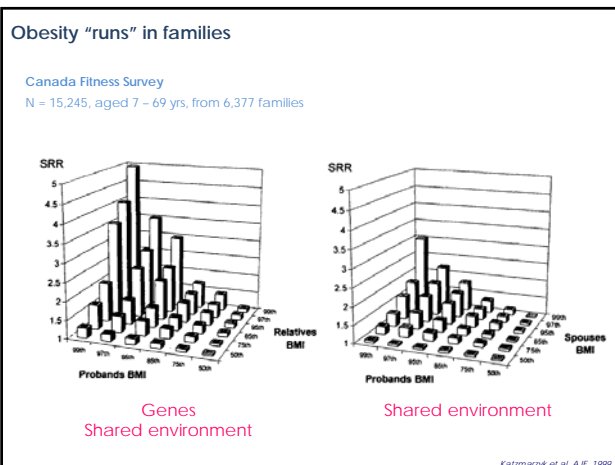
Ruth Loos
 Charles Bronfman Professor in Personalized Medicine
 Charles Bronfman Institute for Personalized Medicine
 Mindich Child Health and Development Institute
 Icahn School of Medicine at Mount Sinai
 New York
 ruth.loos@mssm.edu

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Both genes and environment contribute to obesity risk

Twin studies *Family studies*

MZ 

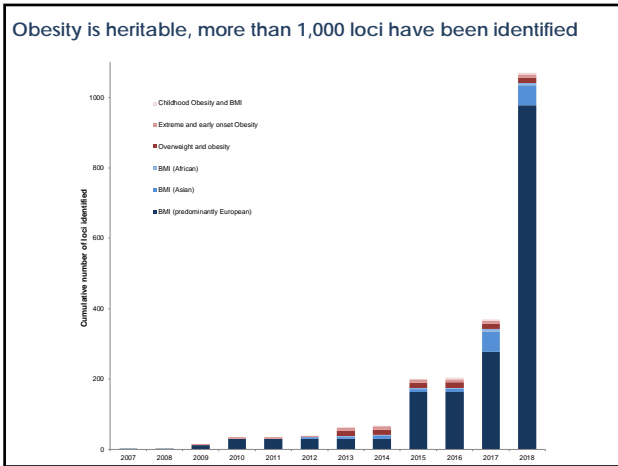
DZ 

Bojsson Acta Paed Scand 1976



$h^2 = 40-70\%$

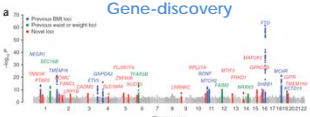
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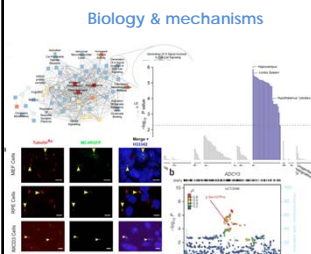
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Why study genetics of obesity ?

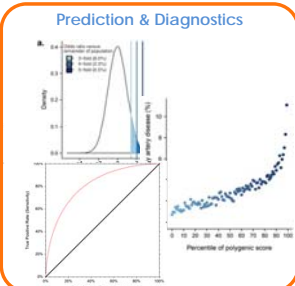
Gene-discovery



Biology & mechanisms



Prediction & Diagnostics



Spillotes et al. Nature Genetics 2010
 Siljee et al. Nature Genetics 2018
 Khara et al. Nature Genetics 2018

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Using genetic information throughout the life-course

Predict & prevent disease Diagnose & treat disease

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Precision medicine to **treat** obesity,
maintain healthy weight

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Precision medicine and common obesity

Monogenic forms of obesity

POMC

Mahe et al. Nat Gen 1998

MC4R

Farooqi et al. NEJM 2003

LEPR

Farooqi et al. NEJM 1999

- One mutation in one gene that affects a specific pathway and have a large effect.
- Lifestyle and environment have minor effect.

❖ LEP mutations → Recombinant human leptin


❖ mutations in POMC, LEPR, ... → MC4R agonists

Common obesity

- Many genetic variants in many genes that act through multiple pathways that have small effects.
- Lifestyle and environment are important.
- Heritability 40-70%

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Precision medicine in the genome era – tailored treatment



- **varied diet**
- **saturated fat diet**
- **aerobic exercise**
- **low glycemic diet**
- **high-fat diet**

Screening

- Exposome (lifestyle, environment)
- Genome
- Transcriptome, ...

Source: MD Anderson

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The Blood-Type diet

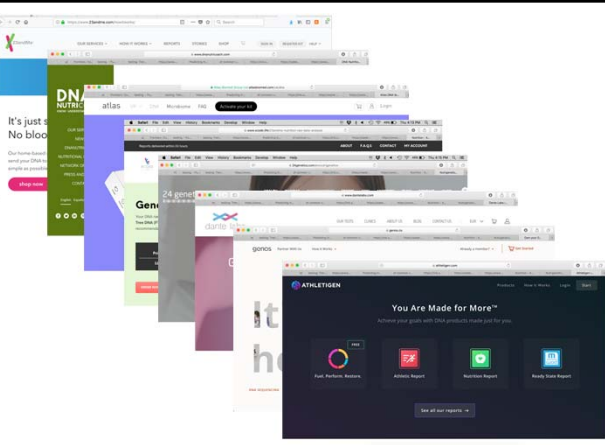


Blood type diets lack supporting evidence: a systematic review¹⁻³
Leticia Casanck, Dami De Back, Verick Casperelle, and Philippe Vanderkerckhove
 Am J Clin Nutr 2013;98(4):104. Printed in USA. © 2013 American Society for Nutrition 99



- emerged as humans migrated toward colder climates
- the most **varied** diet, including meat
- does well with **dairy** products
- need to eat **meat** virtually every day to satisfy your ancient hunter-gatherer genes
- avoid oats, wheat, and most **grains**

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DNATest

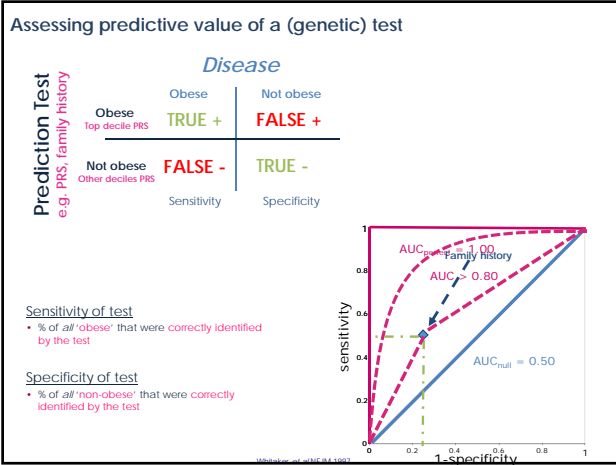
Genom

ATHLETIGEN

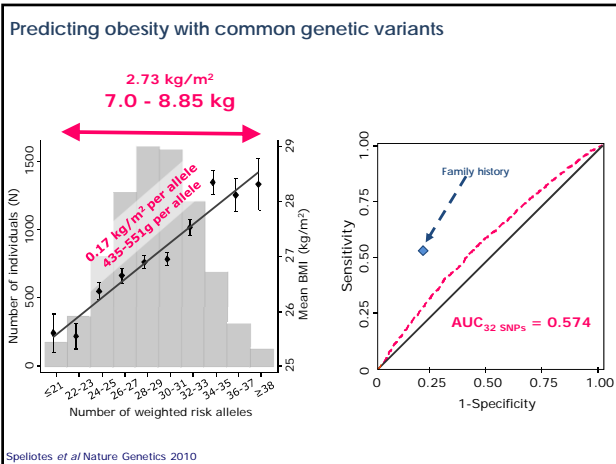
You Are Made for More™

Full Performance Report, Athletic Report, Nutrition Report, Ready State Report

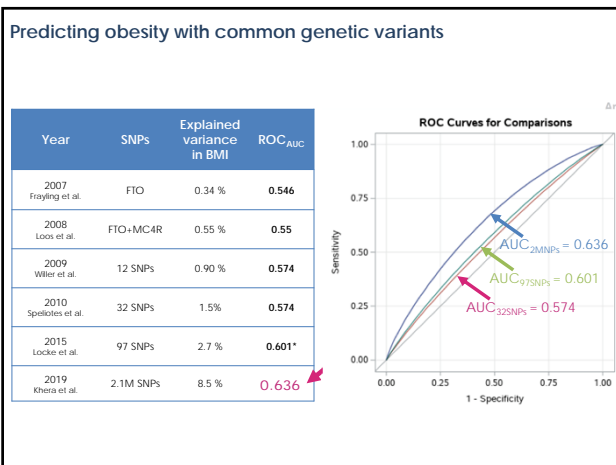
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Does knowing your genetic risk affect your behavior ?

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Would genetic prediction change behavior ?

THE NEW ENGLAND JOURNAL OF MEDICINE

ORIGINAL ARTICLE

Effect of Direct-to-Consumer Genomewide Profiling to Assess Disease Risk

Clinical guidelines

Cinnamon S. Bloss, Ph.D., Nichol

ORIGINAL ARTICLE

Impact of direct-to-consumer genomic testing at long term follow-up

Cinnamon S. Bloss,¹ Nathan E Wineinger,¹ Burcu F Darst,¹ Nicholas J Schork,^{1,2} Eric J Topol^{1,2,3}

Bloss CL, et al. J Med Genet 2013;10:1-8. doi:10.1136/jmedgenet.2012.101207

- Genome-wide profiling with Navigenics Health Compass to estimate lifetime risk of 23 diseases/traits
- 3,639 individuals from health and technology companies enrolled in study; 2,037 (56%) completed follow-up at 3 months and 1,325 (36%) completed follow-up at 1 year
- Anxiety symptoms, dietary fat intake, exercise behaviour

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Would genetic prediction change behavior ?

- Overall, no short- or long-term changes in psychological health, diet or exercise behavior.

Short-term

Overall lifetime risk

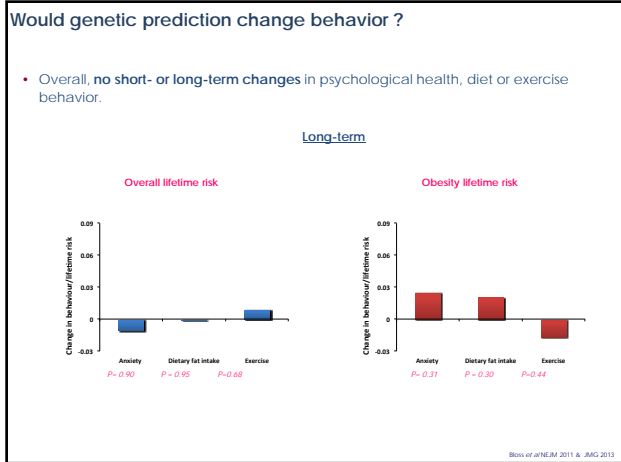
Category	P-value
Anxiety	P=0.74
Dietary fat intake	P=0.76
Exercise	P=0.46

Obesity lifetime risk

Category	P-value
Anxiety	P=0.35
Dietary fat intake	P=0.005
Exercise	P=0.95

Bloss et al N Engl J Med 2013; 369:1013-21

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Conclusions


- The current **contribution of genetic information** to precision medicine in obesity is **limited** → obesity, weight gain, weight loss are **complex, multifactorial and polygenic** traits that cannot be captured by a single genetic score.
- Full(er) picture** is needed. Other, **non-genetic factors**, might be more informative to personalize treatment and improve prediction.
- To tailor treatments to people's genetic and non-genetic "profile", we need more research into the **"predictors" of response to a variety of treatments**.
- Lifestyle and behavior are hard to change – even if people receive "sophisticated" information, it may **still not be possible to adopt new recommendations**.

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Collaborators and acknowledgements

Misa Graff, Michael Preuss, Saori Sakaue, Ioanna Ntalla, Sonja Berndt, Sailaja Vedantam, Adam E. Locke, Eirini Marouli, Loic Yengo, Anne Justice, Kristin Young, Yingchang Lu, and many more


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 **Prevention of ASCVD in South Asians:
Impact of Diet Modification and Physical Activity
as Primary Intervention**

Geeta Sikand, MA, RDN, FAND, CDE, CLS, FNLA
Director of Nutrition
University of California Irvine Prevention Cardiology Program
Wednesday, November 13, 2019
12-1 PM EST


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 **QUESTIONS & ANSWERS**



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