



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
Program Manager
MacDonald Center for Obesity Prevention and Education
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VILLANOVA UNIVERSITY
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1




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2




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3




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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4



CE DETAILS

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

Villanova University College of Nursing Continuing Education/COPE is a Continuing Professional Education (CPE) Accredited Provider with the Commission on Dietetic Registration

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5


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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6




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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7




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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8




DISCLOSURE

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

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9



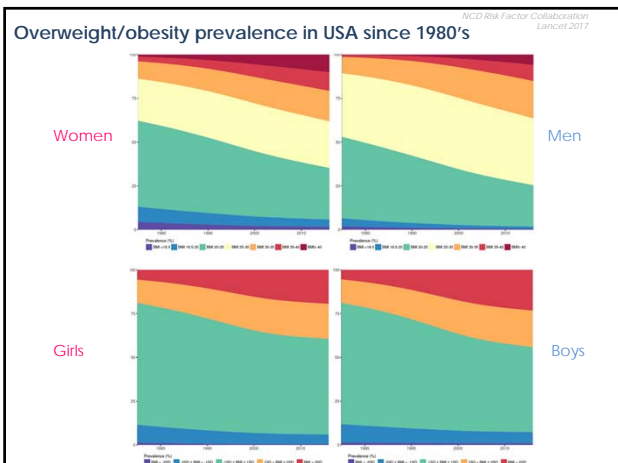
Using genetic information to predict and treat obesity: *Are we ready for precision medicine ?*

Ruth Loos

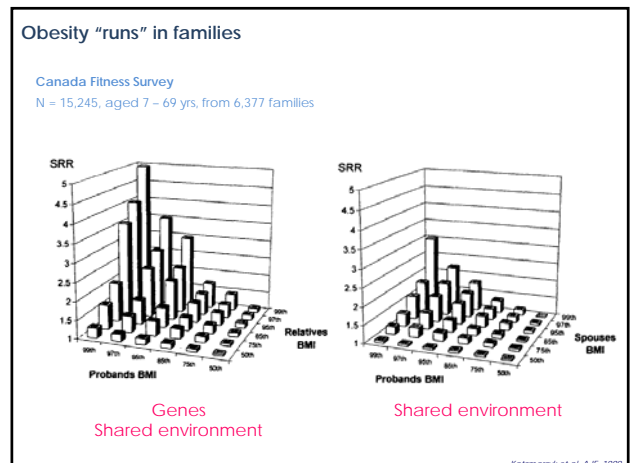
Charles Bronfman Professor in Personalized Medicine
Charles Bronfman Institute for Personalized Medicine
Mindich Child Health and Development Institute
Icahn School of Medicine at Mount Sinai
New York
ruth.loos@mssm.edu

Villanova COPE Webinar - November 13th 2019

10



11



12

Both genes and environment contribute to obesity risk

Twin studies

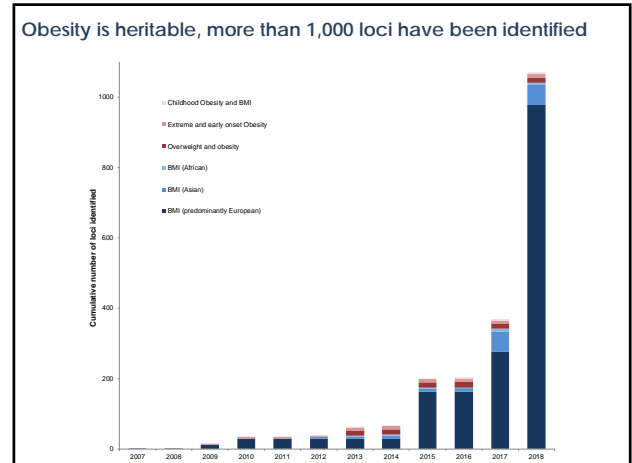
MZ
DZ

Bojsson Acta Paed Scand 1976

Family studies

$h^2 = 40-70\%$

13



14

Why study genetics of obesity ?

Gene-discovery

Biology & mechanisms

Prediction & Diagnostics

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

15

Using genetic information throughout the life-course

Predict & prevent disease

Diagnose & treat disease

16

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

17

Precision medicine and common obesity

Monogenic forms of obesity

POMC

Khalili et al. Nat Gen 2008

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%

18

Precision medicine in the genome era – tailored treatment

Screening

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

✓ diet
 saturated fat diet
 aerobic exercise
 low glycemic diet
 high-fat diet

Source: MD Anderson

19

The Blood-Type diet

Blood type diets lack supporting evidence: a systematic review¹⁻³
 Leticia Casan, Emory De Buck, Verle Comperelle, and Philippe Vanderkloster
 Am J Clin Nutr 2018;98:104. Printed in USA © 2018 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

20

It's just No bloo...
 24 genes...
 You Are Made for More™
 Fuel, Restore, Replenish, Personal Report, Nutrition Report, Ready, Go! Report

21

Direct-to-consumer companies make bold claims

Helix

Wellness

How you can eat a **healthier diet** best suited to your genetics, your metabolism, and your lifestyle. Turn DNA insights into **energy to make** your goals a reality.

Healthy Weight DNA Insights is a comprehensive health and wellness genetic test that provides physicians with a unique combination of information regarding nutrigenetics, medication response, and a number of common health conditions. Using a proprietary algorithm, **this test also provides physicians with genetically matched diet choices that make specific recommendations to their patients to help them achieve or maintain healthy weight.**

22

A case study – healthy woman seeks advice

Wellness Reports

Genetic Health Risk

Estimated Fat and Weights

welln:

23

A case study – the evidence

ORIGINAL INVESTIGATION

APOA2, Dietary Fat, and Body M

Replication of a Gene-Diet Interaction in 3 Populations

Apolipoprotein A2 Polymorphism Interacts with Intakes of Dairy Foods to Influence Body Weight in Two U.S. Populations^{1,2}

Dolores Corella, PhD, Gena Phoenix, MS, Donna K. Arnett, PhD, MPH, N. Iqbal B. Borch-Johnsen, MD, Katherine Tucker, PhD, Chao-Qiang Lu, PhD, Oscar Coltell, PhD, Yu-Chi Lee, MS, Jose M. Ordovas, PhD

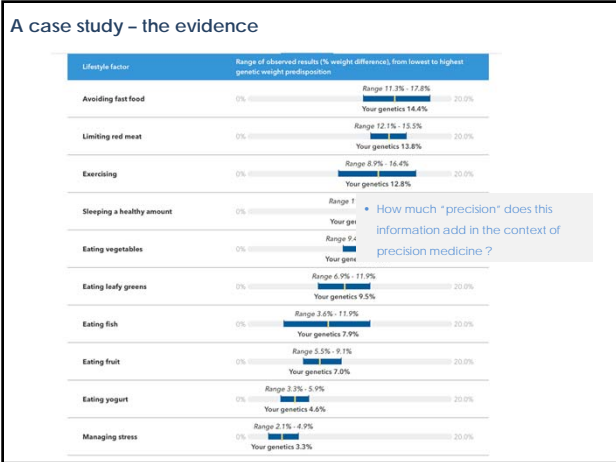
Framingham Offspring: $R^2=0.06$, $P=0.01$

Puerto Rican Centers on PHHD study: $R^2=0.07$, $P=0.004$

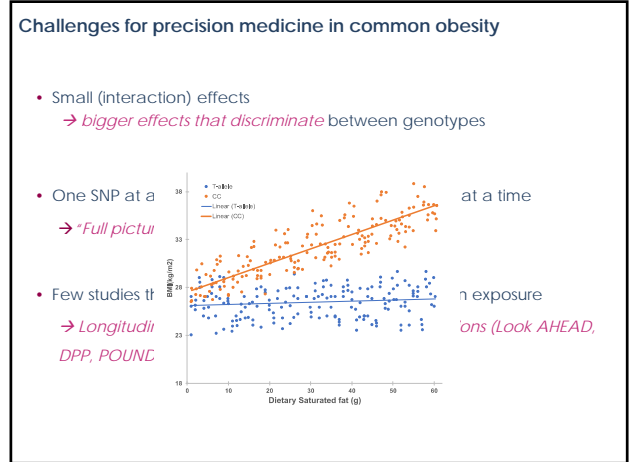
Puerto Rican Centers on PHHD study: P -interaction = 0.008, $P=0.004$

$P=0.19$

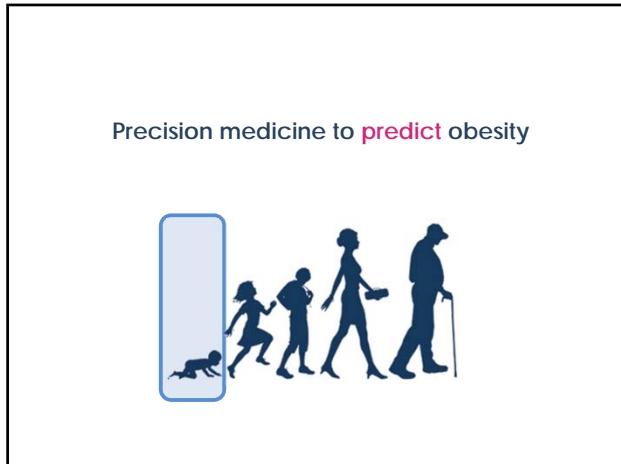
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25



26



27

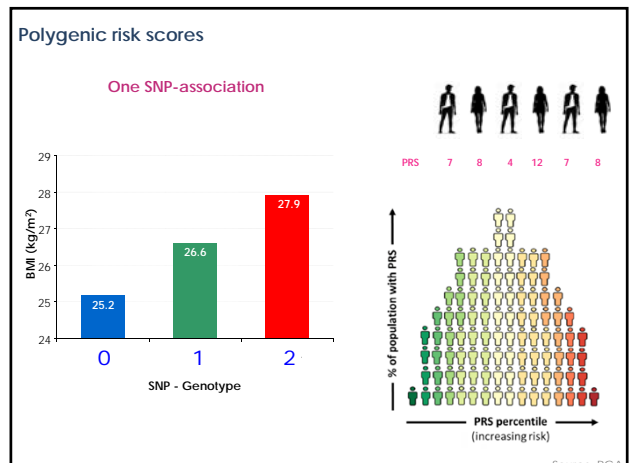
28

SNPs – Single Nucleotide Polymorphisms

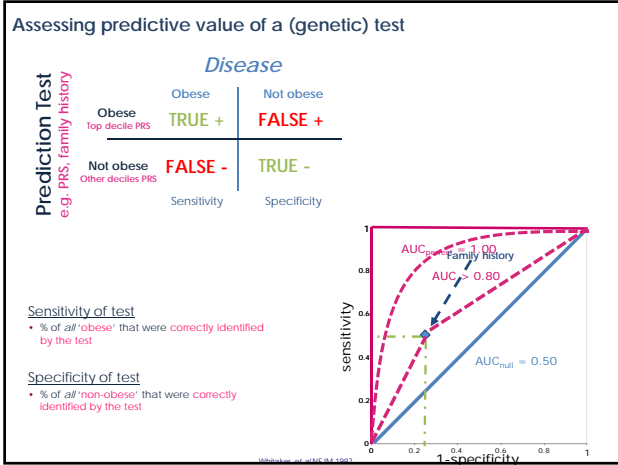
	Gly Ala Gly Arg Ser Ile Ser Trp Ala Trp Trp Ala Cys Val	T T
	Gly Ala Gly Arg Thr Ile Ser Trp Ala Trp Trp Ala Cys Val	A T
	Gly Ala Gly Arg Ser Ile Ser Trp Ala Trp Trp Ala Cys Val	T T
	Gly Ala Gly Arg Thr Ile Ser Trp Ala Trp Trp Ala Cys Val	A A
	Gly Ala Gly Arg Ser Ile Ser Trp Ala Trp Trp Ala Cys Val	A T

SNP → Single Nucleotide Polymorphism

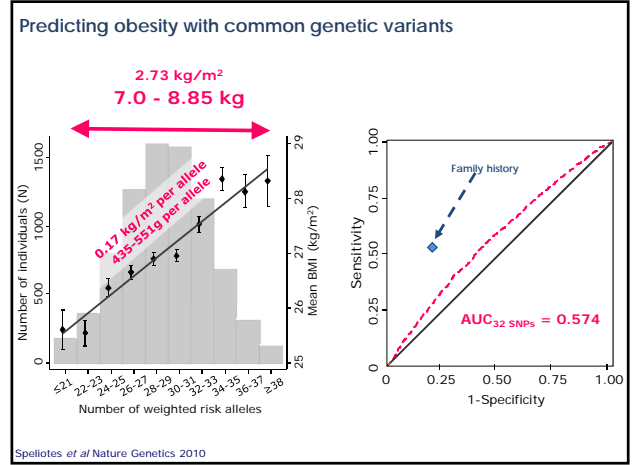
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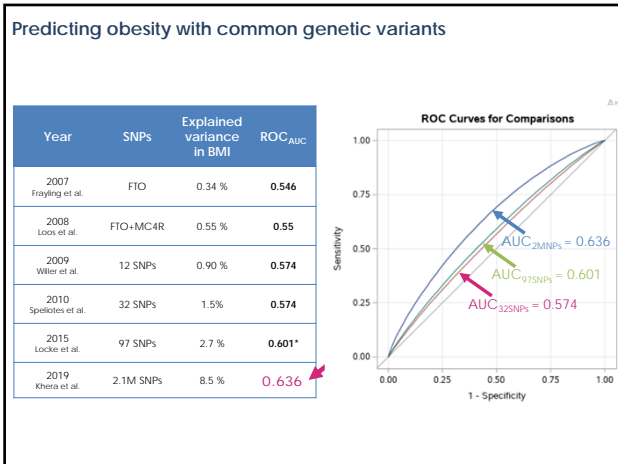
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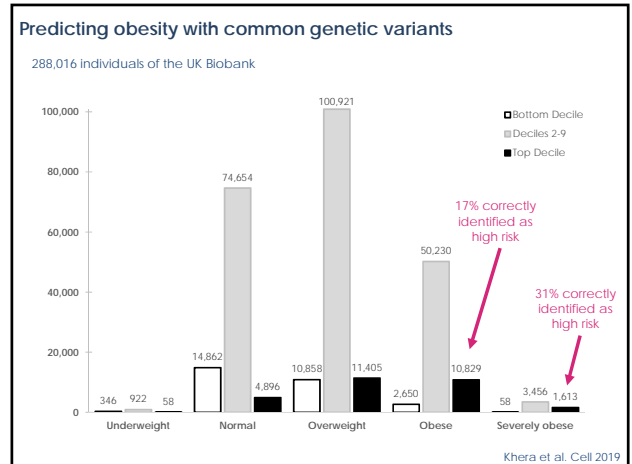
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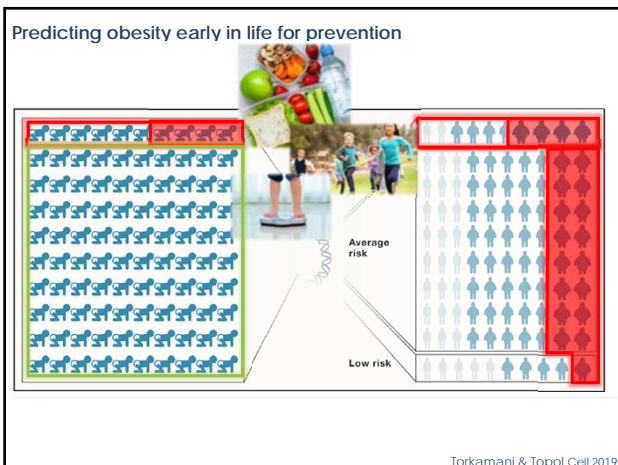
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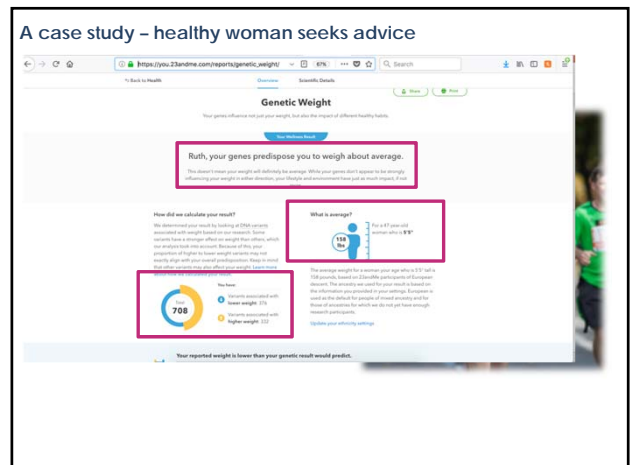
33



34



35



36

Does knowing your genetic risk affect your behavior ?

37

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

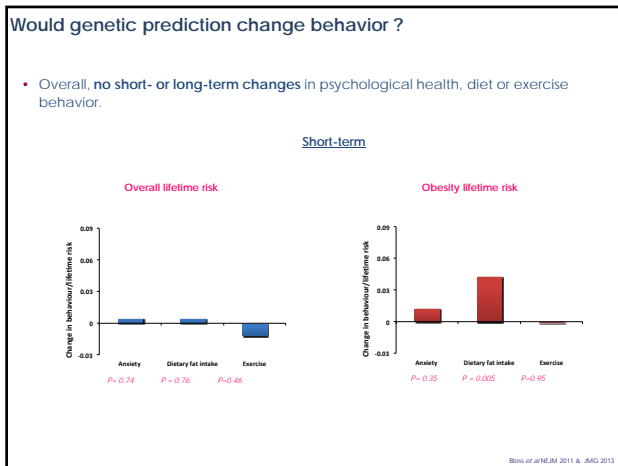
Cinnamon S Bloss,¹ Nathan E Wineinger,¹ Burcu F Darst,¹ Nicholas J Schork,^{1,2} Eric J Topol^{1,2,3}

• Genome-wide profiling with Navigenics Health Compass to estimate lifetime risk of 23 diseases/traits

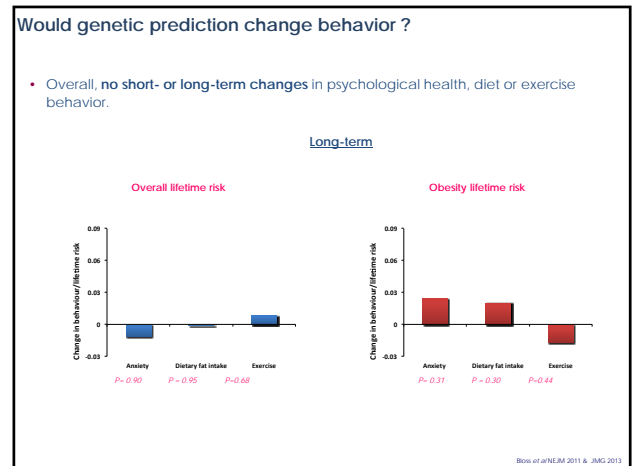
• 3,639 individuals from health and technology companies enrolled in study; 2,037 (56%) completed follow-up at 3 months and 1,325 (36%) completed follow-up at 1 year

• Anxiety symptoms, dietary fat intake, exercise behaviour

38



39



40

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.

41

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




42



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43






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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44



QUESTIONS & ANSWERS





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45