Building a National Nutrition & Genetics Database

Latest findings on the link between Diet Genes Health and Ageing

Dr. Miriam Ryan - UCD Institute of Food & Health



2007 - 2013: 4th Symposium









National Nutritional Phenotype Database







Food & Health Research Initiative

Irish Universities Nutrition Alliance

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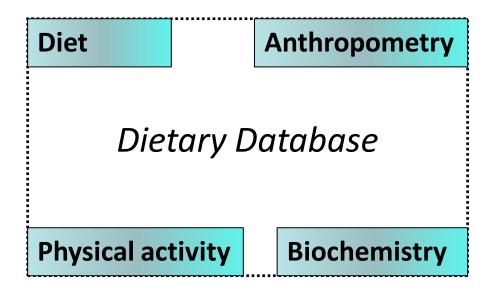






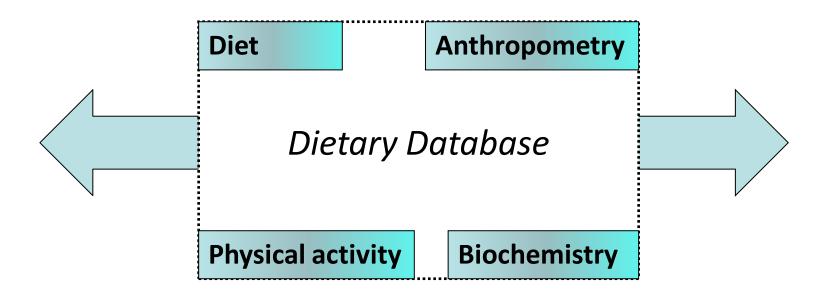
Joint Irish Nutrigenomics Organisation (JINGO)

Concept of a Nutritional Phenotype Database



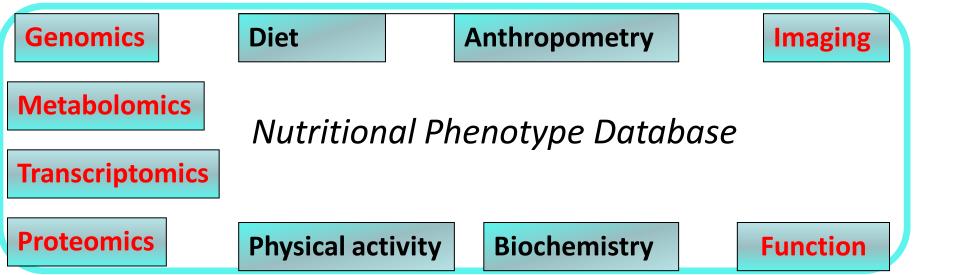


Concept of a Nutritional Phenotype Database





Concept of a Nutritional Phenotype Database







National Nutrition Phenotype Database



€5m

1,500 National Adult Nutrition Survey





€5m

214 Metabolically challenged cohort



5,200 Elderly cohort





+ €1.8m



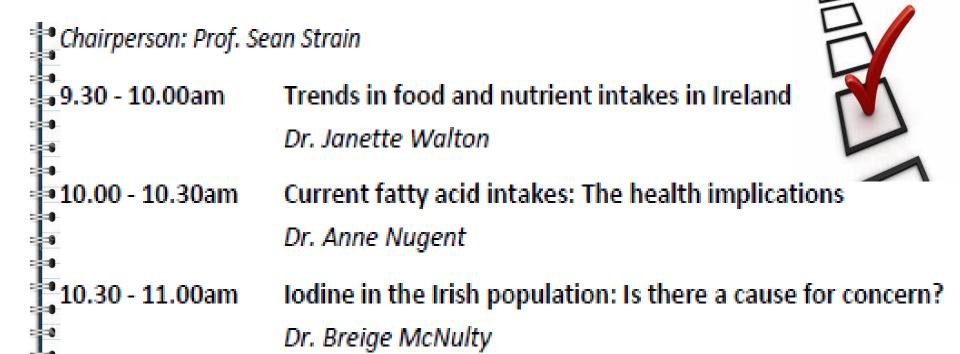


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Today's Programme

11.00 - 11.30am



Tea/Coffee - Poster exhibition

Genetics and Blood Pressure: Why Riboflavin Matters in Irish Adults

Reilly R1, Hopkins S2, Ward M1, McNulty H1, McCann A1, McNulty R2, Walton J3, Molk

Northern Ireland Centre for Food and Dublin *School of Rood and Nutritional

Background

- Hypertension (defined as a blood pressure of s140/90mmHg)is
- An estimated 10% of individuals have a genetic defect (the 677 reductase (MTHFR), commonly referred to as the TT genotype
- We previously demonstrated that BP in this genetically at-risk required for the normal functioning of MTHFR. (3.4).

To examine the role of the MTHFR 677TT genotype and reli B-vitamins as predictors of BP in healthy Irish adults.

Methods

- Data from the National Adult Nutrition Survey (NANS representative sample of Irish adults (n 1019) were analysed (F
- Biomarker concentrations of the relevant B-vitamins measured at Trinity College Dublin (serum folate, red cell fol homocysteine) and the University of Ulster (EGRac, vitamin B6

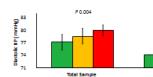


Fig 2: Mean distroic blood pressure of the total sample and split by med

Results

In the total sample:

- > Hypertension was more prevalent in the TT compared to non-TT genotype groups (26% vs. 22%).
- > Significantly higher diestolic (Fig 2) and systolic b pressure (data not shown) was found in individuals with TT genotype following adjustment for age and sex.
- Using logistic regression:
- > Age, male sex, BMI (OR 1.10; 95% CI 1.05-1.14) and TT genotype were significant predictors of elevated BP.
- > Low versus high riboflevin status (split by the median FC value) significantly increased the risk of hypertension by 4 while the combination of the genetic factor and riboflevin status doubled the risk of hypertension (follow adjustment for significant predictors of elevated BP).

FUNCERS: Inth Department of Agriculture, Food and the Marine and HRS under that The PhD studentship for R.R. was funded by the Northern Ireland Departm

Corresponding Author: Prof. Many Ward



Body mass index mediates inflammatory and

adhesion response to f

challenge containing 54g f of a mixture of saturated a

fat), before and after which

using microsmays (platford 1.0). Expression data were

linear models with an inter-

between diet and BMI, ther genes that responded to th

DHI-dependent manner

downregulated in lean part

upregulated in obese). Ger found to display a SMI-dep

response were then mapp

which regions or pathways

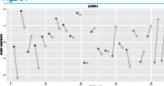
sampled and gene expres

Melissa J. Morine¹³ Colm M. O Grada³⁴ Clara Morris⁴ Euger Gibney^a Lorraine Brennan^a Michael J. Gibney^a Helen M. Ro ¹The Microsoft Research - University of Trento Centre for (
²Department of Mathematics, University of Trento, Trento, Nutrigenomics Research Group, UCD Conway Institute of Health and Population Science, University College Dublin, Institute of Food and Health, University College Dublin, B

Acute food challenges in conjunction with Each of 23 pertidipants rec high-throughput transcriptomic challenge containing 54g fi assessment provide an opportunity to of a mixture of saturated a identify potential biomarkers of metabolic and nutritional health. Decause of the relevance of inflammation to metabolic realth, PSIMC (peripheral blood

mononuclear cells) represent an easily accessible tissue for assessment of response to food challenge. This study ught to determine the soute postprandial effect of an oral lipid challenge on the PSMC transcriptome in a cohort of individuals ranging in age and BNI, with a view to identifying potential stratification in challenge response.

Floure 1





Conclusions

nation and adhesion are central to __in obese individuals folio the pathology of cardiovascular disease. In particular, genes from the fibroblest growth factor (FGF) and collegen (COL) families are directly implicated in the onset and progression of cardiac fibrosis. Furthermore, distary fat has been associated with the activation of these factors that impede cardiovascular health. Our results here indicate that these factors are even more strongly activated

challenge, suggesting that pattern may be even more cardiovascular health in th than lean state. Future wo this lipid-adhesion relations efficient dietary modificati avoidance and reduction of

University of University of ULSTER Description of Older Irish and William Control of



McGarel C¹ McCann A¹, Ward M¹, Curningham C², Moloy AM², Strain JJ¹, Casey M², Scott JM¹, Pertieva K¹ and

ÜÇD

- Cognitive dysfunction in ageing range in severity from mild
- While some degree of cognitive decline is considered a nonplay a role in helping to maintain cognitive health in ageing.
- Foliate and the metabolically related 9 vitaming (912,95 and In one carbon metabolism and methylation reactions³.

Objectives

 To investigate the relationship between homocysteine, relat (>50yrs) from the Trinity, Uster and Department of Agricult



Subjects installed in this protestoury analysis. Hypertension softert: e-0100

Results : Participant characteristics

Sales and a second second

	_	10.11.2	200				
	g=0100		g=1000				
Server 1							
Characteristics							
Age (pro)	70.4 (0.4)	89.3 (3.7)	73.0 (0.3)	40.000			
mar(se/en/)	29.0 (2.0)	109 (2.1)	28.0 (0.7)	0.001			
Months Lead	10.2 (2.9)	10.4 (1.7)	10.0 (2.0)	0.000			
CognitionNewson							
Michigan	27.2 (2.3)	27.2 (2.9)	27.2 (2.2)	0.001			
CID-C State	3.8 (7.8)	0.0 (2.9)	3.0 (0.4)	-0.001			
HAD State	8.8 (8.8)	0.0 (0.9)	2.7 (2.0)	-0.001			
DeCamin Dismorting							
Heleff Jerrel/0	09.2 (07.9)	70.0 (49.4)	97.7 (99.8)	0.186			
REP(mmel/D)	931 (002)	973 (666)	922 (622)	0.018			
PUP (messal/l)	00.9 (17.2)	73.0 (37.9)	00.7 (10.7)	0.001			
Citation (195a)	187 (0.33)	1.60 (0.33)	146 (0.10)	0.001			
Her Lame (/)	16.7 (3.7)	38.3 (4.8)	10.9 [2.8]	40.000			
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South NOT, Red Cell February		a Commercial					

Ch. Peridical Colonials

Background

- Having an increased homocysteine level is associated with the development of heart disease and death in people with Type 2
- An optimal status of the metabolically related B-vitamins may therefore play a preventative role in the development and progression of diabetes and its complications.

To investigate biomarkers of B-vitamin status in relation to Type 2 diabetes among older Irish adults.

Methods

The Trinity Ulster Department of Agriculture (TUDA) cohort study – an all-Ireland investigation of clinical, drug, nutritional, metabolic and genetic factors in the development initially of 3 common diseases of ageing - cardiovascular disease, osteoporosis and dementia.



aligned units (%).

Biomarker concentrations of the relevant B-vitamins were measured in Trinity College Dublin (homocysteine, red cell folate, vitamin B12 and Holo TC) and the University of Ulster (vitamin B6/PLP and riboflavin/EGRac

Table 1: Diabetes related variables of interest

Variable	Recognised risk values
Weist size	Maio 2 94 cm
(Europids/caucasions)	Fomalo ≥ 50 cm
Reised triglycerides	2 1.7 mmol/L
Reduced HDL cholesterol	Malc < 1.05 mmol/L Fomalc < 1.29 mmol/L

Statistical analysis was preformed using SPSS version 20.0.

McCann, A¹., Hoey, L¹., O' Kane, M²., Ward, M¹., Strain, JJ¹., Molloy, A²., MoNulty, H¹.

Northern Ireland Centre for Food and Health, University of Ulster, Coleraine, Northern Ireland. I'Western Health and Social Care Trust, Albagelvin Area Hospital, Derry, Northern Ireland. I'School of Clinical Medicine, Trinity College Dublin, Ireland.

Homocysteine and Related B-vitamins

Table 2: Comparison of diabetes related variables and B-vitamin biomarkers between the normogy asemic group and those with or at-

Variable	Normal blood glucose (n=1155) (Mean [SO])	With or st-risk of disbutes (n=434) (Mean (SO))	P value
Age (years)	69.5[6.3]	69.9[6.5]	0.261
6A1c (%)	5.7[0.5]	7.0[1.3]	\$0.001
Vaist ircumfarance (cm)	98.7[12.8]	106.4[12.7]	\$0.001
Vaisthip ratio	0.92[0.08]	0.96[0.08]	\$0.001
riglycerides mmol/L)	1.82[0.97]	1.97[0.97]	0.006
IDL cholesterol mmol/L)	1.58[0.59]	1.21[0.55]	\$0.001
lomocystaina µmol/L)	14.0(5.1)	15.1[1.0]	0.003
ad cell foliste smol/L)	995[521]	971[552]	0.416
fitamin 512 pmol/L)	277[145]	269[159]	0.226
tolo TC (pmdl/L)	65[28]	64[28]	0.487
ritemin 86 nmol/L)	80.4[59.8]	62.5[40.3]	\$0.001
liboflavin*	1.58[0.22]	1.42[0.27]	0.024

- Statistical analysis indicated the following variables were significant predictors of a persons average blood glucose (HbAsa):
 - weist size (8=0.162, Ps0.001) HDL ("good") -cholesterol (\$=-0.155, Ps0.001)
 - vitamin 86 (8=-0.077, P=0.003)
- Neither homocysteine nor the other B-vitamin biomarkers were

The potential roles of vitamin B6 and riboflavin (metabolically interdependent vitamins) in Type 2 diabetes merit further investigation.

References

- Ueland PM, Nygård C, Volket SS, RefsumH. The Hodaland Homocysteine Studies Lipids. 2001;38 Suppl. 523-9
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Funders: Food for Health Research Initiative of the Inith Department of Agriculture and Health Research under its Cross-Gorder Research and Development Programme: "Strengthening the sil-Idand Research Base ch Soard, with co-funding from the Department for Employment and Learning Northern I wand







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Today's Programme



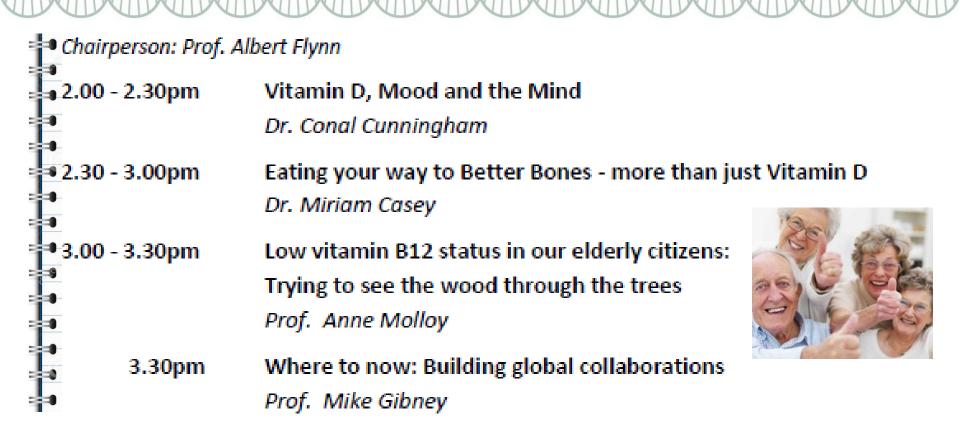
11.30 - 12.00pm What metabolite analysis can tell us about our health Dr. Lorraine Brennan 12.00 - 12.30pm Do fats fuel a fire? Prof. Helen Roche

> Riboflavin and blood pressure: Findings and lessons learned from the National TUDA elderly study Prof. Helene McNulty

12.30 - 1.00pm Hot Buffet Lunch – Poster exhibition 1.00 - 2.00pm



Today's Programme



Open discussion

www.ucd.ie/jingo



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Welcome to the Joint Irish Nutrigenomics Organisation

Introducing JINGO

The Joint Irish Nutrigenomics Organisation (JINGO) in corporates four universities working together to create a National Nutritional Phenotype Database. The project is funded by the Irish Department of Agriculture's Food Institutional Research Measure. The database which has been built from 2007 - 2013 extends and deepens traditional dietary survey databases by combining dietary, physical activity, body measurement and lifestyle data with nutrigen omics technology data.

The JINGO Database combines information from 3 Projects:

National Adult Nutrition Survey (NANS)

Led by University College Cork (1,500 adults 18+ yrs)

Trinity-Ulster Department of Agriculture Project (TUDA)

Trinity College Dublin and University of Ulster (5,200 adults 60+ yrs)

Metabolic challenge study (MECHE)

Led by University College Dublin (214 adults 18 - 60 yrs)





JINGO Home Page

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NutrigenomicsEU

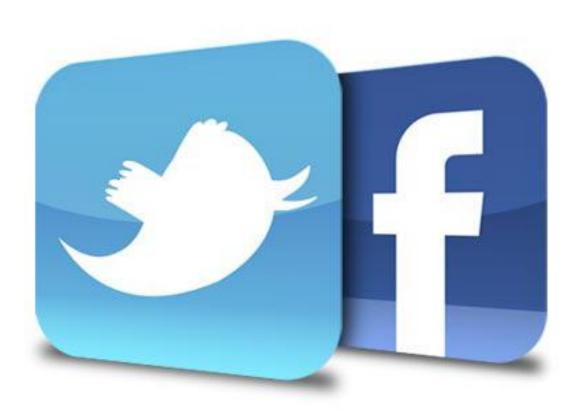
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#VitaminD, #mood & the #mind. Dr. Cunningham -St. James's Hospital to explain -15th Nov bit.ly/18Ep8Pr #jingoEU #depression #elderly



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