

# Early Nutrition: the opportunity for childhood obesity prevention

Prof. Cristina Campoy

Department of Paediatrics. University of Granada. Spain

Member of the ESPGHAN Committee on Nutrition



*ugr* | Universidad de Granada

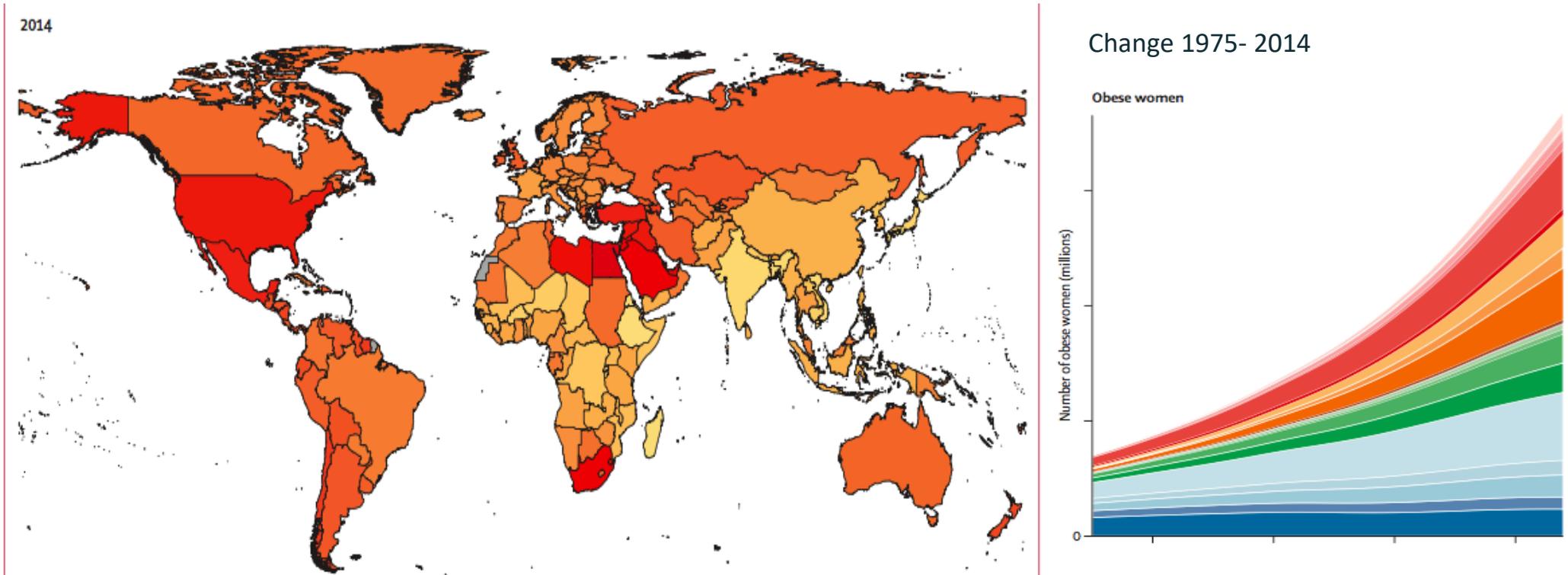


**HIGH LEVEL GROUP  
ON NUTRITION AND PHYSICAL ACTIVITY**

**23 NOVEMBER 2016**

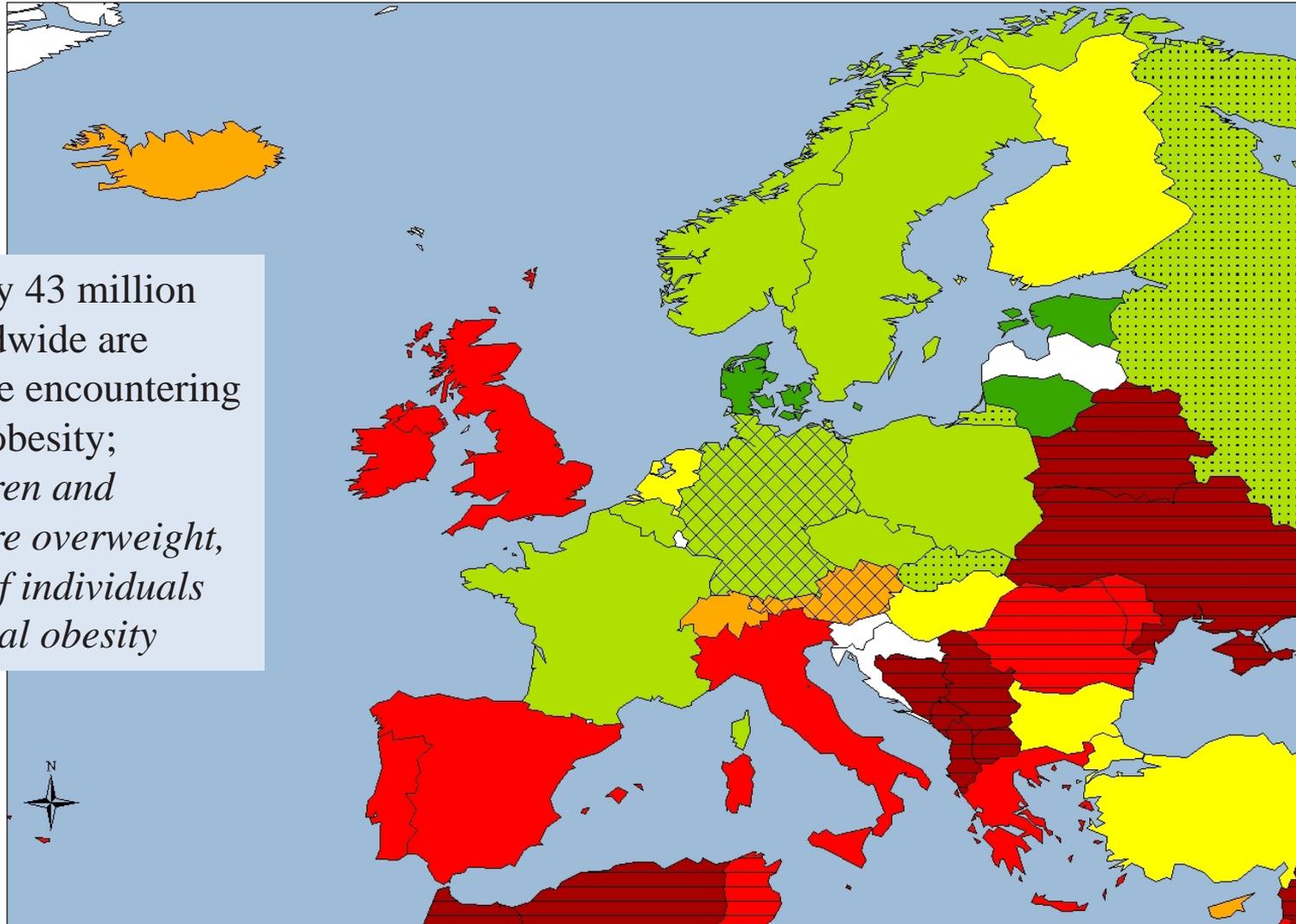
# Obesity amongst women 2014

‘By 2025, global obesity prevalence will reach 18% in men and surpass 21% in women’



*NCD Risk factor Collaboration, Lancet 2016*

# Prevalence of overweight and obesity in European children and adolescents

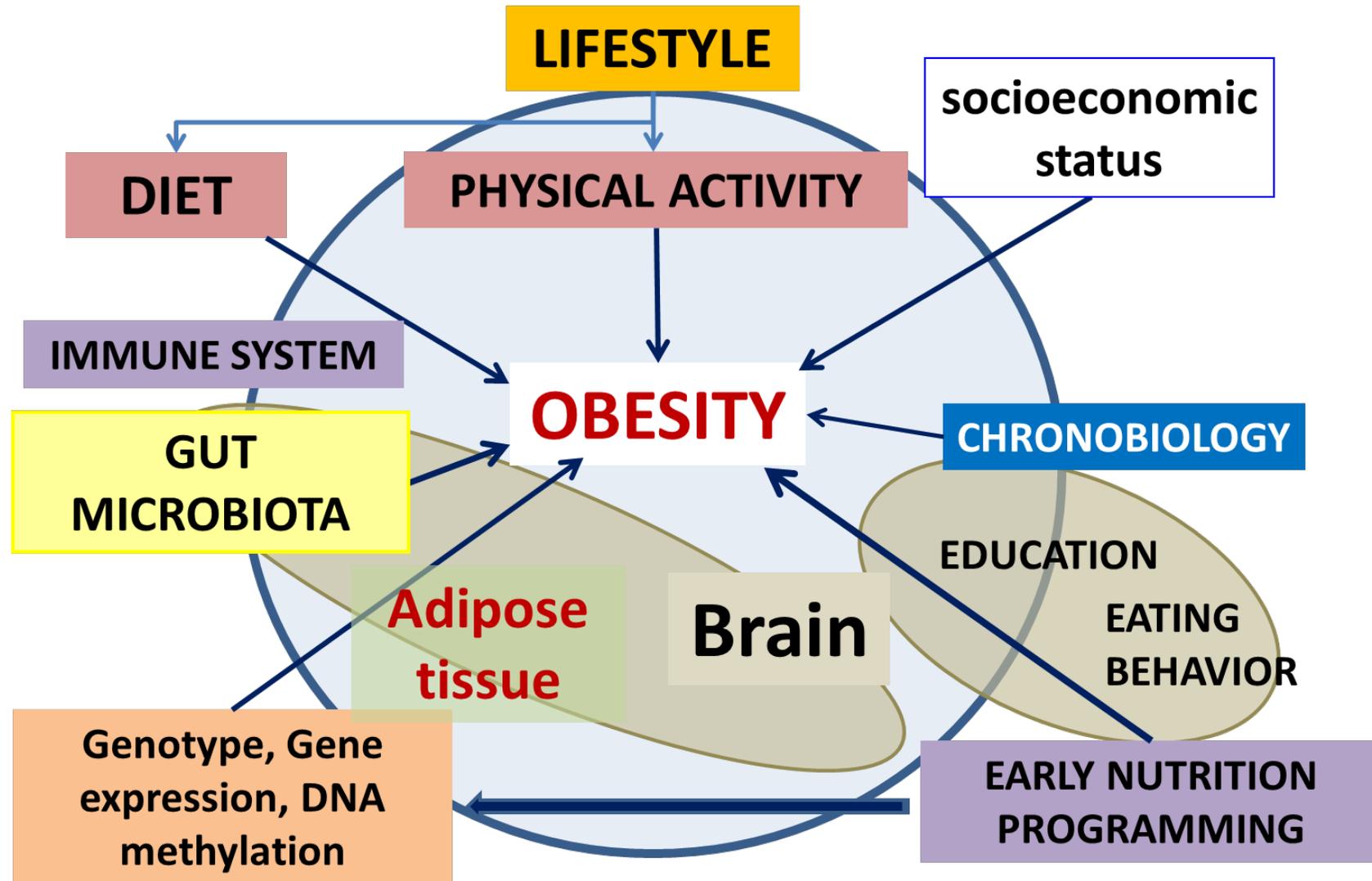


no data
  < 10%
  10% - 15%
  15% - 20%
  20% - 25%
  25% - 30%
  > 30%

IOTF
  CDC
  K-H
  Other
  WHO

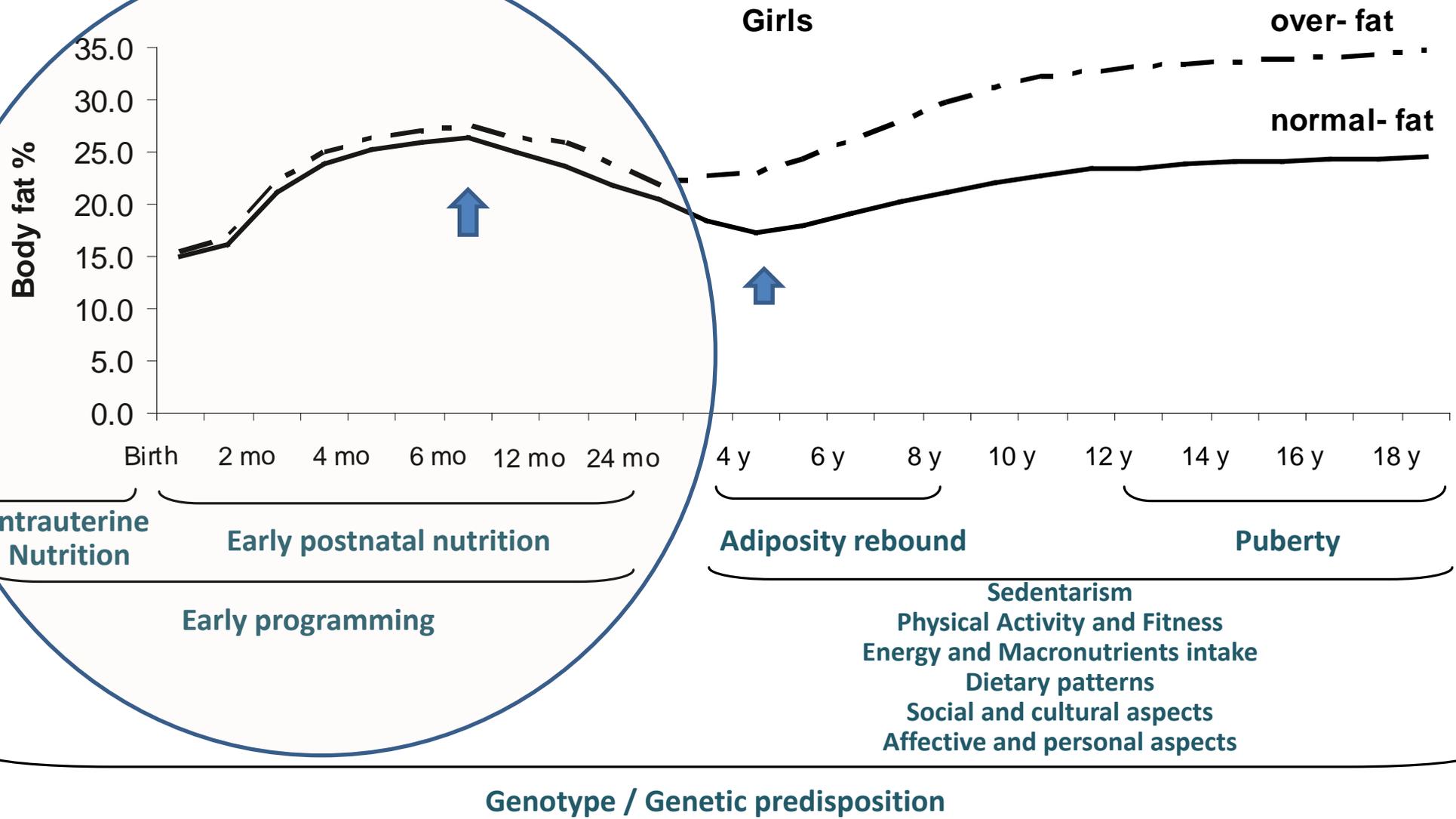
Moreno, Pigeot, Ahrens (eds.): Epidemiology of overweight and obesity in children and adolescents. Springer, New York 2011

# CAUSES OF CHILDHOOD OBESITY



Symonds ME, Mendez MA, Meltzer HM et al. Early life nutritional programming of obesity: Mother-Child Cohort Studies. *Ann Nutr Metab* 2013; 62: 137-145.

# Factors influencing obesity development along childhood



(Moreno LA et al. World Rev Nutr Diet 2013;106:119-26)



# Mother obesity/diabetes determines pathologic phenomena in the mothers and their offspring



## MOTHERS

Mortality (*Venous thrombo-embolism,..*)

Morbidity (*Gestational diabetes, pre-eclampsia,..*)

Anesthetic complications

Perinatal complications (*Caesarean section, Haemorrhage,..*)



## FETUS & NEONATE

Congenital Defects

Perinatal Death

Placental dysfunction

Stillbirth

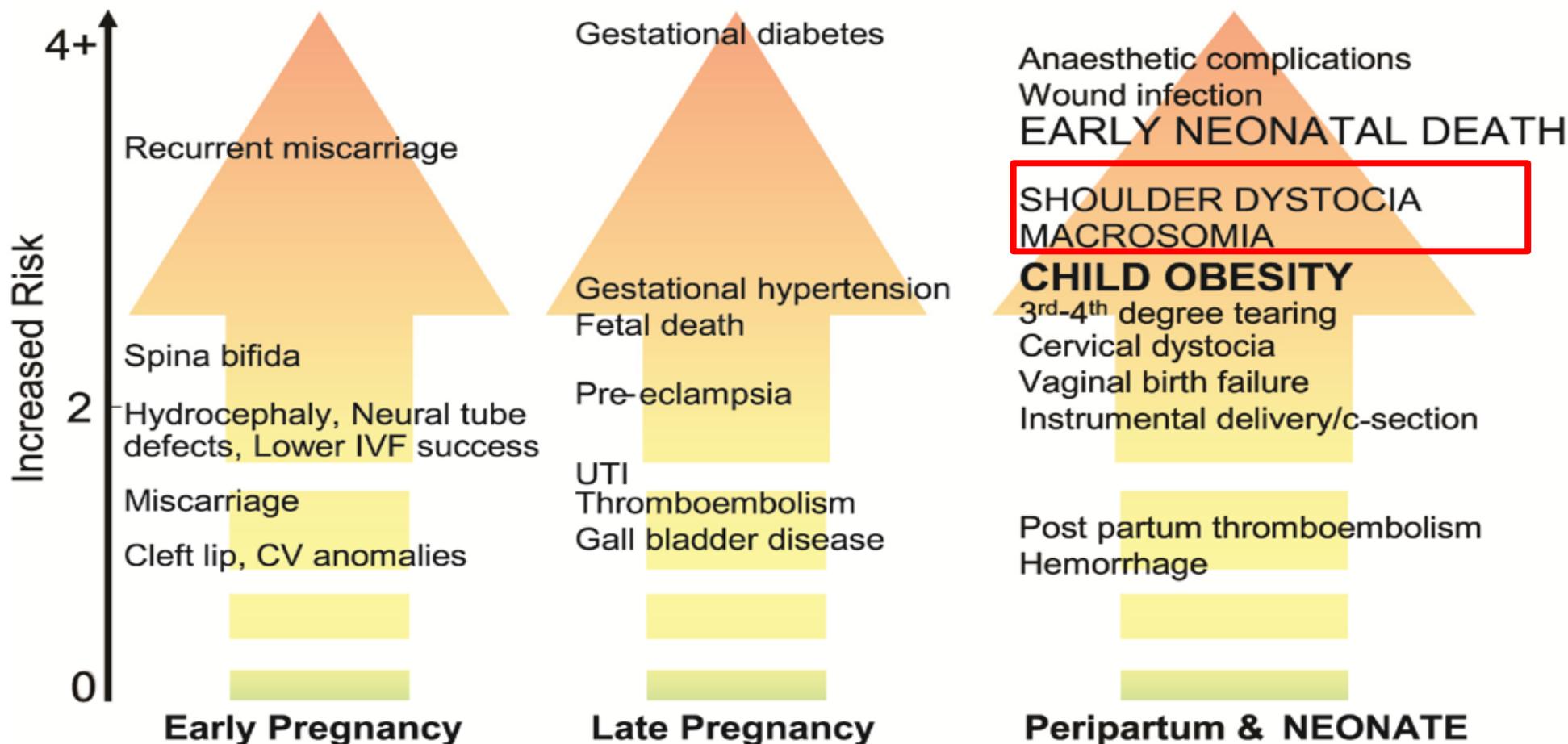
IUGR

Macrosomia

Shoulder dystocia



# HOW MOTHER'S OBESITY AFFECTS THE OFFSPRING?



(Adamo et al, 2012)



Interventions to Promote Healthy Eating Habits: Evaluation and Recommendations



I Family is funded by the EC FP7 Project No. 266044 building on



# ESPGHAN Committee on Nutrition

Coming papers related to the EU Platform topics

1. **Complementary Feeding 2015: An updated Commentary by the ESPGHAN Committee on Nutrition**
2. **Sugar in infants, children and adolescents. A position paper of the ESPGHAN Committee on Nutrition**

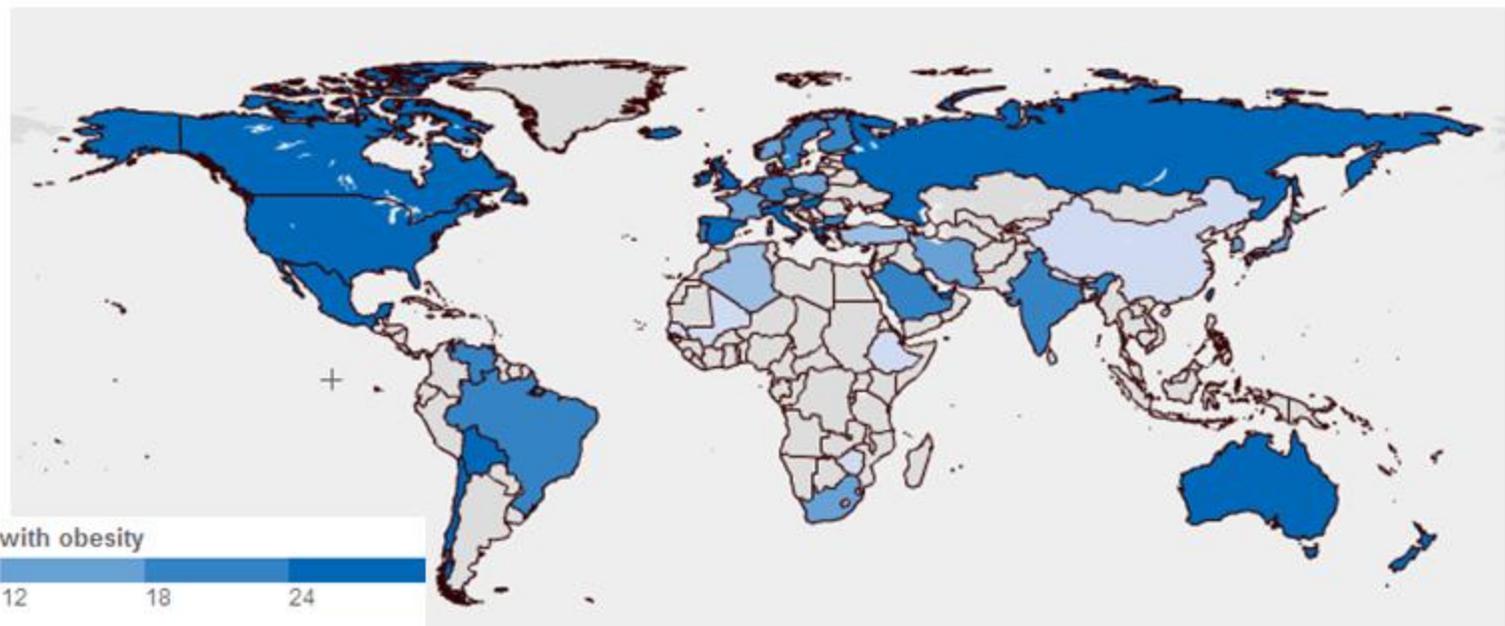


# Why Research on Early Nutrition $\Rightarrow$ Adiposity?

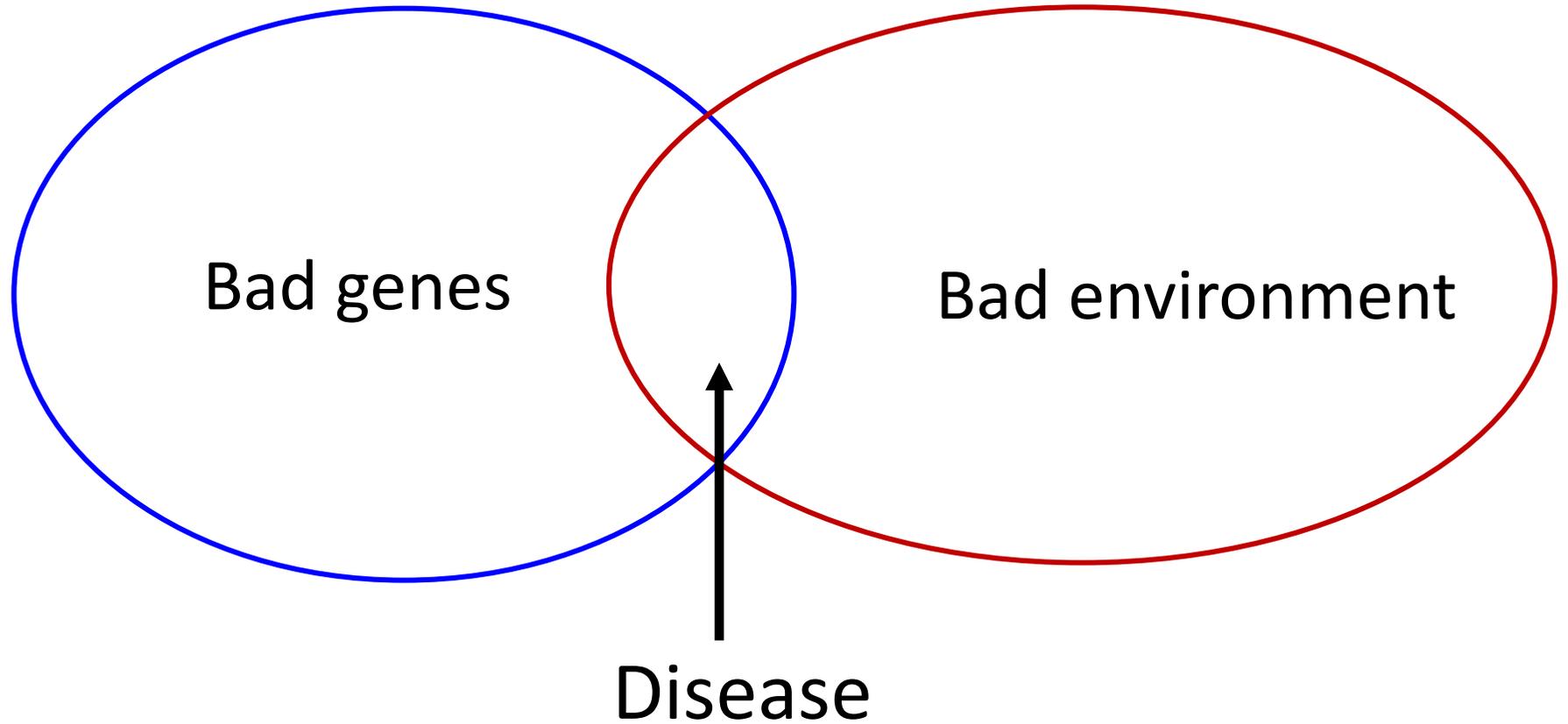


**WHO: overweight & obesity = 5<sup>th</sup>. leading cause for global deaths**

- The growing obesity propels an upsurge of non communicable diseases e.g. diabetes, hypertension and cardiovascular diseases
- Globally, 44% of the diabetes burden, 23% of the ischaemic heart disease burden and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity.



# Gene: Environment interaction



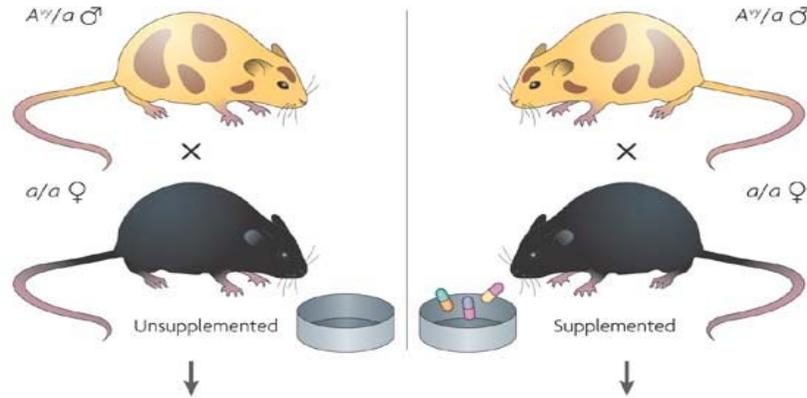
# Potential environmental epigenetic regulators

## - animal models

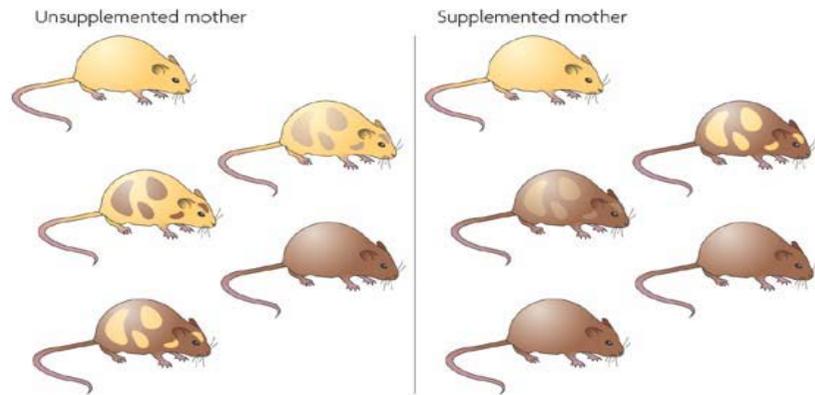
- Maternal care & stress
- Endocrine disruptors
- Folate and micronutrients
- Multiple dietary compounds
- Assisted reproduction
  - superovulation and/or embryo culturing
- Alcohol exposure
- Smoking
- Pollution/heavy metals/particulates
- Many others emerging

# Maternal diet and the neonatal epigenome – a focus on folate

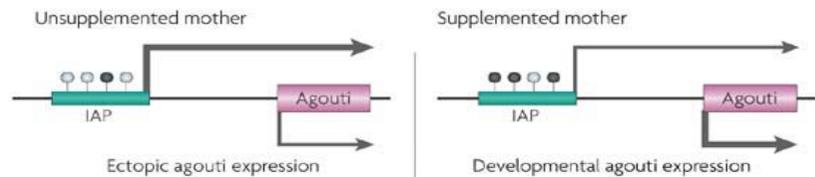
## a Dietary supplementation during pregnancy



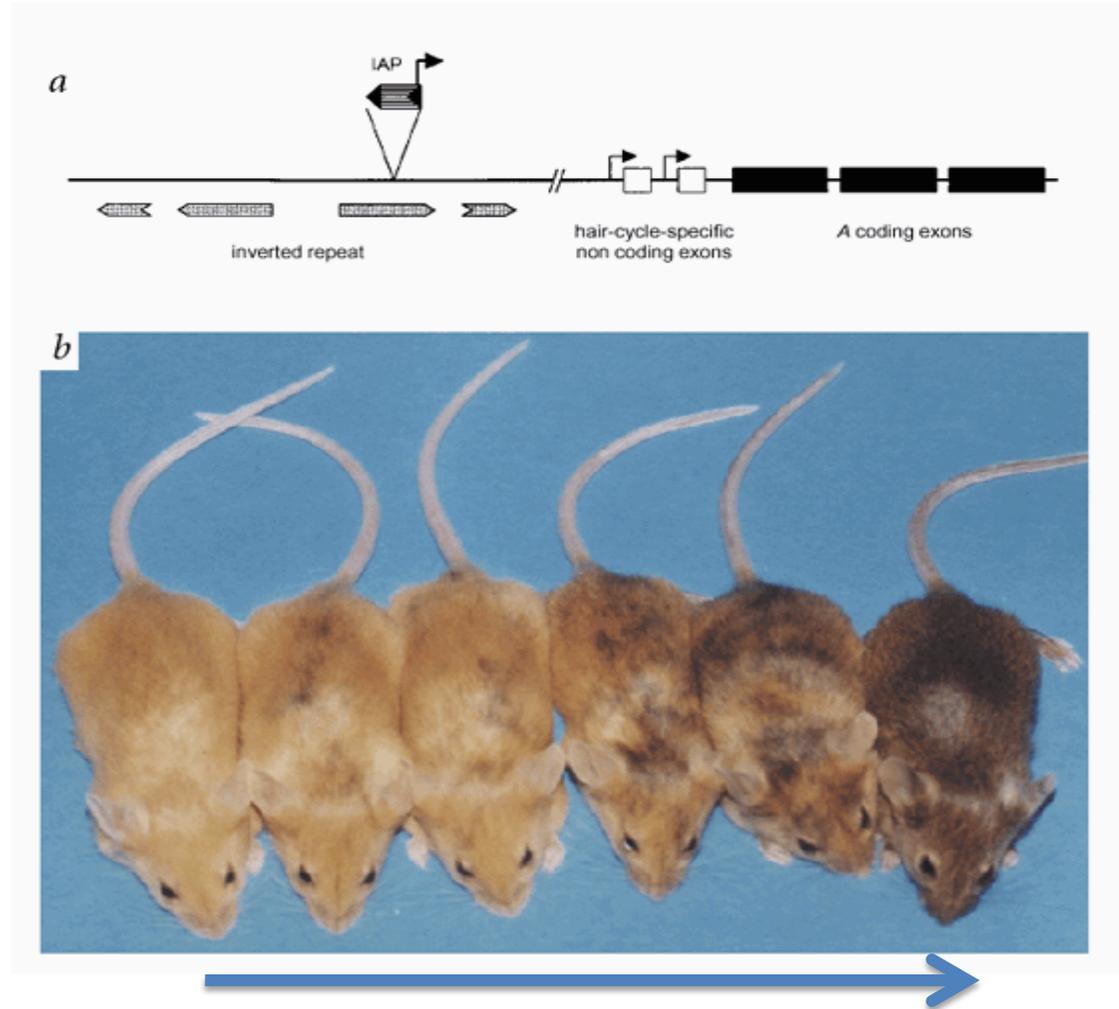
## b $A^y/a$ offspring



## c Agouti expression



Nature Reviews | Genetics



Increasing dietary methyl donors

Wolff GL, et al. FASEB J. 1998; 12: 950



Vitamin B2

Vitamin B6

Vitamin B12

Choline

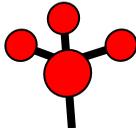
Folate

one carbon donors

Diet

SAM-e

primary methyl donor in all eukaryotes



Addition of methyl group to DNA



# EARLYNUTRITION

Long-term effects of early nutrition on later health



PARTNERS FROM: Australia Austria Belgium Denmark Germany Greece Ireland Italy  
Norway Poland Spain The Netherlands United Kingdom United States of America

[www.project-earlynutrition.eu](http://www.project-earlynutrition.eu)



**EARLYNUTRITION**

Long-term effects of early nutrition on later health



**THEME [KBBE.2011.2.2-03]  
[Long-term influence of early  
nutrition on health]  
Grant agreement n°: 289346**



**ESPGHAN**

# EARLY NUTRITION

Long-term effects of early nutrition on later health

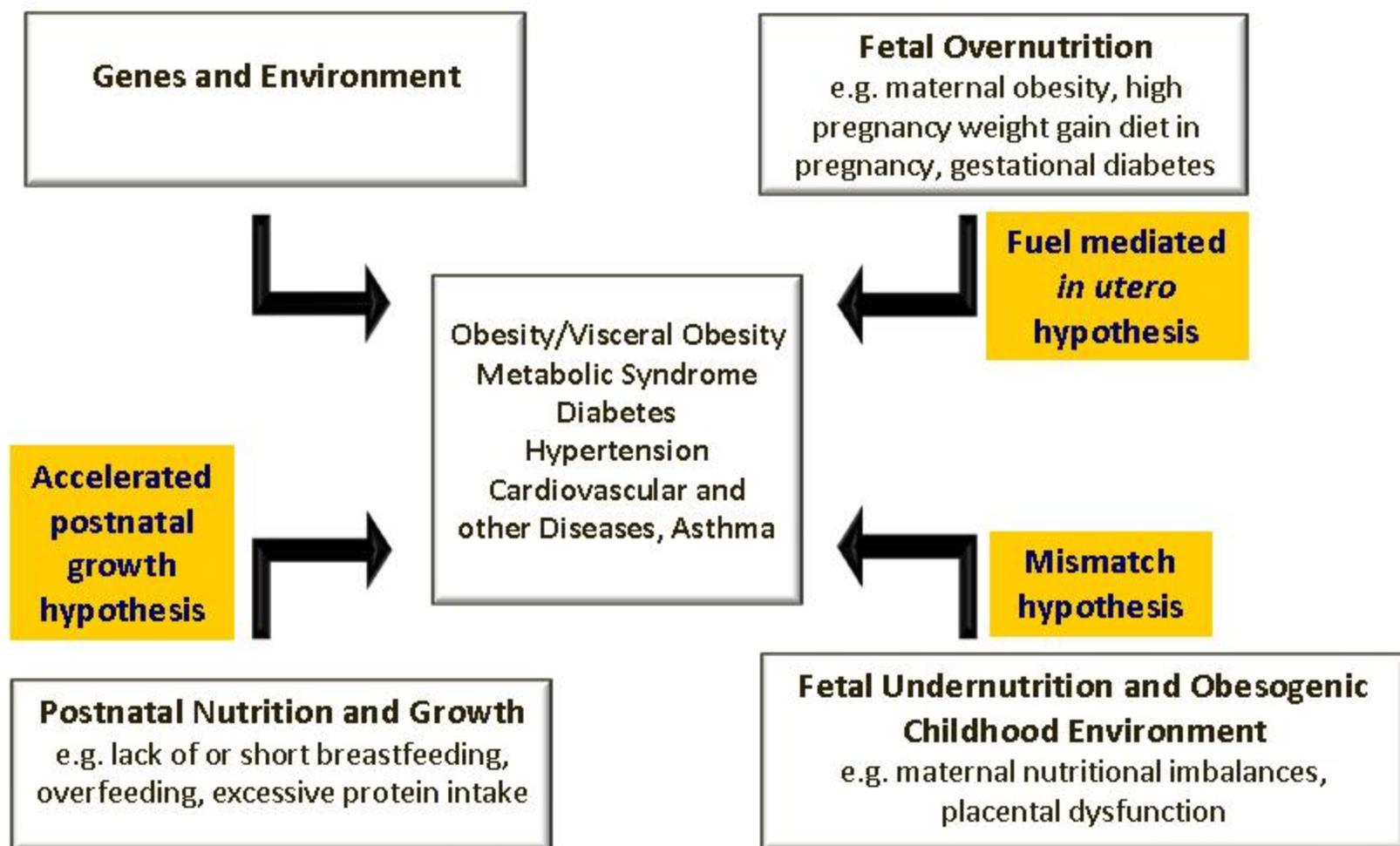


- World's largest research project on developmental origins of adult disease
- Key question: influence of diet and metabolism from pre-pregnancy to early childhood on later adiposity and related health outcomes
- Collaboration of a multi-disciplinary team of scientists from **36 partners** in 13 European countries, USA and Australia
- Funded under the Food, Agriculture and Fisheries, and Biotechnology Priority of FP7, with an **EU contribution of 8,96 mio €** towards a total budget of **11,12 mio EUR**, cofunded by **Australian NHMRC with 440k €**
- Project duration **60 months**
- Coordinated by Dr. von Hauner Children's Hospital, University of Munich (LMU) Medical Centre

# International Research Consortium

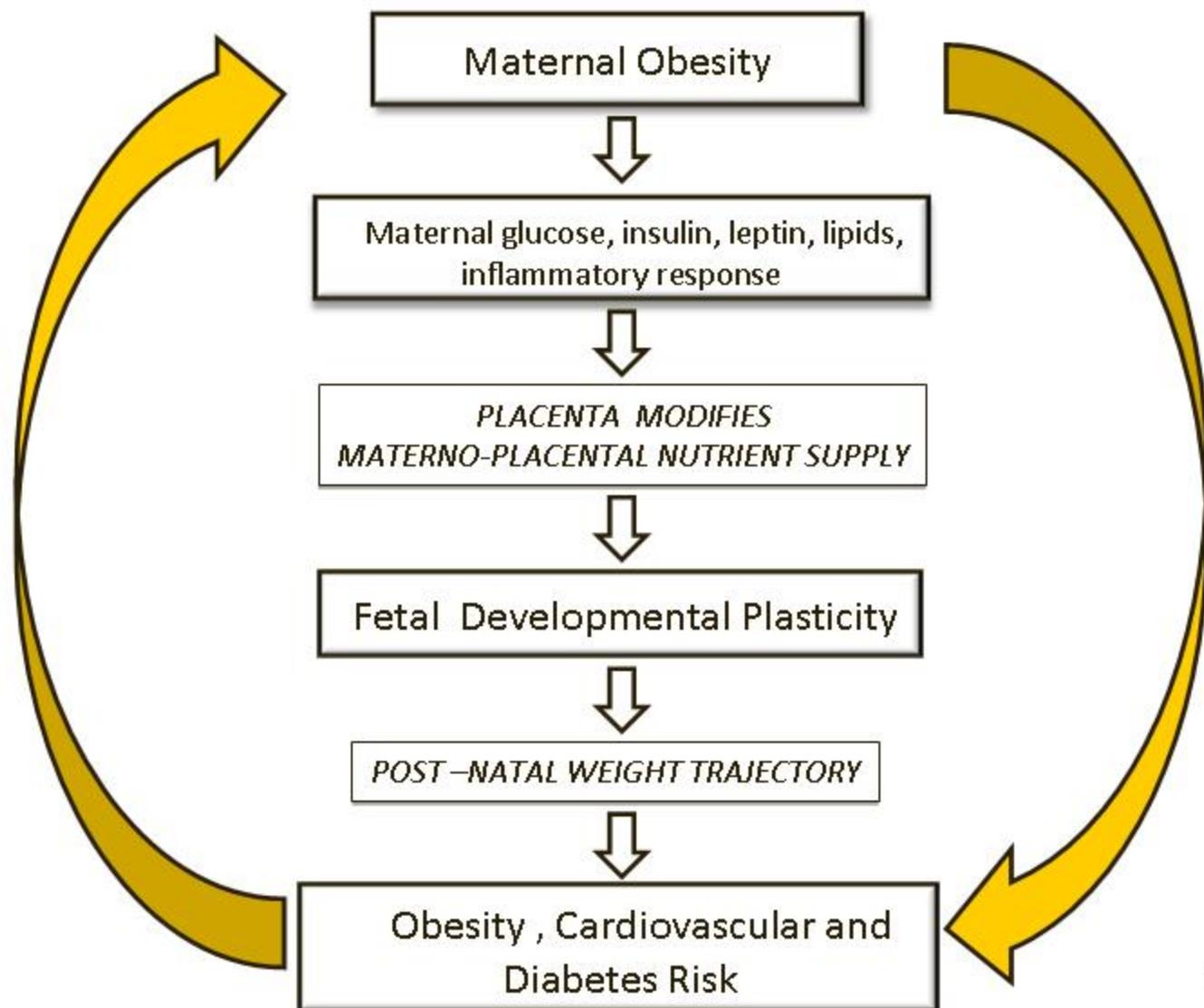


# Key Hypotheses

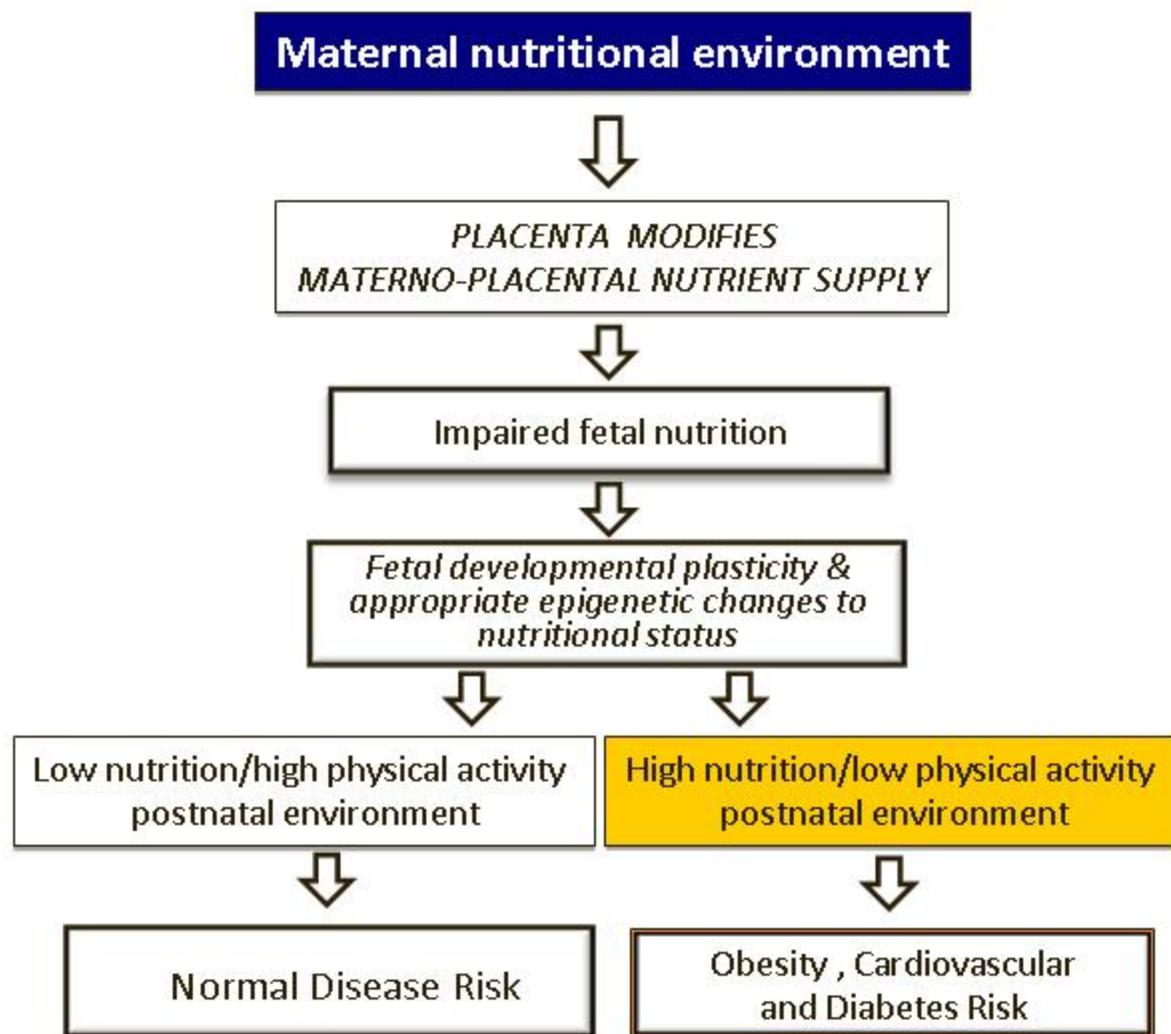


modified from Koletzko et al, Am J Clin Nutr, 2011 Dec;94(6):2036S-2043S.

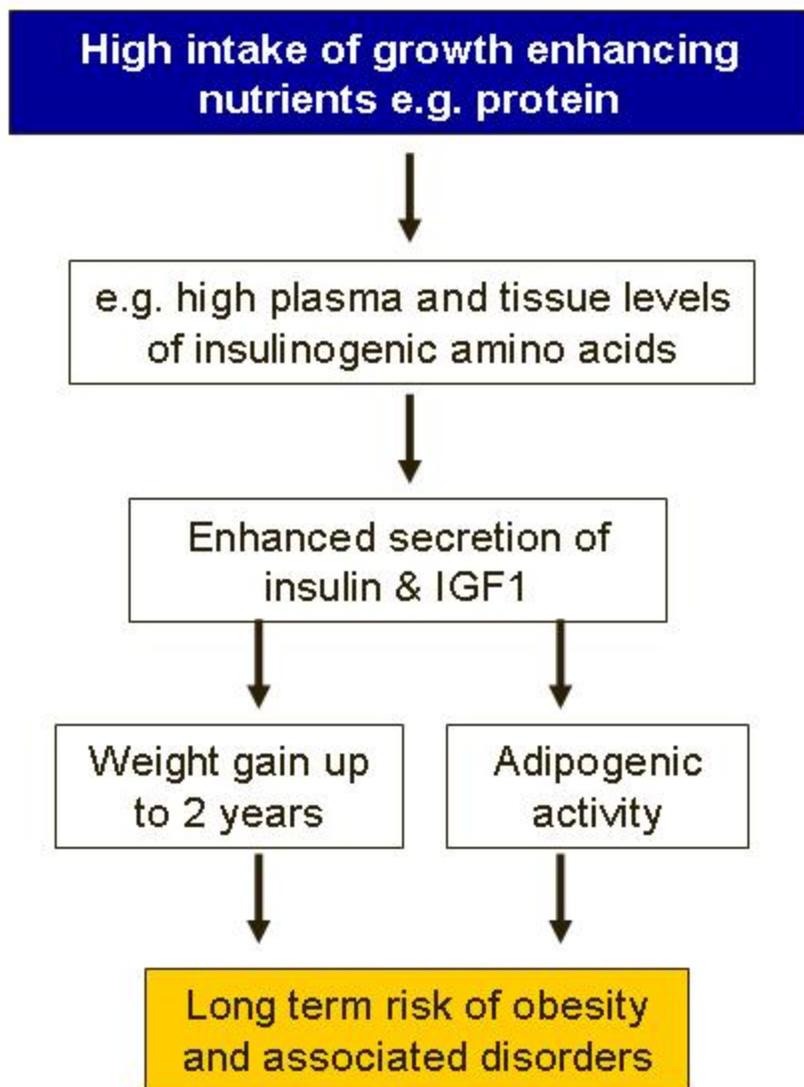
# Transgenerational Circle of Obesity



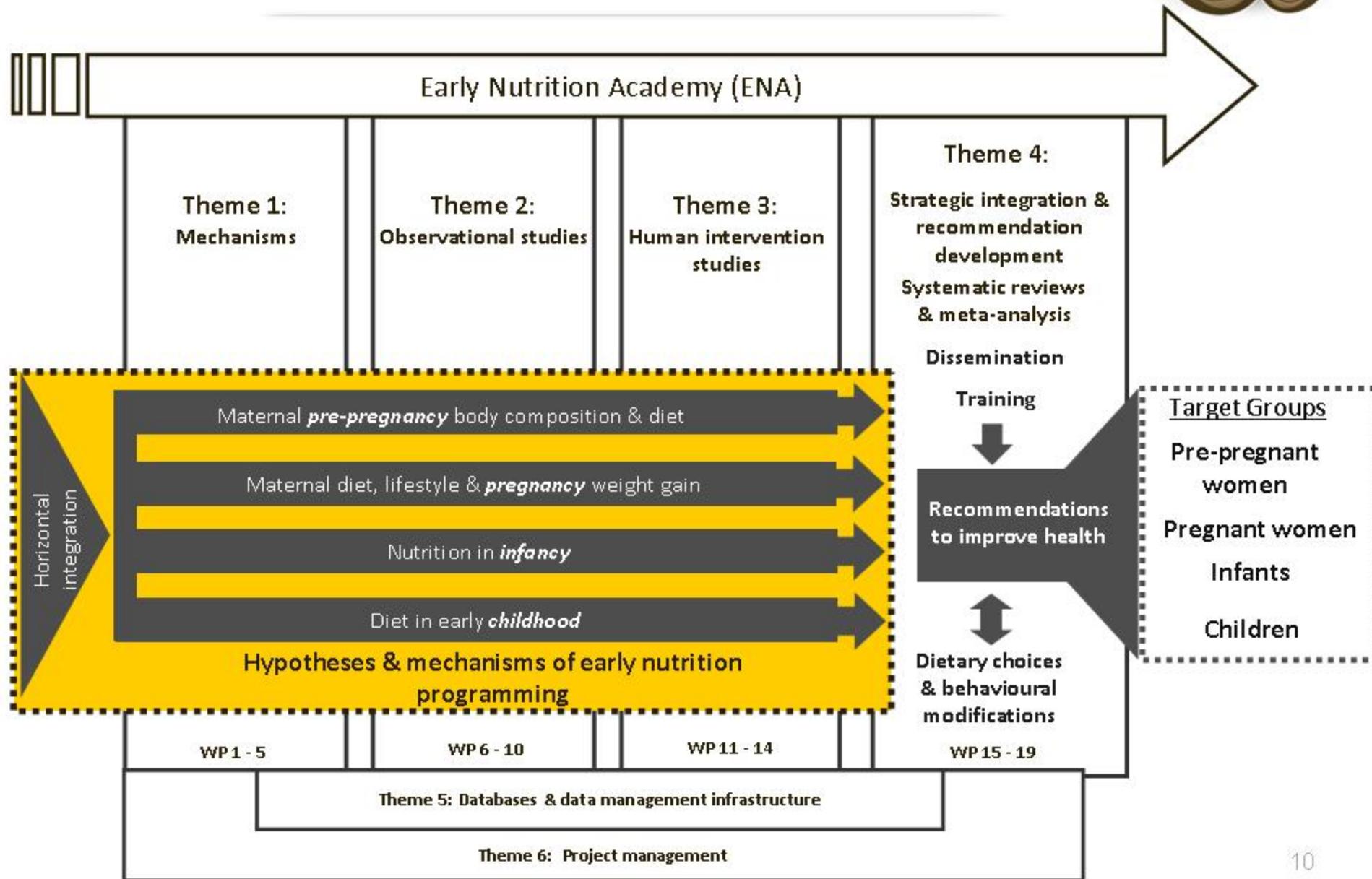
# Mismatch between pre- and postnatal Environment



# Postnatal accelerated Weight Gain



# Project EarlyNutrition - Structure



## Project EarlyNutrition brings together...

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⇒ **11 observational cohorts:** SWS, DNBC, GenerationR, HUMIS/MOBA, Genesis, LISA, PreventCD, RAINE, UC Irvine, VIVA

and

⇒ **9 interventional studies (RCTs):** UPBEAT, SCOPE/Baseline, CHOP, ROLO, LIMIT, new RCT „LGI dietary supplement“, new RCT „low GI follow-on formula“; new RCT „novel nitrogen composition in infant formula“

from 13 European countries, the USA and Australia comprising  
**>470,000 individuals**

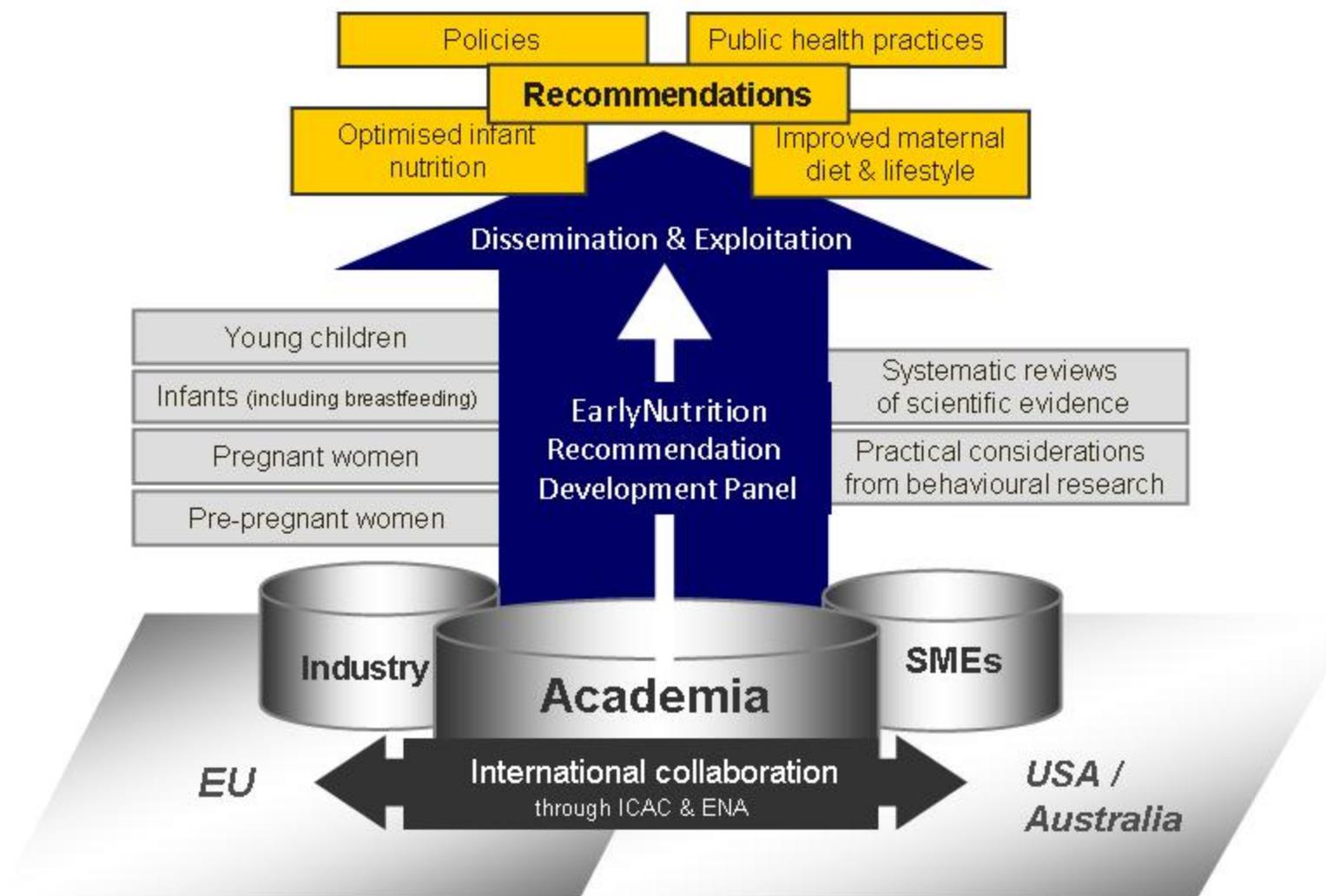
## Expected Impact

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- Better evidence for the effects of early nutrition programming on health, well-being and performance, with a focus on reduction of obesity and associated disorders
- Characterisation and validation of biomarkers for early growth patterns and later outcomes
- Demonstration of effects on novel dietary interventions
- Definition of behaviour change approaches to the practical implementation of dietary and physical activity recommendations among consumers

# Closing the Gap between Research and Application



## Expected Key Benefits

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- Contribution towards EU policies on reduction of health inequalities, EU strategies on obesity and ageing, the Europe 2020 strategy and the EU Innovation Union policies
- Economic benefits through prevention of obesity
  - ⇒ major reduction of health care and social security costs
  - ⇒ enhanced wealth due to increased productivity, and due to development and production of improved dietary products for the target populations
- Attracting and training of new biomedical researchers that will be the innovators of the future



Cohort studies analyzing epigenetic influences and the persistence of such signatures

GUSTO study (Asia)

Danish Cohort

Early Nutrition Project (Europe)

Nutritional intervention studies in obese pregnant women

Limit Trial (Australia)

Upbeat Study (UK)

Nigo-Health (Spain)

Rolo Study (Ireland)



UPBEAT



## EARLYNUTRITION

Long-term effects of early nutrition on later health

## UPBEAT

A randomised controlled trial of a complex (diet and physical activity) intervention to prevent gestational diabetes and LGA infants in obese pregnant women

1555 women from 8 UK inner city hospitals.

UK Pregnancy Better Eating  
and Activity Trial

*Poston et al, Lancet Diabetes  
and Endocrinology 2015*



This project receives funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289346

## SCIENTIFIC EVIDENCES



## EARLYNUTRITION

- Evidence that **diet and lifestyle modifications during pregnancy** can reduce the increased risk of obesity in offspring of obese pregnant women helping to break an intergenerational cycle of obesity and related disorders.
- Evidence that **excessive weight gain in pregnancy and/or rapid early infant weight gain** leads to later obesity will help to formulate policies to reverse the increasing rates of childhood obesity and co-morbidities.
- Evidence that **dietary modifications in infancy**, in particular relating to breastfeeding and complementary feeding practices, as well as novel compositional approaches to infant formula, can reduce the risk of obesity and related disorders in offspring.

***Nutrición Precoz:  
10 recomendaciones para  
la planificación familiar***

***EarlyNutrition Priority Recommendations***

***Preconcepción, Embarazo,  
Lactancia al pecho & Lactante***



Project No. 289346



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[www.project-earlynutrition.eu/recommendations](http://www.project-earlynutrition.eu/recommendations)



*A healthy weight  
before conception  
gives your baby the  
best possible chance  
of lifelong health!*



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[www.project-earlynutrition.eu/recommendations](http://www.project-earlynutrition.eu/recommendations)



Project No. 289346



*Don't eat for two, but think for two!  
Eat a healthy diet and only  
increase your dietary energy intake  
in late pregnancy by no more  
than 10 %, which is about  
180 – 200 calories.*



## **EARLYNUTRITION**

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Project No. 289346



Project No. 289346

*Breastfeeding women  
should eat a balanced diet!*



## **EARLYNUTRITION**

Long-term effects of early nutrition on later health

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*No cow's milk  
in the first year  
of life!*



## **EARLYNUTRITION**

Long-term effects of early nutrition on later health

[www.project-earlynutrition.eu/recommendations](http://www.project-earlynutrition.eu/recommendations)



Project No. 289346



**EARLYNUTRITION**  
Long-term effects of early nutrition on later health



**SAVE  
THE  
DATE**

**October  
13 - 15, 2016  
Munich,  
Germany**

# THE POWER OF PROGRAMMING 2016

International Conference on Developmental Origins  
of Adiposity and Long-Term Health

<http://munich2016.project-earlynutrition.eu/>

[www.project-earlynutrition.eu](http://www.project-earlynutrition.eu)

[www.early-nutrition.org](http://www.early-nutrition.org)





- 5000 students all over the world
- In English, and translated into Chinese and Arabian, and comming in Spanish!





# EARLY NUTRITION

Long-term effects of early nutrition on later health

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**THANK YOU VERY MUCH FOR YOUR ATTENTION!**



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