

4th Aviesan Meeting Tuesday, March 31, 2015
4.00 PM - 6.00 PM - CLORA - avenue des Arts 8, 1210 Brussels



ITMO Physiopathology, Metabolism, Nutrition

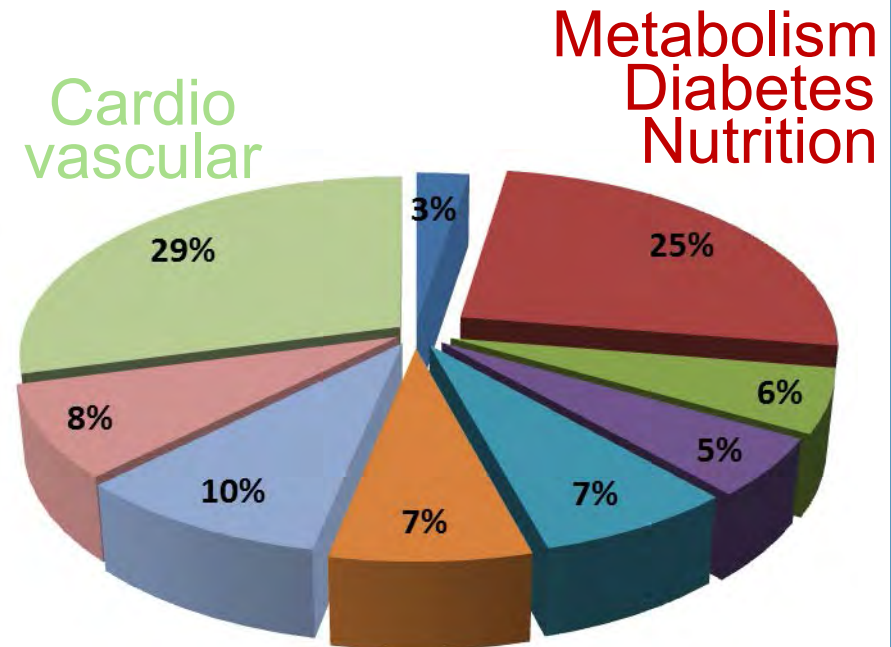
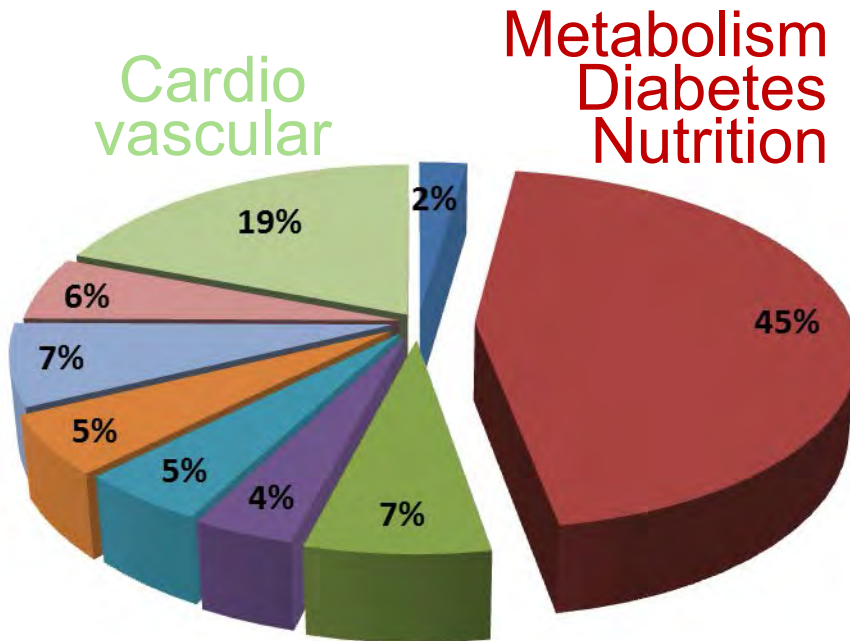
- ❑ 312 research teams
- ❑ 1369 scientists
- ❑ 869 university physicians
- ❑ 4 Research Centers in Human Nutrition (CRNH)
- ❑ 4 national networks of Centres d' Investigation Clinique
- ❑ 15 800 publications per year

🔗 CEA 🔗 CHRU 🔗 CNRS 🔗 CPU 🔗 INRA 🔗 INRIA 🔗 INSERM 🔗 INSTITUT PASTEUR 🔗 IRD 🔗

IT Physiopathology, Metabolism, Nutrition

ITMO Physiopathology, Metabolism, Nutrition

% teams per domain



- CEA
- CHRU
- CNRS
- CPU
- INRA
- INRIA
- INSERM
- INSTITUT PASTEUR
- IRD

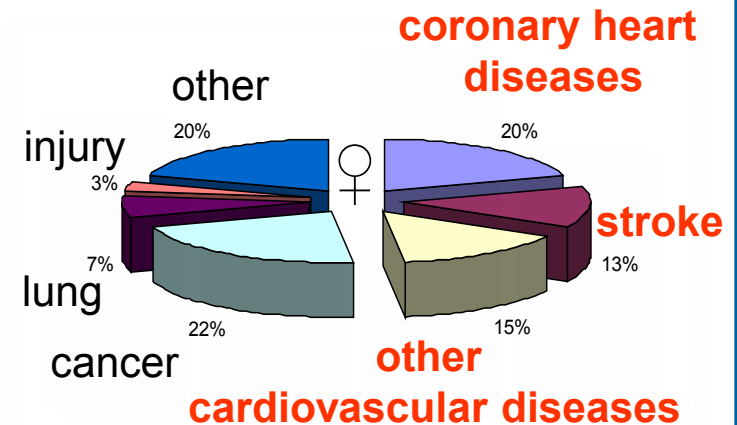
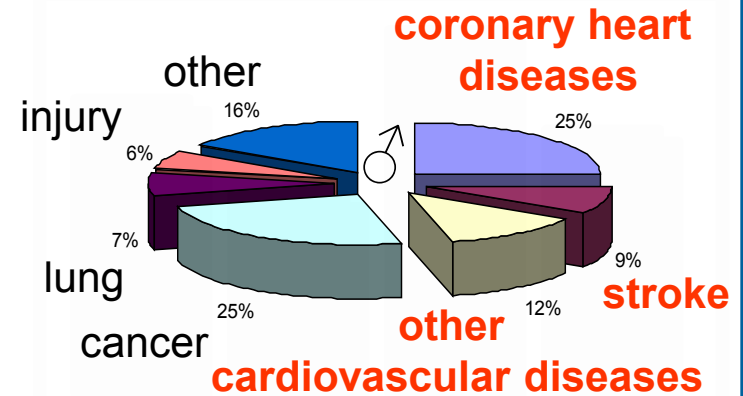
NUMBERS

Cardiovascular diseases:
world leading cause of death

ischemic heart disease

stroke

Causes of death in Europe



NUMBERS

Cardiovascular diseases in France

☞ **29% of deaths in France**

27% ischemic cardiopathies

25% strokes

23% cardiac failure



☞ **hypertension: (adults > 20) 12-13.10⁶**

☞ **obesity: 12.4% of adults in 2006**

☞ **diabetes: 6.2% (20-70)**

glucose intolerance: 5.6%

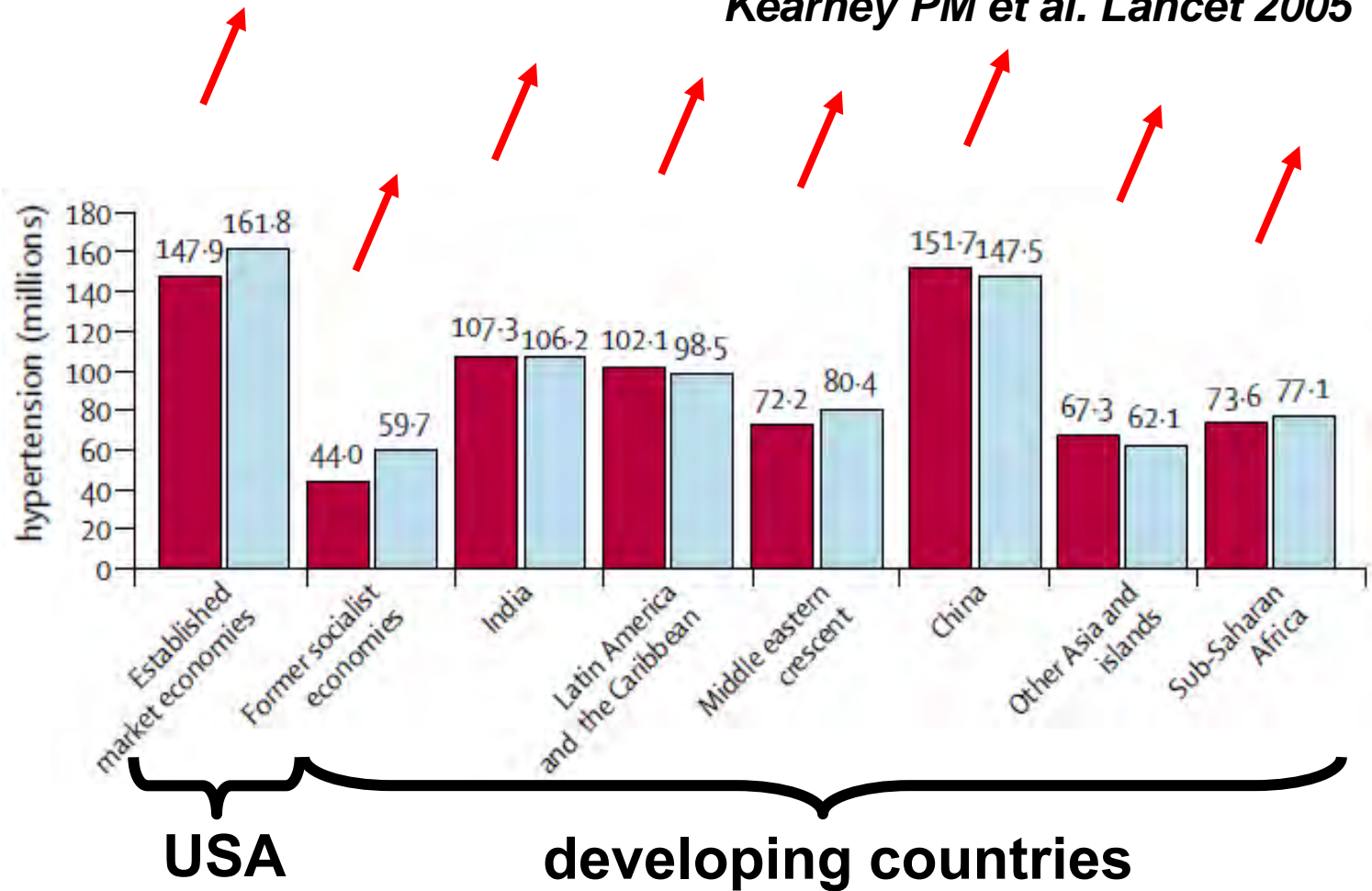
10% health care expenses in France

USA ↗ 50% 1997 → 2007

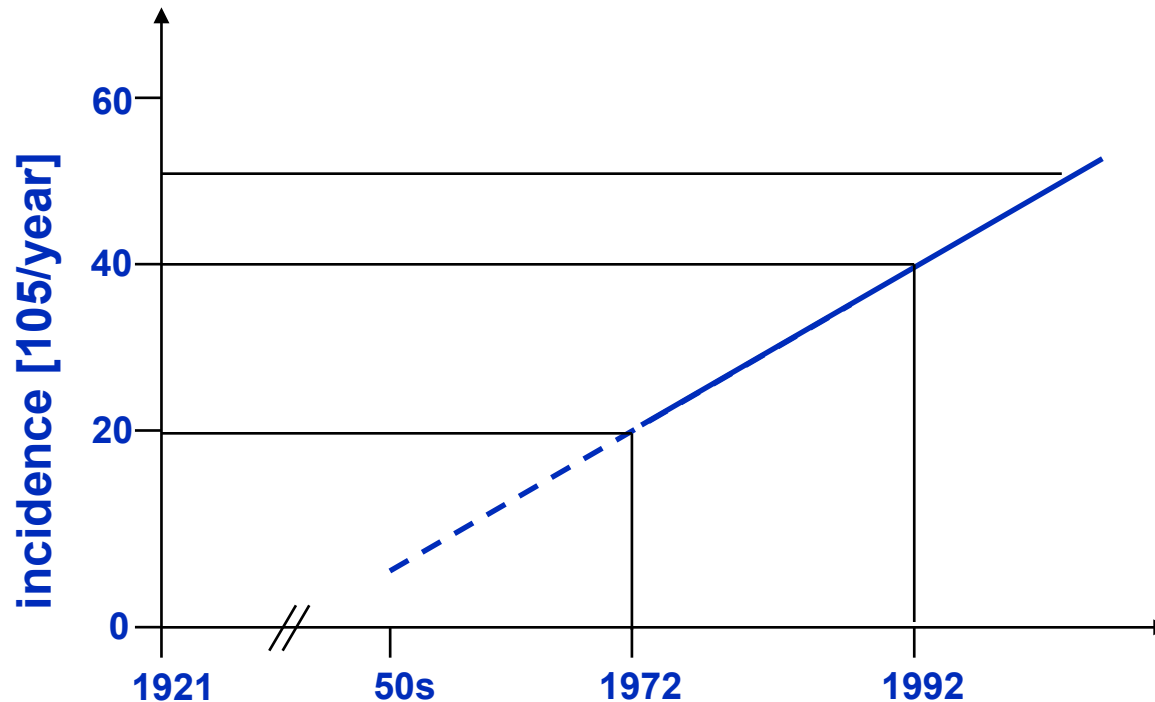


HYPERTENSION PREVALENCE 2025

Kearney PM et al. Lancet 2005



TYPE 1 DIABETES MELLITUS



The role of the environment ? A triggering event ?

THE VASCULAR LINK

g/l

GLUCOSE INTOLERANCE

1.26

1.10

1.40

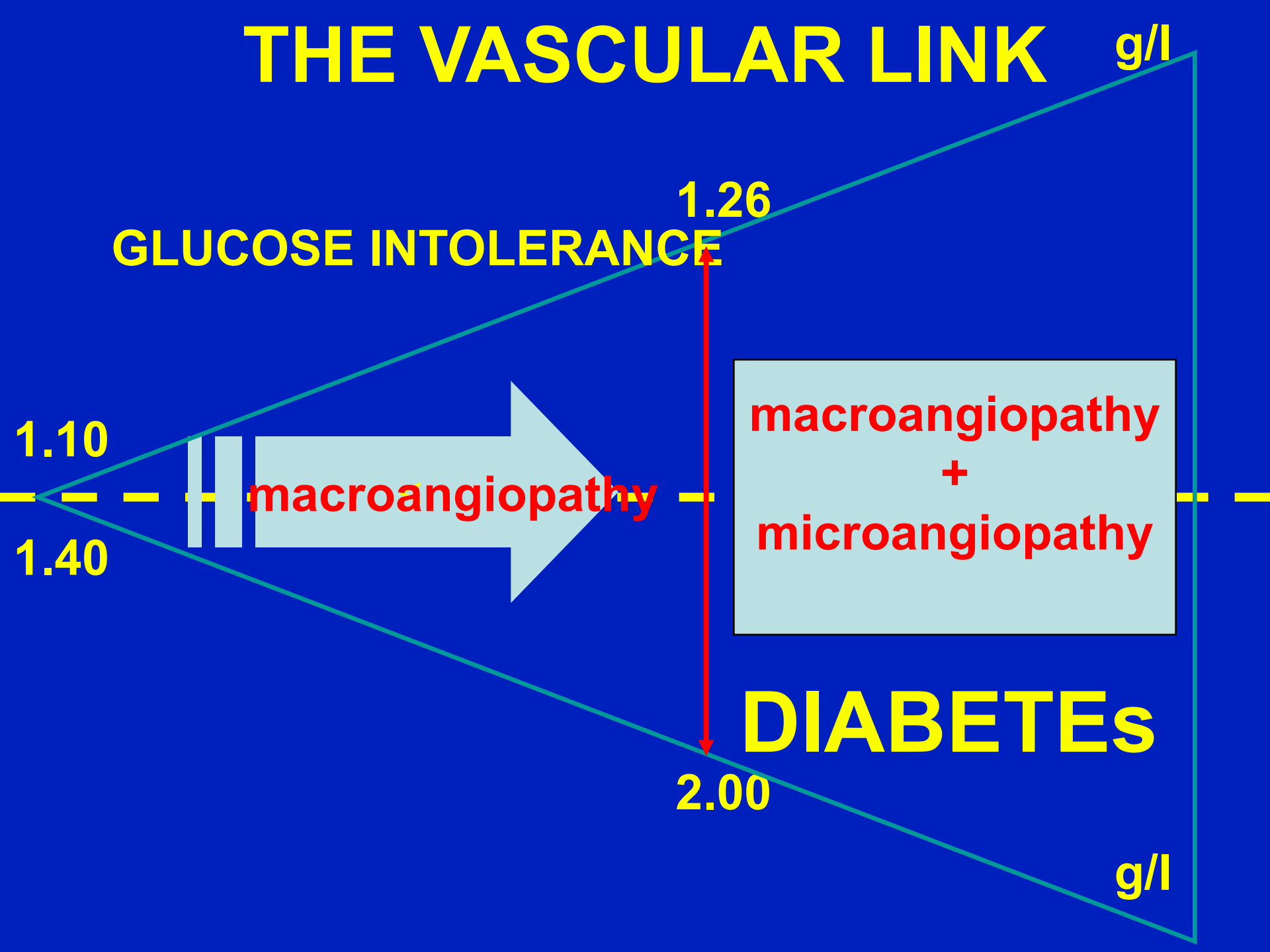
macroangiopathy

macroangiopathy
+
microangiopathy

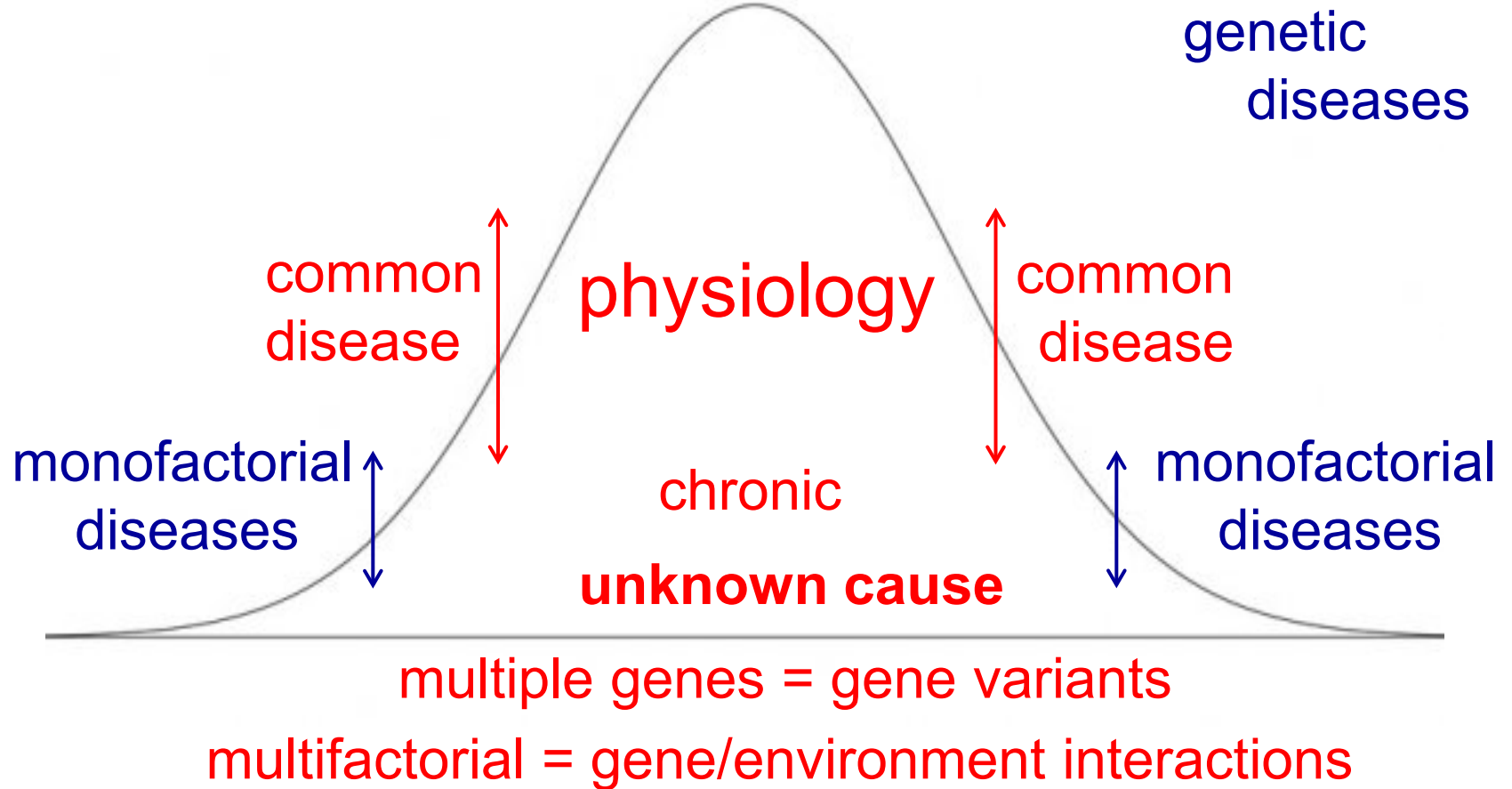
DIABETES

2.00

g/l



A MEDICAL CHALLENGE



TYPE 2 DIABETES: MORE THAN 40 GENES

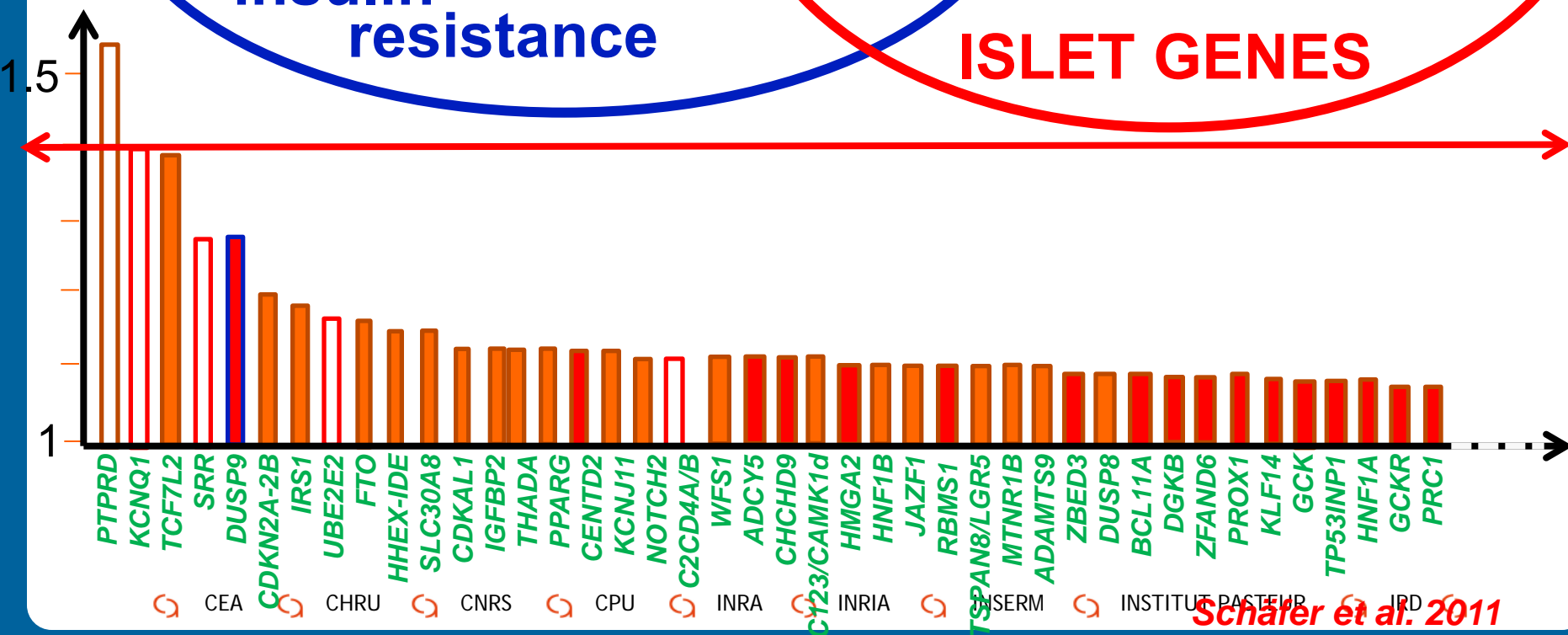
PPARG, ENPP1,
ADIPOQ, SREBF1,
PPARGC1A, AHSG,
SHBG, IRS1, FTO

**insulin
resistance**

TCF7L2
ADAMTS9
CAPN10

KCNJ11, HNF1B
FOXO1, SLC30A8
HHEX, CDKAL1, WFS1
IGF2BP2, CDKN2A/B
SGK1, JAZF1, KCNQ1,
CDC123/CAMK1D, THADA
TSPAN8/LGR5, MTNR1B

ISLET GENES



* GWAS

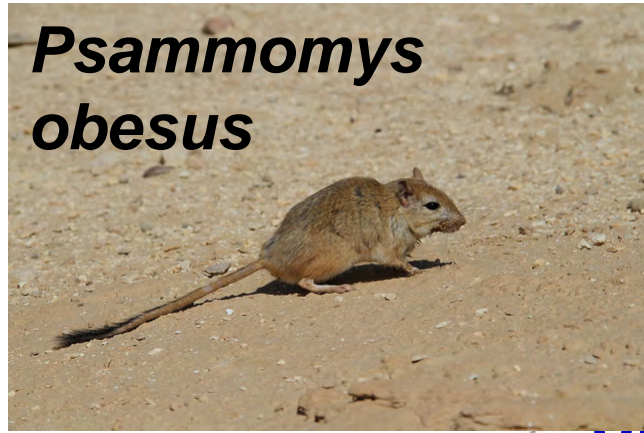
aviesan

Schäfer et al. 2011

Travers ME et al. 2011

T2D DIAGNOSIS

from physiology to disease



population %

physiology

diagnostic threshold

common
disease
chronic
unknown cause
multiple genes
multifactorial

genes

monogenic
diabetes

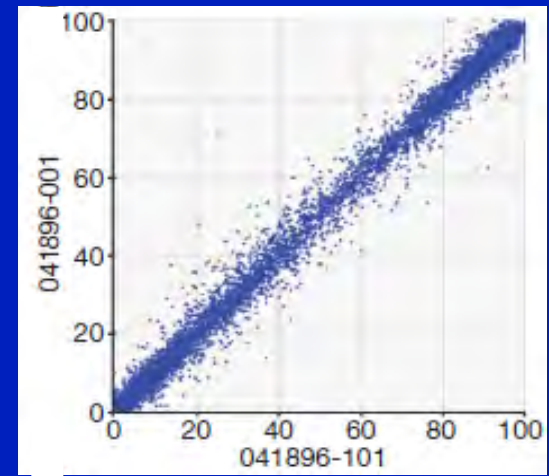
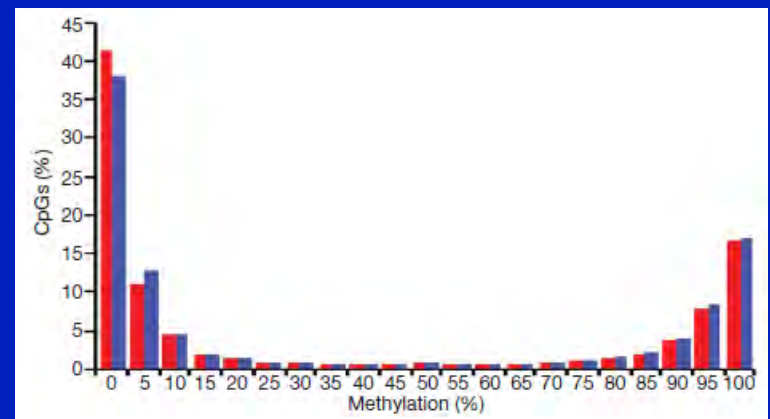
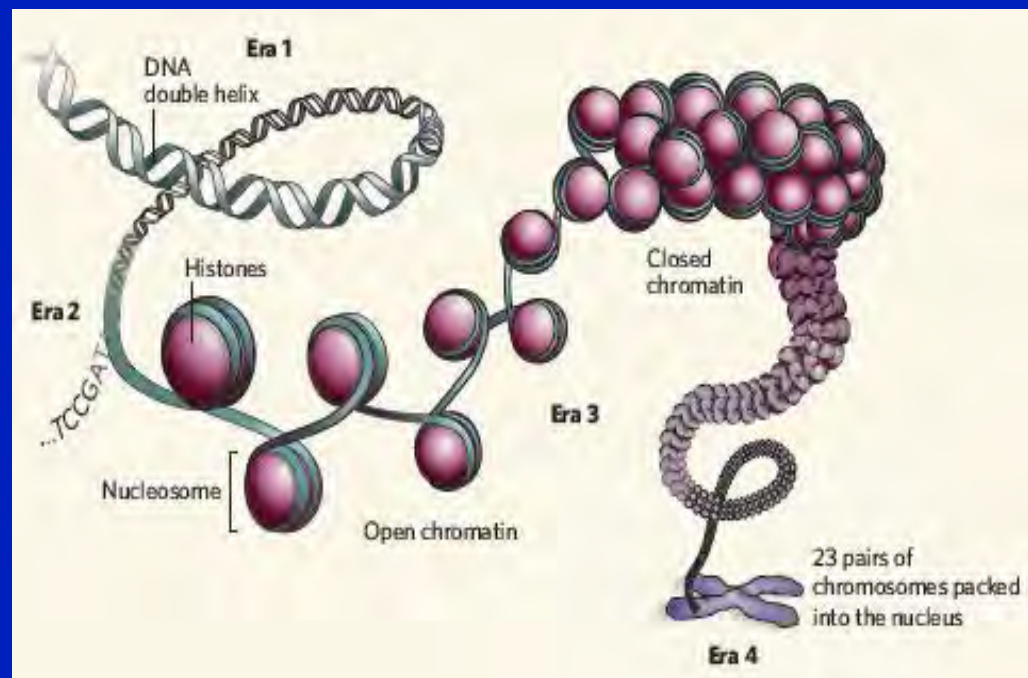
environment

GENETIC DIVERSITY

vs. ENVIRONMENT

epigenome sequences of CD4⁺ lymphocytes from 3 pairs
pairwise comparisons of CpG site methylation (ELAND-extended)

Epigenetic variability



GENE-ENVIRONMENT INTERACTION

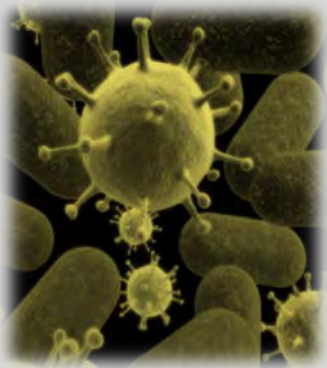
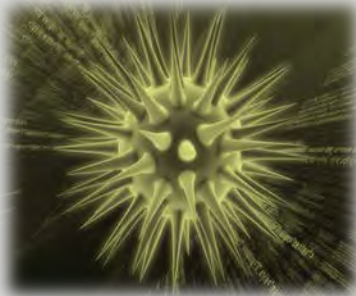
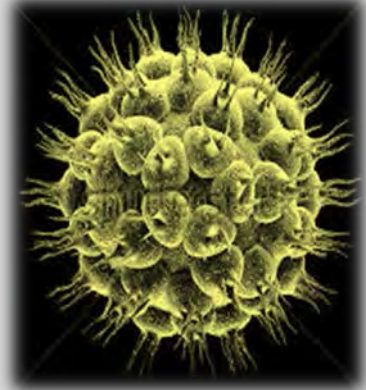
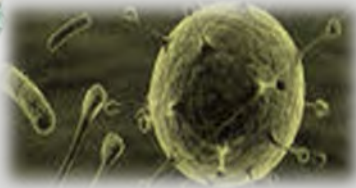
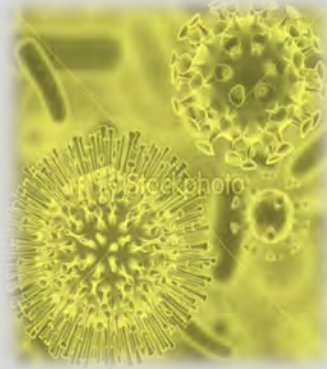
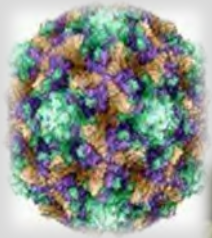
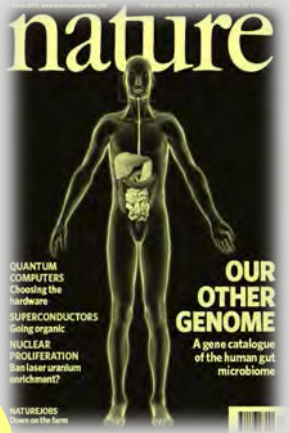
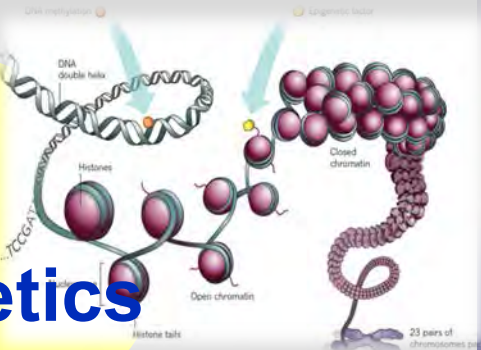
metagenome

miRNA

epigenetics

nature

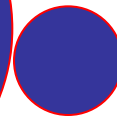
OUR OTHER GENOME
A gene catalogue of the human gut microbiome



Microbiota, obesity, cardiovascular diseases

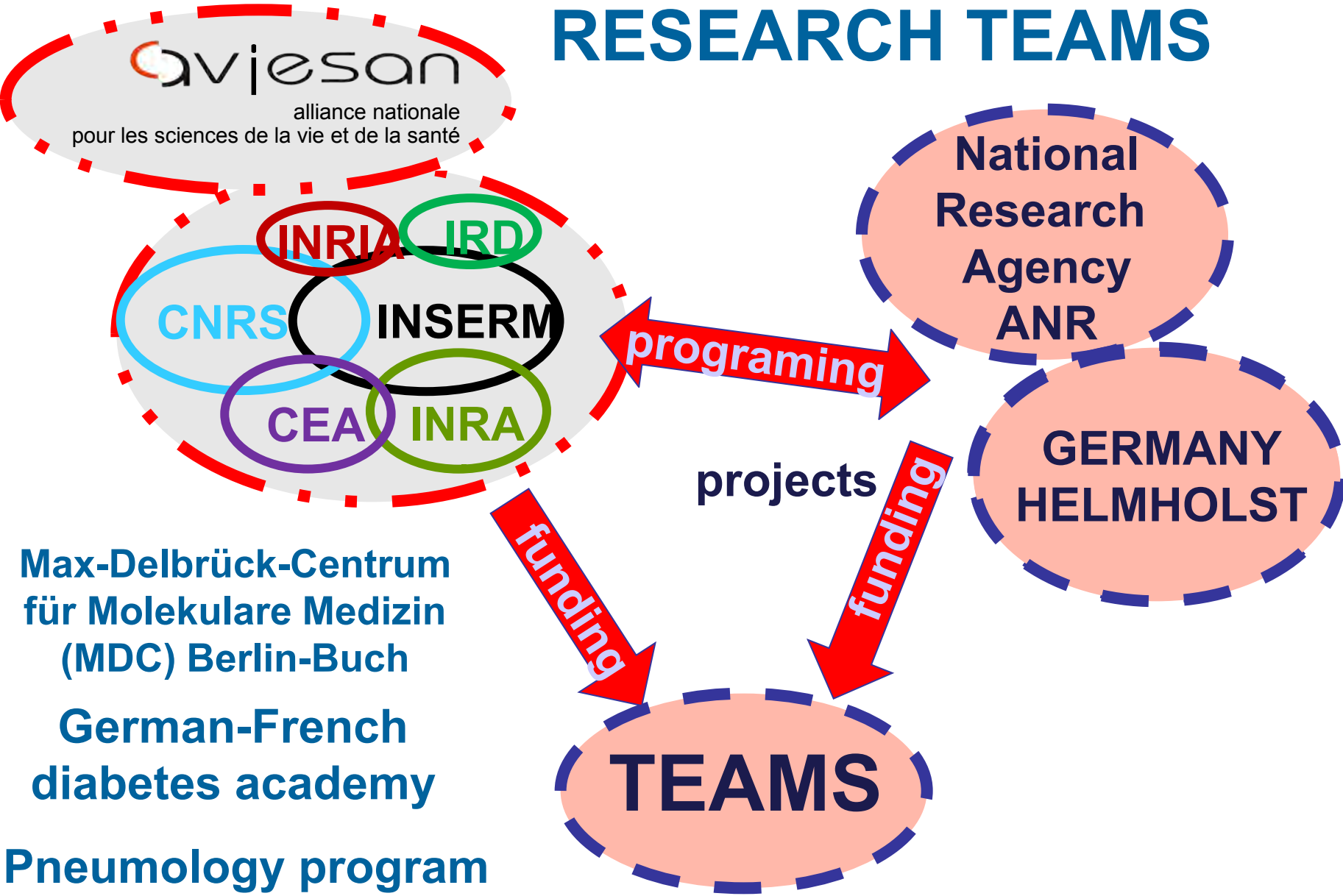


Human
microbiome
10⁶+ genes



Human
genes
22 000

RESEARCH TEAMS



Max-Delbrück-Centrum
für Molekulare Medizin
(MDC) Berlin-Buch

German-French
diabetes academy

Pneumology program

- CEA
- CHRU
- CNRS
- CPU
- INRA
- INRIA
- INSERM
- INSTITUT PASTEUR
- IRD