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Robert Trengove – Metabolomics/Metabolic Profiling
ANPC

What is Metabolomics/Metabolic Profiling

Metabolomics/Metabolic Profiling

Use High Throughput technologies to identify and/or characterize all the *small molecules or metabolites* in a given biological fluid, cell, tissue or organism (i.e. the metabolome).

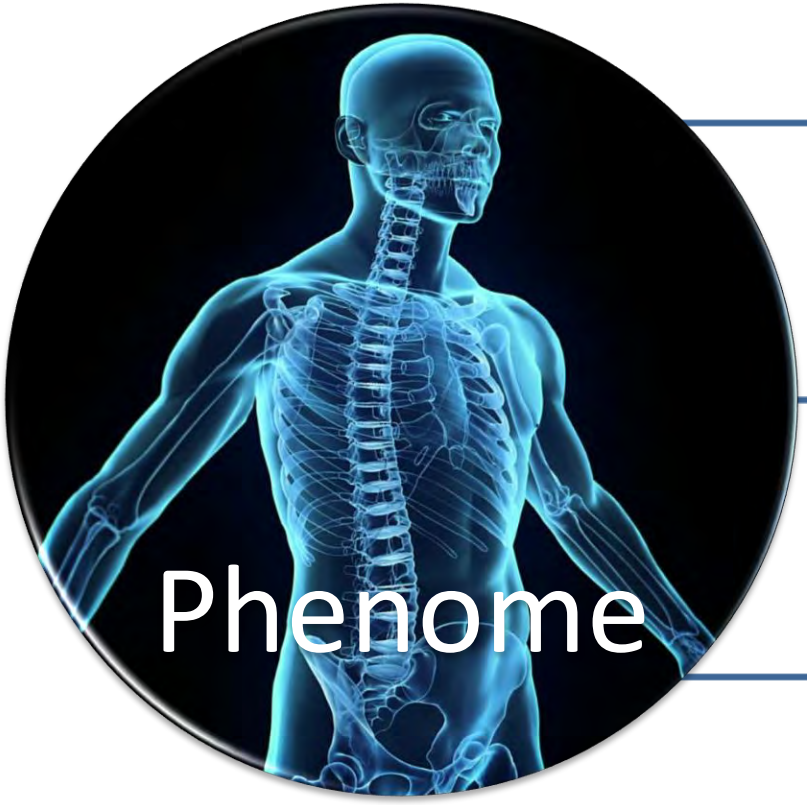
Metabolites describe phenotypes

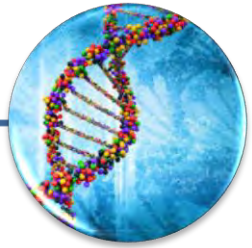
Initially molecular weights of metabolites < 1000 Daltons

Now – typically up to 2000 Daltons

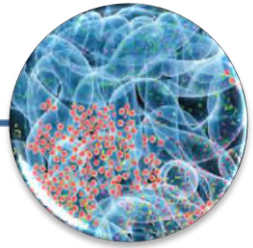
- Include some lipids and small peptides

Metabolic Profiling Provides New Approach & New Levels of Insight





Human Genome

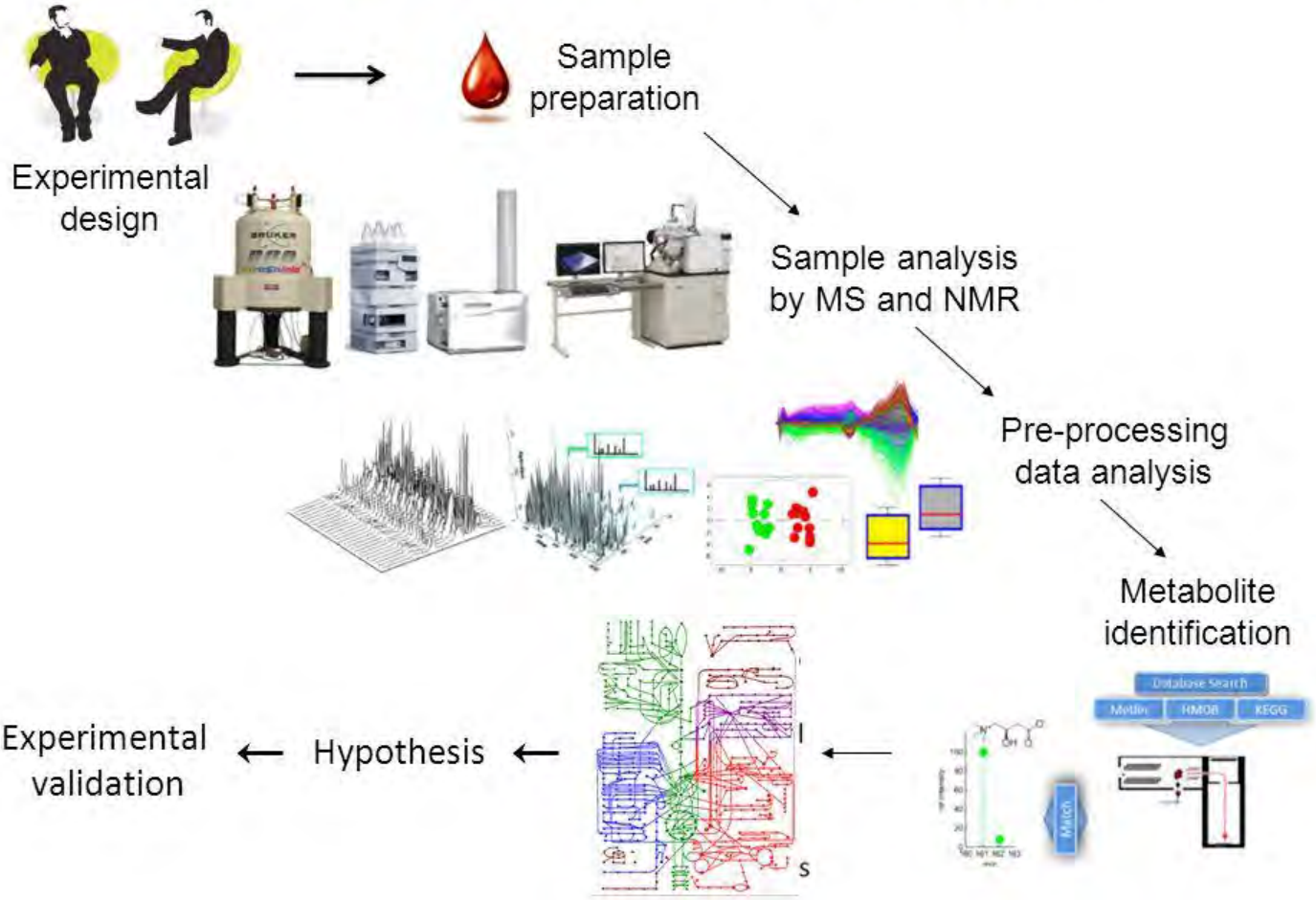


Microbiome

Diet, life-style, stress, medication

Sum of Genome, Microbiome, Exposome And Lifestyle

Untargeted metabolomics workflow



(EMBL-EBI)

Challenges with untargeted approaches

Analytical complexity of samples – minimal sample preparation

Data complexity and magnitude

No single technique

- NMR based - quantitative
- Mass Spectrometry based – semi quantitative

Compound Identification

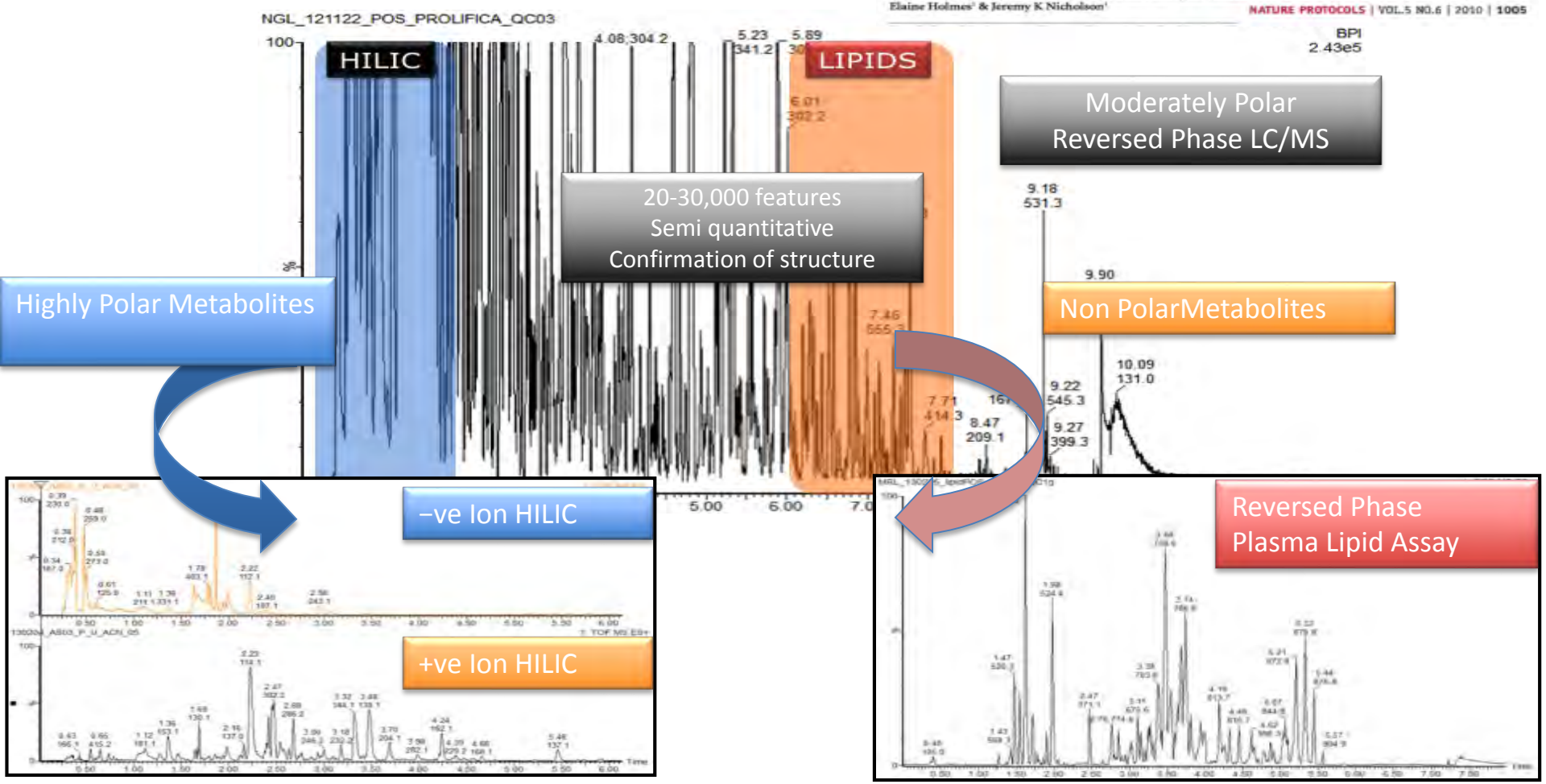
Biomarker panels are dependent on the technique used

Exploratory LC-MS(MS) Platform

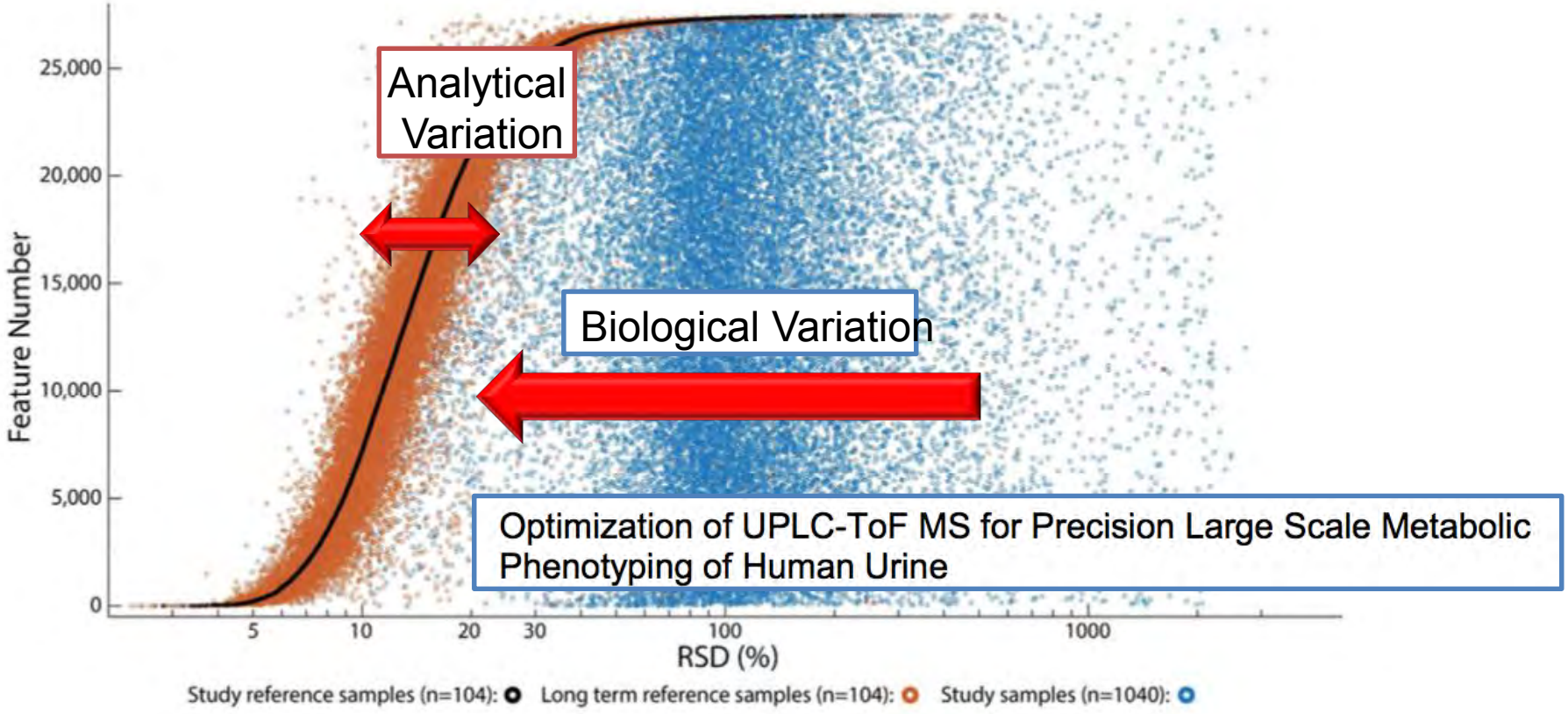
Global metabolic profiling procedures for urine using UPLC–MS

Elizabeth J Want[1], Ian D Wilson[2], Helen Gika[3], Georgios Theodoridis[3], Robert S Plumb[4], John Shockcor[4], Elaine Holmes[1] & Jeremy K Nicholson[1]

NATURE PROTOCOLS | VOL.5 NO.6 | 2010 | 1005



Biological Variation Resolution Dependent on Analytical Accuracy



Matthew Lewis et-al Analytical Chemistry 2016

Targeted Metabolic Profiling

Panels of targets/biomarkers

Absolute Quantification

Rapid

Very High Sensitivity

Moving Forward

Integrating metabolite profiling with proteomics, transcriptomics and genomics

Stratification of patients/cohorts based on their metabolic phenotype

- Pre-screen cohorts for compatibility with medical/clinical interventions

Identification of a broader range of metabolites – critical for translation into the health care system

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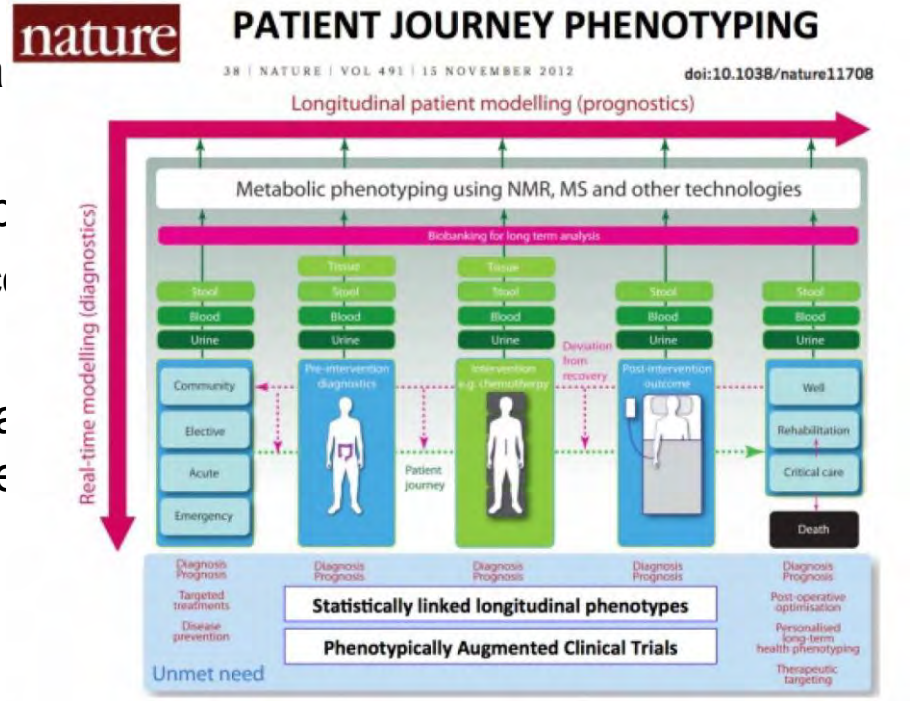
Moving Forward-Disruptive Technology Developments

Integrating meta nics and genomics

Stratification of p henotype

- Pre-screen c l interventions

Identification of a translation into the health care syste



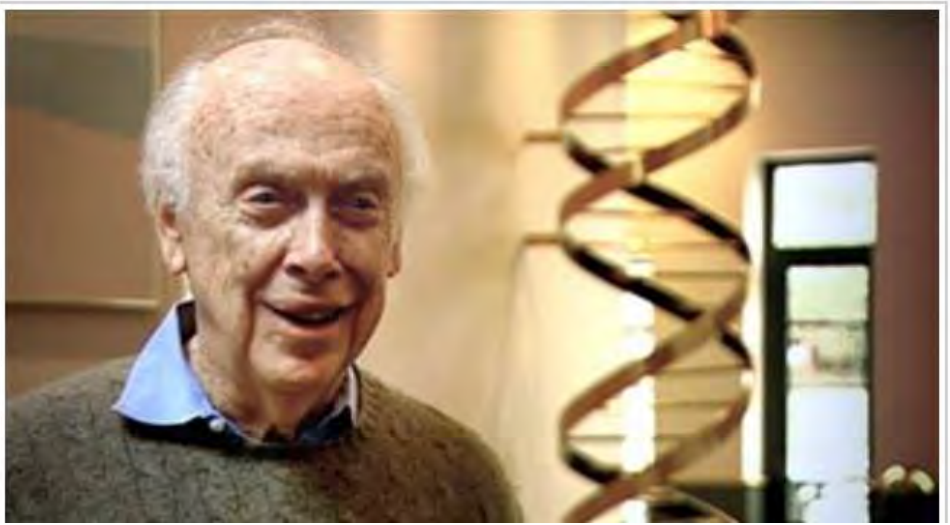
Imperial College: Nicholson & Holmes

The Context

12 ABRIL 2013 3.102 VIEWS NO COMMENT

From the DNA discovery to Metabolomics.

James Watson: " If I were doing a PhD, I'd be doing it in Metabolomics"



http://www.metabolomica.uspceu.es/index.php/2013/04/james-watson-about-metabolomics/