From X-omics research to clinical practice

3rd X-omics Festival
12 April 2021

ONLINE *Festival*
Monday April 12th

Prof. Alain van Gool

Professor Personalized Healthcare
Head Translational Metabolic Laboratory
Lead PI Netherlands X-omics Initiative
Radboudumc Technology Centers
Chair EATRIS Biomarker Platform

X-omics·nl

eatris
European infrastructure
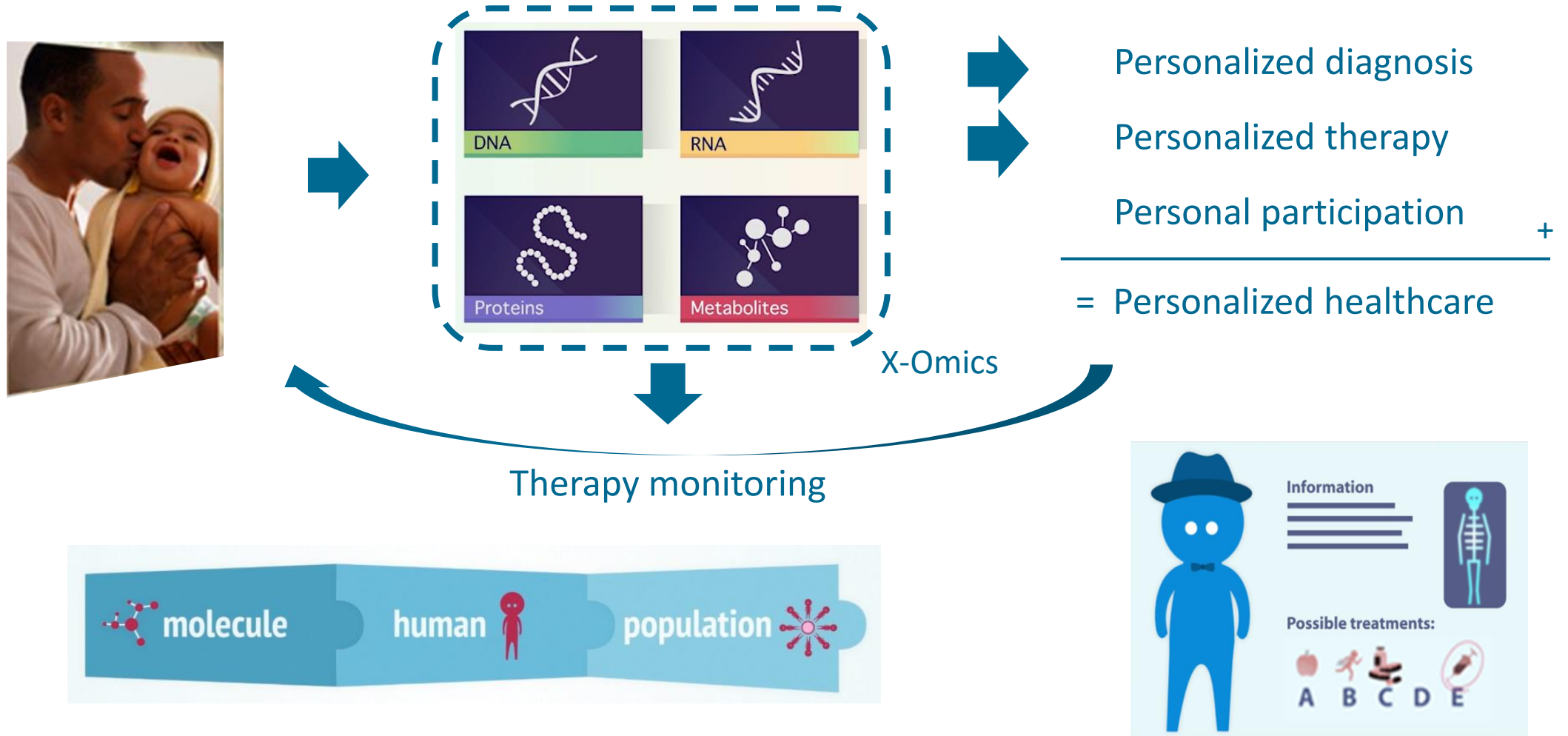for translational medicine

umd·nl united for metabolic diseases

DTL

health RI research infrastructure
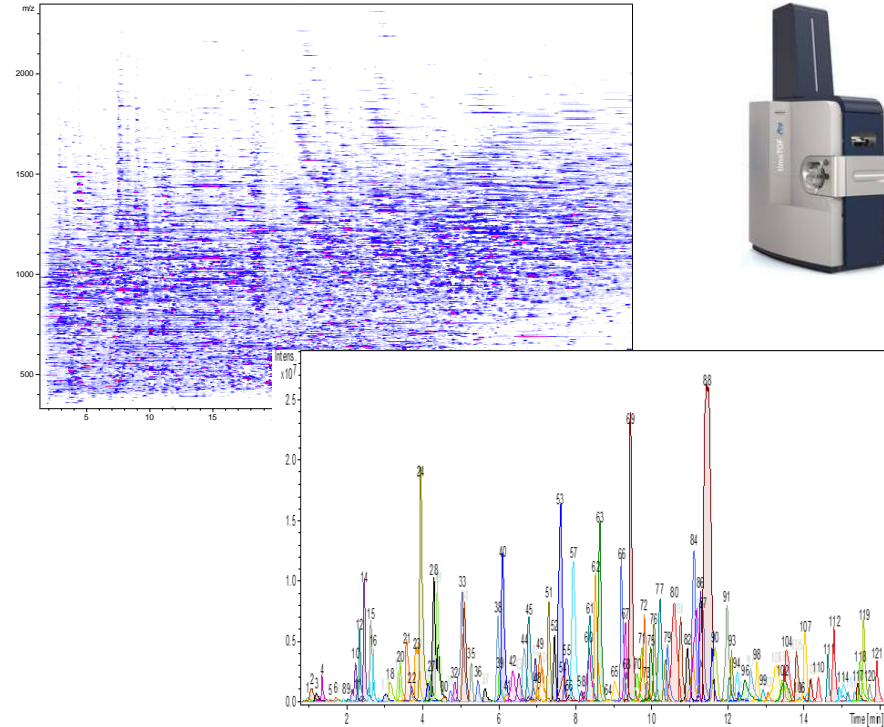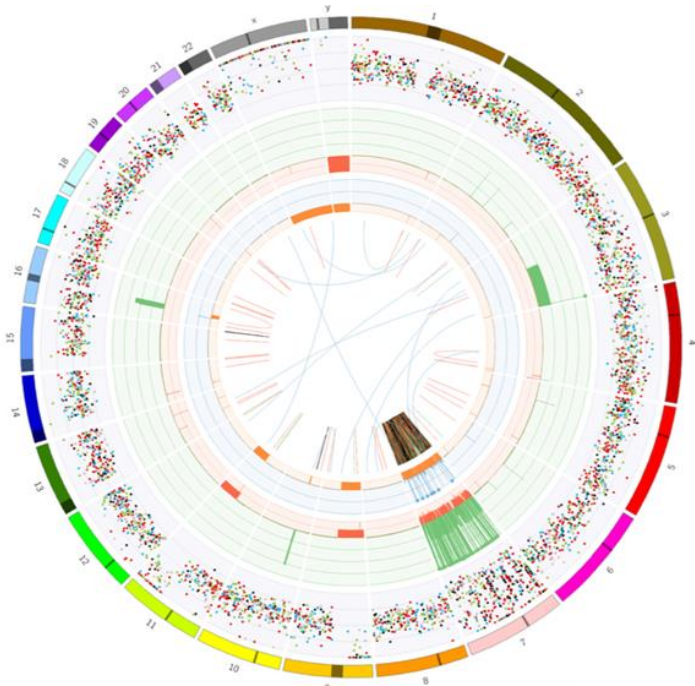
clinical biomarkers

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Role of molecular (Omics) biomarker data in Personalized Healthcare

Personalized diagnosis

Personalized therapy

Personal participation

+
_____

= Personalized healthcare

X-Omics

Therapy monitoring

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The power of omics in molecular analyses

Genomics
Testing 3.000.000.000 DNA bases in 1 assay

{Source: Prof. Edwin Cuppen}

Proteomics, glycomics, metabolomics
Testing of 10.000-50.000 proteins and metabolites in 1 assay

{Source: Translational Metabolic Laboratory}

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The power of omics in diagnostics
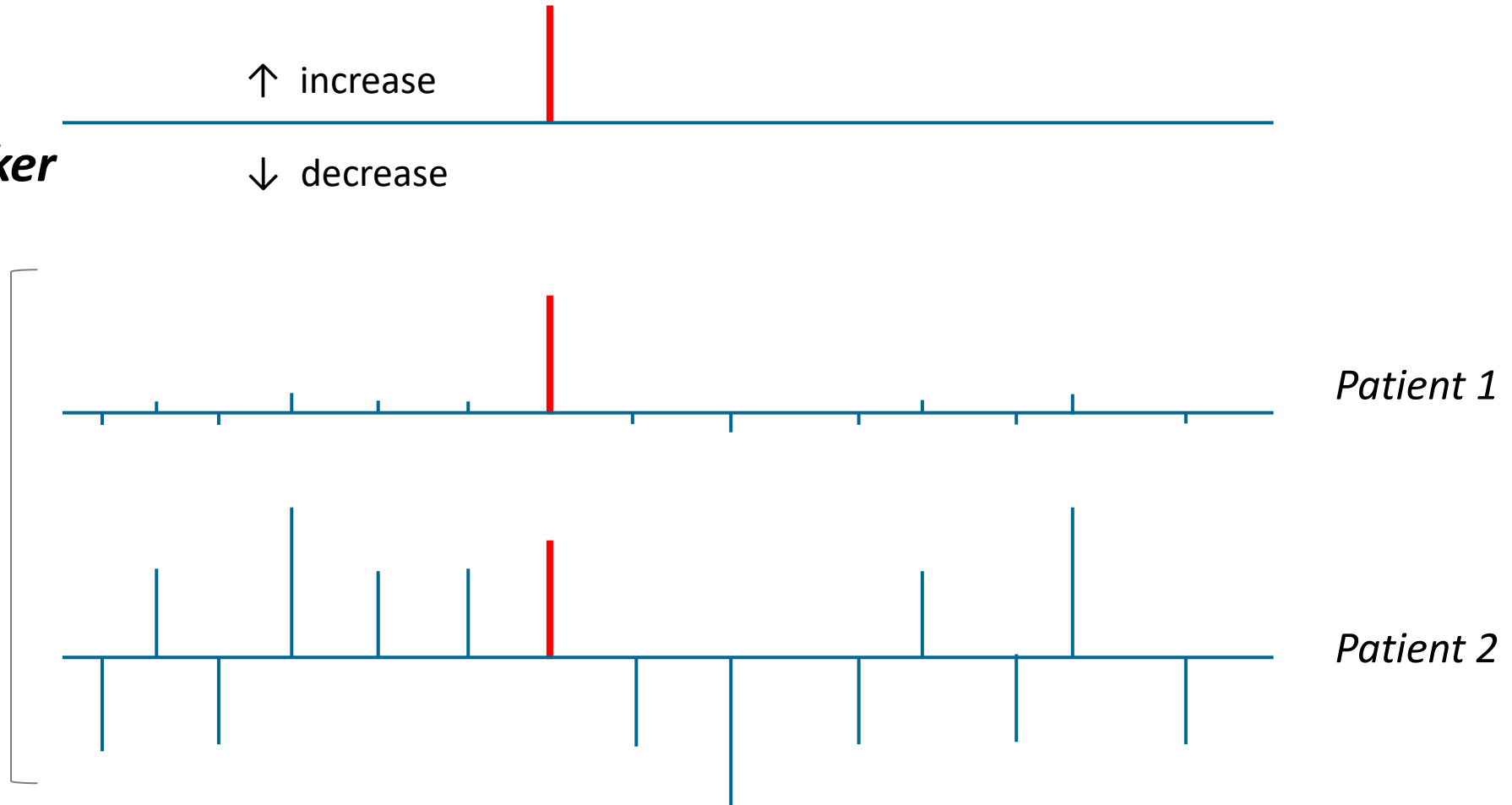
- Higher diagnostic yield
- Contextualisation of change

Single biomarker

↑ increase

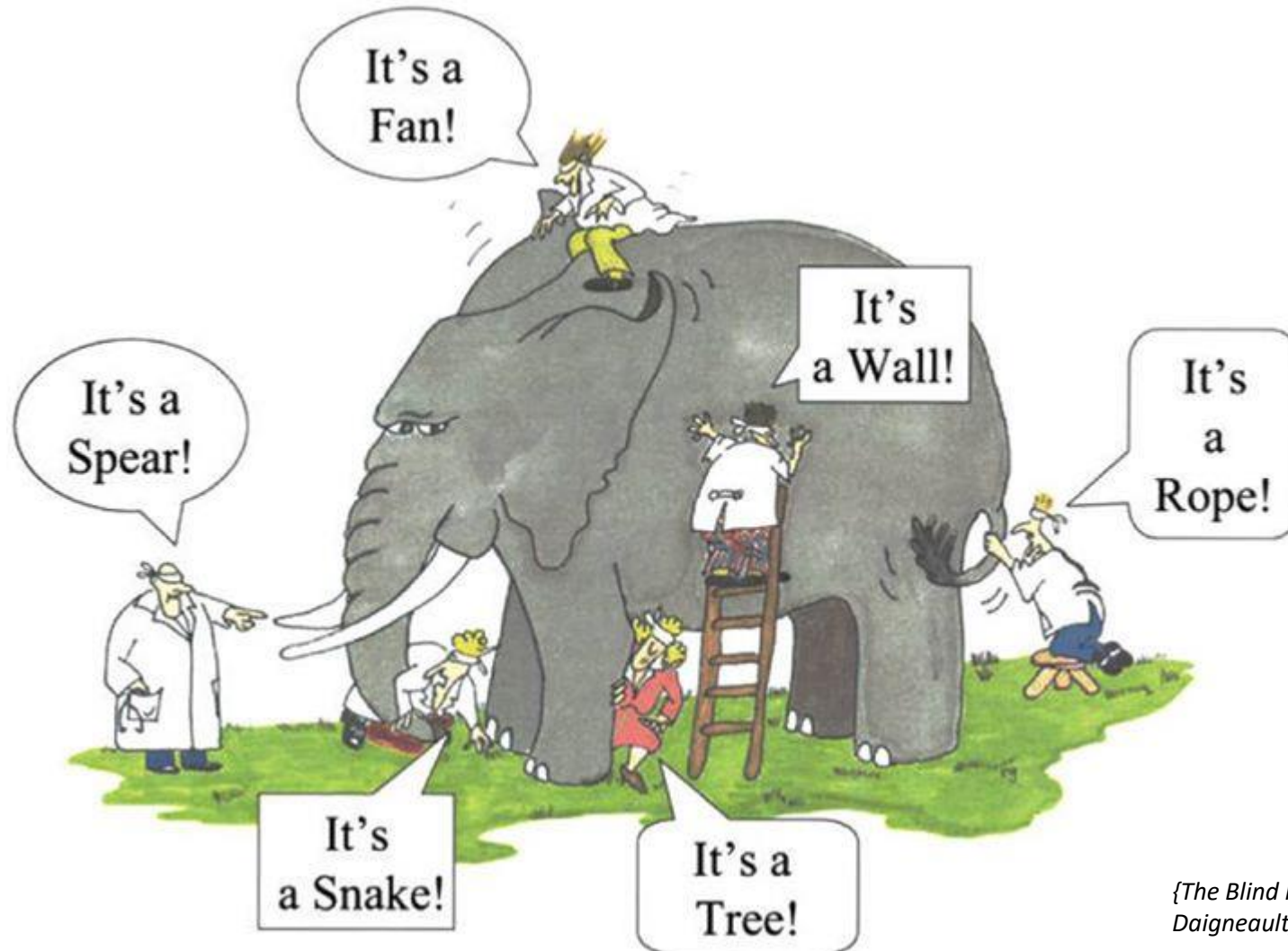↓ decrease

Omics panel

Patient 1

Patient 2

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Integration of clinical omics data will give better big picture

{The Blind Men and the Elephant
Daigneault, 2013}

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X-omics to drive personalized healthcare

Personalized diagnosis

Elucidating new disease mechanisms

Monitoring new personalized (combination) therapies

Genomics

Epigenetics

Transcriptomics

Proteomics

Glycoproteomics

Glycomics

Metabolomics

Cellomics
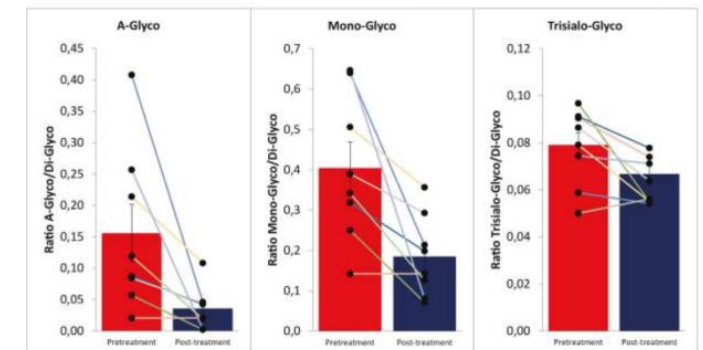
…-omics

Deep Learning

Artificial Intelligence

System biology

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We need to bring clinical X-omics to a higher level

- Technologies: Quality, harmonised, standardised, cheaper, higher throughput
- Translation: Clinical understanding, regulatory acceptance

- Genomics is quite advanced
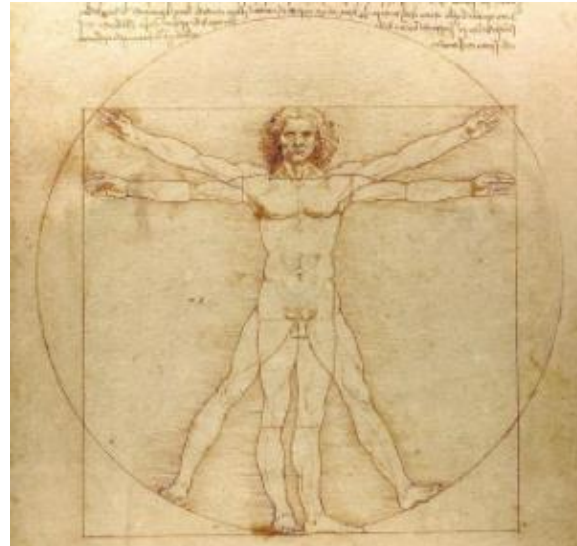- Proteomics, metabolomics (and other omics) much less so

DNA

RNA

Protein

Metabolite

Static

Dynamic
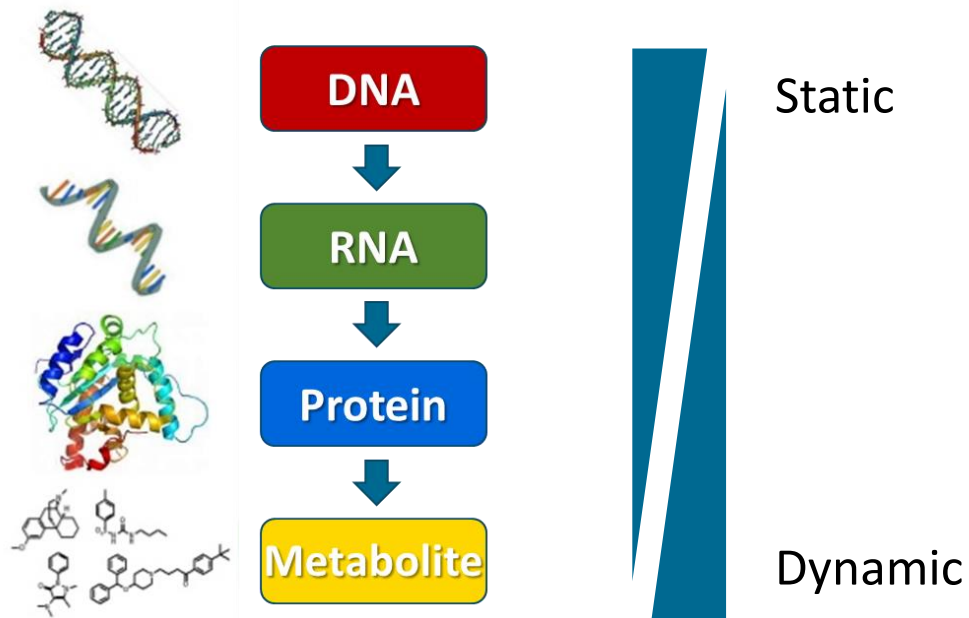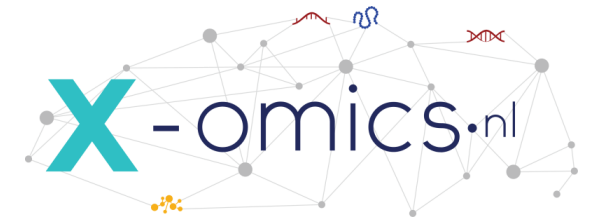
1. Biology
2. Analytics
   - Samples
   - Preanalytical factors
   - Analytics
   - Data analysis
   - Interpretation
3. Implementation

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Develop and demonstrate impact of robust X-omics analysis
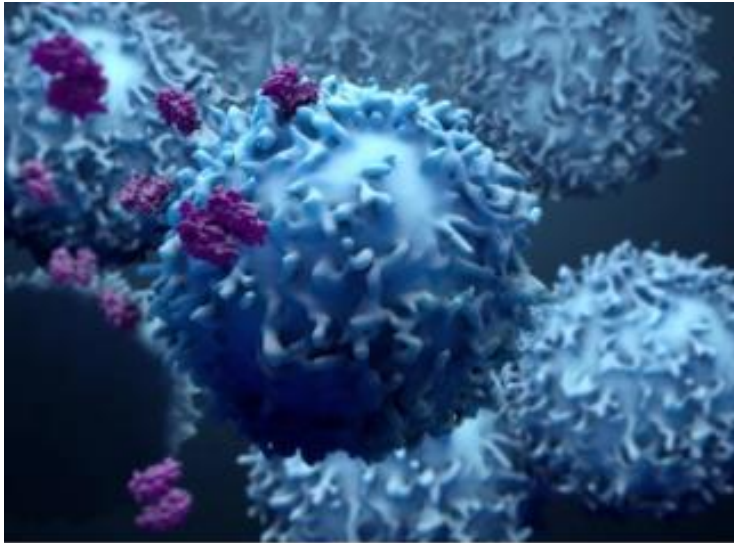
Cell

Individual

Population

15.35-15.55   X-omics highlights and impact:

Alain van Gool (Radboudumc):
"From X-omics research to clinical practice."

Lonneke de Boer (Radboudumc):
"UMPS deficiency case, the importance of multi-omics diagnostics."