10 YEARS OF BREAKTHROUGHS A HEALTHIER FUTURE

U-BIOPRED

15

Data analytics and bioinformatics to successfully define asthma subphenotypes

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Facts & Figures

Start date:	01/10/2009
End date:	30/09/2015
Contributions	
IMI funding:	9 935 501 €
EFPIA in kind:	14 574 652 €
Other:	2 415 549 €
Total Cost:	26 925 702 €

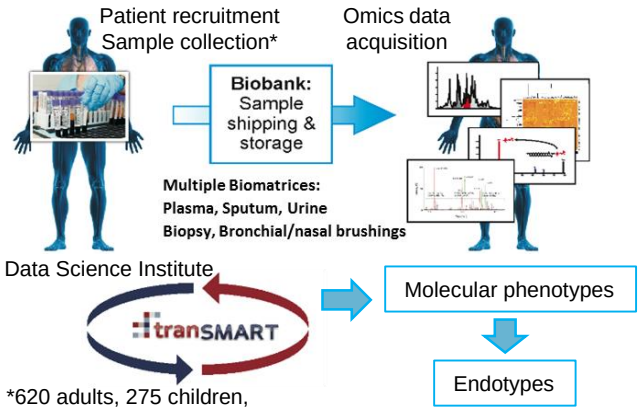
Project website: www.europeanlung.org/projects-and-research/projects/u-biopred/home

Social media: @ubiopred

Challenge

Severe asthma is notoriously difficult to treat, with substantial number of patients exhibiting uncontrolled symptoms and steroid insensitivity. U-BIOPRED was an ambitious plan to tackle the understanding of asthma through an integration of clinical and multi-'omics approaches, to identify patient subpopulations with distinct underlying molecular pathology and improve patient care.

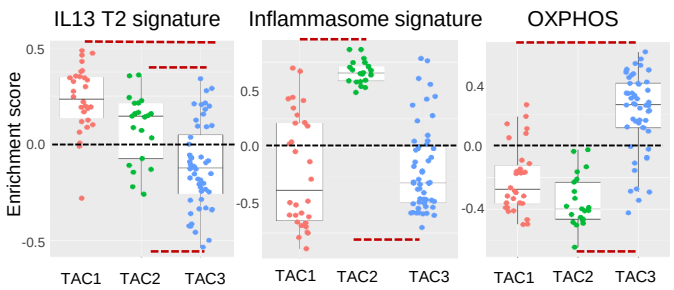
Approach & Methodology



*620 adults, 275 children, transcriptomics, proteomics, genomics, metabolomics, metagenomics

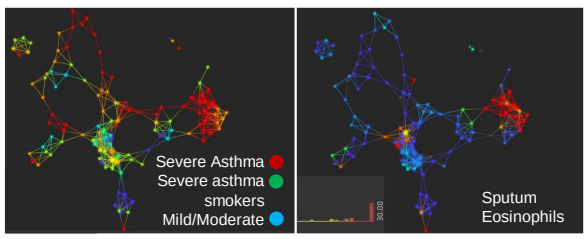
Results

Identification of patient sputum transcriptomics associated clusters (TAC) – novel patient phenotypes



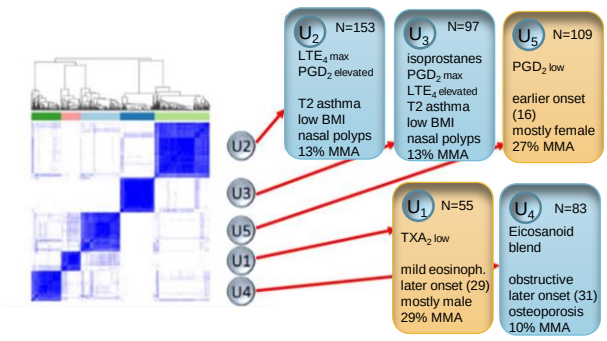
Gene set variation analysis implies distinct underlying molecular pathology in the 3 groups, with TAC1 enriched for T2 high asthma, TAC2 for inflammasome activation and TAC3 for oxidative phosphorylation gene signatures.

Topological data analysis of U-BIOPRED proteomics data



Exploring features of complex data from multiple sources. Dataset from 80 asthmatic participants. U-BIOPRED cohorts exhibit alignment with obtained network.

Sub-phenotypes defined by clustering of main lipid metabolites (urine)



Distinct pathways linked to highly symptomatic adult-onset severe asthma

Adult-onset severe asthma is characterized by inflammatory pathways involving eosinophils, mast cells, and group 3 innate lymphoid cells. Potential targets for adult-onset severe asthma treatment.

Value of IMI collaboration

Resources from Seventh Framework Programme (FP7) of the EU.
'In-kind' contributions from European Federation of Pharmaceutical Industries and Associations (EFPIA) member companies.
Collaboration: Partners from industry, academia, small- and medium-sized enterprises (SMEs), patient groups, and regulators worked alongside each other, each one bringing their expertise.

Impact & take home message

- U-BIOPRED legacy is its contribution to our understanding of asthma, which, in turn, contributes to the development of new drugs, enabling improved treatments of severe asthma patients.
- The multi-'omics integration handprints that are being produced entirely novel and will contribute to target discovery
- Close collaborative network that has been built in a team with diverse backgrounds
- Patients involvement U-BIOPRED had a positive impact on the passion and motivation
- The tranSMART platform was invaluable for managing the data.

imi innovative medicines initiative efpia

This work has received support from the EU/EFPIA Innovative Medicines Initiative [2] Joint Undertaking (U-BIOPRED grant no 115010).