University of Athens - Medical School

pMedGR

The Greek Research Infrastructure for Personalized Medicine

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Bioinformatics leader for the pMedGR program

pMedGR - www.precisionmedicine.gr
Coordinators

**Prof. Petros Sfikakis**
- President and Professor of Internal Medicine & Rheumatology at the Medical School of National and Kapodistrian University of Athens

**Prof. George Kollias**
- Professor of Experimental Physiology at the National and Kapodistrian Medical School of the University of Athens
- President and Scientific Director at the Biomedical Sciences Research Center BSRC "Alexander Fleming"
Personalized Medicine

In the past: The same treatment (drug)

Testing to apply optimal treatment methods

- Different groups of people with varying outcomes
Genetic diversity within Europe

3,000 individuals European genotyped at over half a million variable DNA sites
National Biomedical Research road map

pMedGR is one of the Biomedical Research Infrastructures included in the new National Roadmap that has just been launched.
About pMedGR

4.000.000 Euros

Three years (started 19/12/2017)

Medical School
Center of new technology and precision medicine
pMedGR - Structure

Clinical Tissue Sampling Facility
The Unit will determine strategies and implement best practices for collecting, cataloguing, and storing samples and specimens (fresh, frozen or FFPE samples) for use.

Personalised Genomics Facility
The Unit will provide services and support in high-throughput, genome wide research, including genomic applications (whole genome sequencing, exome sequencing, whole genome mapping, genotyping etc), transcriptomic (RNA-Seq, smallRNA-Seq), epigenomic (MeDIP-Seq, ChIP-Seq, bisulfide sequencing etc), metagenomic and genotyping services.

Proteomics and Metabolomics
The Unit will provide the following services:
- improved sample separation and sensitivity
- accurate quantization in parallel with identification
- high-throughput analysis of proteins and metabolites
- metabolic profiling and fingerprinting

Data Analysis, Integration and Modeling Unit
The Unit will provide bioinformatic and data analysis resources for individual medical genomic applications through the following pipelines:
- Analysis of genetic variability
  - Transcriptome profiling
  - Pharmacogenomic analyses
  - Individual epigenetic profiling
  - Modeling
  - Efficient reference genome indexing
  - ExomeSeq data analysis

Advanced Imaging Facility
The Unit will employ new approaches for the discovery and validation of novel biomarkers. These include:
- light sheet and multi-photon microscopy system
- echographic apparatus for assessing novel treatment strategies for heart and vascular diseases
- probe-based in vivo imaging for assessing novel biomarkers for disease progression
pMedGR and Bioinformatics data production

Illumina NGS 550 (~350.000 €)

CyTOF Helios - Mass Cytometer (~870.000 €)

Thermo Scientific Q Exactive HF-X Hybrid Quadrupole-Orbitrap Mass Spectrometry System (~650.000 €)

Servers (~30.000 €)
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<th>Whole genome sequencing</th>
<th>mRNA sequencing</th>
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<td>De novo sequencing</td>
<td>small-RNA sequencing</td>
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<tr>
<td>Targeted sequencing</td>
<td>total RNA sequencing</td>
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<tr>
<td>Exome sequencing</td>
<td>Targeted RNA sequencing</td>
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<td>Amplicon sequencing</td>
<td>Ribosome profiling</td>
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<td>Mate pair sequencing</td>
<td>HLA sequence based-typing</td>
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<td>ChIP-seq</td>
<td>CLiP-Seq (RNA-protein interactions)</td>
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<td>Epigenetic methylation</td>
<td>CNV-seq (Variations)</td>
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<th>Signaling pathways</th>
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<td>Cytokine expressions</td>
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<td>Mass quantification</td>
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<td>Protein identification</td>
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<td>PPI complexes</td>
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<td>mAntibody subunits</td>
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<td>Peptide, proteins, small-molecule applications</td>
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<td>Real-time data acquisition</td>
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● Services and pipelines
● Data production
● Data storage
● Data analysis
● Data sharing
Sensitive controlled-access data are stored locally.
- Data are stored locally
- Metadata are shared

“Offer solutions when data could not leave the submitter facilities”
https://www.slideshare.net/jrambla/genomic-data-sharing-the-beauty-of-recycling
pMedGR - Aims

- Strengthen basic research
- Move regulatory science forward
- Follow the “Big-Data” revolution
- Revise clinical trial designs
- Educate new generation of Doctors and PhDs
- Fund raising
- Cope with the brain drain phenomenon
- Become a bridge between industry and academia
Thank you