The Greek Research Infrastructure for Personalized Medicine

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Fast Forward in Biomedical Innovation!

- New Biology – New momentum
- New phase in Biomedical Innovation
- New opportunities for academic research
Can we succeed?

- Legal / Regulatory frameworks suitable for Research
- Foster Immediate Launching and Use of New Technologies
- Motivate top level personnel for recruitment
pMedGR: The Greek Research Infrastructure for Personalized Medicine

Center of New Biotechnologies & Precision Medicine
Enabling precision prognosis, diagnosis & therapy of diseases through advances in Biotechnology

The Greek Research Infrastructure for Personalised Medicine
Towards more accurate and cost-effective health management for the Greek citizen

Proteomics
Genomics
CyTOF
Single Cell Analysis
Bioinformatics

pMedGR - www.precisionmedicine.gr
The Greek Research Infrastructure for Personalised Medicine (pMedGR)

Following recent technological breakthroughs, such as rapid sequencing of the human genome, the concept of personalized medicine has become key in understanding, classifying, preventing and treating human diseases. Establishing an ex-ante and basis research roadmap, the pMedGR infrastructure aims to support research towards earlier identification, diagnosis, development, tailored healthcare interventions and personalized treatment strategies to help bridge the gap between genetic information and clinical practice. pMedGR is particularly significant for the Greek population and neighboring countries, which represent a genetic pool that differs from Central and Northern European populations. Thus, offering unique potential for the development of targeted therapies and diagnostic modalities specifically for this population.

The objectives of the new pMedGR infrastructure are to: (a) support research aiming at the transition from traditional symptom-based healthcare models to omics-based approaches for health and disease; (b) allow the in-depth characterization of individual patients at a systems level by providing access to cutting-edge technological platforms, clinical data and biological specimens; (c) facilitate the development of technological solutions that will be processing, integration and modeling of the output of several technological platforms; (d) induce the next generation of physicians and biologists that will develop and implement personalized medicine, and (e) add industrial innovation towards novel diagnostic and therapeutic modalities and advanced knowledge for personalized healthcare.

pMedGR will have close contacts with EMBL-GR, the biomedical EF, in order to align activities, in providing access to biological specimens and data. The ICT modules of pMedGR, which will be responsible for data analysis, integration and model building, will cooperate closely with EMBL-GR. The data storage infrastructure key interactions will be pursued also with HTPHAPC.OEFH, the mouse archiving and phenotyping infrastructure, which is expected to provide for research platforms and pilot of transcontinental projects for further clinical development. Lastly, pMedGR will cooperate with Biobanking GR for the development of advanced imaging platforms with clinical applications for personalized medicine. pMedGR will also collaborate with the European counterparts of these and other EMBL-Gs in order to establish an international network of partners that can provide relevant know-how and expertise.

pMedGR will provide a hub for the implementation of coordination and integration of personalized medicine approaches in the region and as a part of a pan-European and global network, thus offering centralized information on patient stratification efforts, susceptibility factors and response to treatments for the regional population. This hub will effectively serve as a single entry point for researchers and industry interested in this area. Furthermore, Greece’s strategic geographic position together with the region’s genetic characteristics (pMedGR is an ideal paradigm for personalized approaches that target an isolated regional area, including southern Italy, the Balkans & Turkey). Through pMedGR, Greece has the potential to become a South East European Node for Personalized Medicine, linking Europe to emerging markets such as Asia, Africa, and the Middle East.
pMedGR is one of the Biomedical Research Infrastructures included in the new National Roadmap that has just been launched.
pMedGR - Aims

- Strengthen basic research and public health
- Join the “Big-Data” communities
- Revise clinical trial designs
- Move regulatory science forward
- Educate new generation of Doctors and PhDs
- Become a bridge between industry and academia
- Ensure development of precision medicine in a safe technical and ethical framework
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"
About pMedGR

4.000.000 Euros

4 years (started 19/12/2017)

Independent 400m² space at the Medical School
Stratified Medicine: The example of Zelboraf

Identification of $BRAF^{V600}$ mutations is key to optimizing treatment in metastatic melanoma, as only patients with the $BRAF^{V600}$ mutations may benefit from Zelboraf therapy.

Approximately 50% of metastatic melanoma patients are positive for $BRAF^{V600}$ mutations.

To be eligible for Zelboraf, patients must have their $BRAF^{V600}$ mutation-positive tumor status confirmed by a clinically validated test.

81% of metastatic melanoma patients with a B-RAF$^{V600}$ activating mutation responded to treatment with Zelboraf.
Genetic diversity even within Europe

3,000 individuals European genotyped at over half a million variable DNA sites
pMedGR Focus Areas

- CANCER
- CHRONIC INFLAMMATORY DISEASES
- NEURODEGENERATIVE
pMedGR and Bioinformatics data production

Illumina NGS 550

10X Genomics single cell transcriptomics and CyTOF Helios – single cell Mass Cytometer

Thermo Scientific Q Exactive HF-X Hybrid Quadrupole-Orbitrap Mass Spectrometry System

Servers
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 Elixir

- Services and pipelines
- Data production
- Data storage
- Data analysis
- Data sharing
Sensitive controlled-access data are stored **locally**

![Graph showing the distribution of studies across different categories: Cancer, Cardiovascular, Infectious, Inflammatory, Neurological, and Other. The Cancer category has the highest number of studies, followed by Neurological and Other.](image-url)
- 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
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Thank you

PARTNERS

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