Next Generation Genome-Based High Resolution Tracing of Pathogens (PATHO-NGen-Trace)

Research Areas
- Tool Development
- Data-Sharing Enabler

At a Glance
- Status: Active Consortium
- Year Launched: 2012
- Initiating Organization: European Commission Seventh Framework Programme (FP7)
- Initiator Type: Government
- Location: Europe

Abstract
Patho-NGen-Trace is a 54-month, small and medium-size enterprise (SME)-targeted, collaborative project funded by the European Commission under the Seventh Framework Program of the European Union (EU). Its overall objective is to foster the development of new and widespread applications of next generation sequencing (NGS) in clinical microbiology and disease surveillance, ranging from basic research to medical research, diagnostics, and pathogen genotyping.

Mission
The overall objective of Patho-NGen-Trace is to foster the development of new and widespread applications of NGS in clinical microbiology and disease surveillance, ranging from basic research to medical research, diagnostics, and pathogen genotyping. Its major aim is to bring NGS from a basic research tool to a highly efficient technology for pathogen typing and diagnostics on the EU level.

Patho-NGen-Trace utilizes recent advances in NGS and optical mapping (OM) technology,
bioinformatics, and applied (computational) genomics. Research activities will be performed by a consortium combining complementary expertise and broad experience. Active participation of industry is an integral part of Patho-NGen-Trace and will lead to an enhanced impact in exploitation and dissemination.

The development of new tools and technologies in this SME-targeted project will overcome existing obstacles for large-scale use of NGS by European clinical microbiologists and scientists, which is crucial for increasing the competitiveness of Europe in the areas of “-omics” research and systems biology.

The newly developed bio-informatics and process tools will be tested for clinical and public health applications, namely for ultra-sensitive and early detection of drug resistance and spread of Mycobacterium tuberculosis complex (the cause of tuberculosis), methicillin-resistant Staphylococcus aureus (MRSA; major cause of hospital-acquired infections), and Campylobacter spp. (most common cause of diarrhea) strains. Patho-NGen-Trace will enable efficient pathogen epidemiological surveillance and early warning systems and thus create a significant long-lasting “added value” to European health.

**Impact/Accomplishment**

The key objective of the EU-funded “Next generation genome based high resolution tracing of pathogens” (Patho-NGen-Trace) project is to apply the NGS technology to the high-resolution typing of microbial pathogens. Consortium partners have selected pathogens that pose a significant global medical threat, namely M. tuberculosis, MRSA, and human-pathogenic Campylobacter species. The proposed technology will overcome problems associated with conventional typing and diagnosis and will convert pathogen genotyping into standard diagnosis. Additionally, the study hopes to validate NGS for epidemiological tracing of these pathogens.

Apart from sample preparation, project members worked on selecting an appropriate sequencing platform and developing a completely integrated bioinformatics tool for data extraction. This tool also includes an interpretation add-on that would be useful in the future for general diagnostics.

NGS is currently being used for whole-genome analysis of more than 86 different M. tuberculosis strains involved in disease outbreaks over the past 10 years. Similarly, a retrospective MRSA outbreak
analysis will verify whether the generated information holds epidemiological value. With respect to Campylobacter, the data from the 561 isolates investigated to date suggest very high levels of accuracy and effectiveness.

Taken together, the Patho-NGen-Trace deliverables are expected to promote a major technological shift towards NGS for medical research and diagnostics. Especially in medical microbiology, the accuracy and sensitivity of NGS-mediated pathogen typing will bring about a new era in pathogen diagnosis.

Links/Social Media Feed

Other website  http://cordis.europa.eu/project/rcn/101800_en.html
Homepage  http://www.patho-ngen-trace.eu/

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