1. Publishable summary

The MACPROGEN project aims at upgrading and improving the capacity of Research Centre for Genetic Engineering and Biotechnology (RCGEB), at the Macedonian Academy of Sciences (MASA) and Arts and to establish a National Reference Centre for Genomics and Proteomics. The RCGEB is the major research, educational and diagnostic facility in the field of molecular genetics and biomedical sciences in the Republic of Macedonia which has acquired national, regional and international recognition. The RCGEB is one of the few institutions from the Republic of Macedonia that met the criteria for a Centre of Excellence due to its esteemed scientific and educational record in life sciences.

The main OBJECTIVES of MACPROGEN project are:

- To upgrade the RCGEB and to provide a technological platform for high throughput genomics and proteomics research that will meet the needs of the scientific community in the Republic of Macedonia and the region;
- To foster the networking with EU research institutions through exchange of visits, training of Macedonian scientists in leading European institutions and preparation of collaborative projects of mutual interest;
- To enhance the participation of the Republic of Macedonia in the 7th Framework Programme;
- To promote the new trends in the field of genomics and proteomics and to disseminate the knowledge;
- To create an improved interactive and competitive research environment that will increase the scientific carrier opportunities and will slow down the brain-drain phenomena.

Altogether, the realisation of MACPROGEN objectives will contribute to the strengthening of Macedonian research, technology and development capacities and enhancement of career opportunities for Macedonian scientists. The proposed activities will provide a technological platform and critical human research potential that will ultimately make Macedonia a part of the European research area and will facilitate the EU integration of the country.

Results obtained during the first reporting period (01.04.2009-31.09.2010)

The work within MACPROGEN project was organized in *five work packages*: Management and Coordination (WP1); Technological Platform and Employment (WP2); Networking and Training (WP3); Workshops and Symposia (WP4); and Promotion and Dissemination (WP5).

WP1: Management and Coordination covered administrative, financial and technical management of the project activities. The activities within this project were coordinated by the Steering Committee which composed of the *Coordinator* of the project and the *Work Package Leaders*. The Steering Committee was working closely with the administration and financial departments of the MASA, as well as RCGEB Scientific Committee. The Steering Committee met regularly each month to enable a smooth operation of all foreseen activities and to fulfill the objectives of the project.

The **WP2: Technological Platform and Employment** is leaded by Academician Georgi D. Efremov. The three main objectives of this work package are: 1) purchasing of equipment; 2) preparation of working protocols and operational use of equipment; and 3) hiring of scientists. These objectives were successfully completed in the first reporting period.

A total of 23 candidates expressed their interest in the six opened job positions advertised as part of the MACPROGEN project. The documentation submitted by the candidates was evaluated in accordance with the selection criteria set in Annex 1 Description of Work of the MACPROGEN Grant Agreement, also published in the public job announcement. Six candidates were initially selected to fill the positions funded by the MACPROGEN project. At present, five researchers paid by MACPROGEN are working in RCGEB.

The following equipment was purchased within the MACPROGEN project: DNA microarray system (Agilent Technologies); 2D DIGE scanner and electrophoretic system (GE Healthcare); ABI 3130 Genetic Analyzer (Applied Biosystems), 7500 Fast Real-Time PCR System (Applied Biosystems), Bioanalyzer 2100 (Agilent Technologies), UltraSpec 6300 pro spectrophotometer (Biochrom), NanoVue spectrophotometer (GE Healthcare), Microfuge 16 and 18 mirocentrifuges (Beckman Coulter), Liquid scintillation counter (LKB-Croatia). The equipment was purchased following a feasibility study performed at the early stages of the project, public procurement for purchasing of the major equipment, selection of best offers, analyses of best price-quality ratio and signing of contracts with appropriate suppliers. The installation of the equipment was performed by representatives of the different suppliers and in most instances it was followed by training covering the use and maintenance of the instruments as well as data analysis using the specialised software packages.

The equipment purchased and installed at the RCGEB has been integrated into its laboratory practices. Several working protocols have been developed using the new equipment. Training provided by the suppliers' representatives along with previous experience were sufficient to ensure a quick integration of the ABI 310 Genetic Analyzer and real-time PCR system into everyday lab work resulting in the development of several new procedures. In addition, microarray and the 2D DIGE experiments were successfully carried out after completion of additional training of RCGEB researchers in European laboratories with extensive experience in these technologies.

The **WP3: Networking and Training** was leaded by Dr Dijana Plaseska-Karanfilska. The main objectives of this workpackage are to: 1) foster networking and establish close collaboration with leading EU institutions; 2) transfer the high throughput genomic and proteomic technologies and scientific knowledge; and 3) foster preparation of collaborative projects. The work towards these objectives has been initiated as planned and various activities are under way, as detailed below.

Knowledge transfer has been achieved through training of MACPROGEN researchers in the new technologies. Following the installation of new equipment and the recruitment of new MACPROGEN team members, several visits of researchers from RCGEB to EU laboratories have been organised. These aimed to ensure that RCGEB researchers are familiarised with the new technologies through practical experience. Three RCGEB researchers have been trained in genomics technologies. Mrs Katerina Popovska-Jankovic was trained in gene expression profiling by microarray technologies in Functional Genomic Centre, University of Verona, Italy. Mrs Ivana Maleva has been trained in Henri Mondor Hospital, Paris, France in array comparative genomic hybridization (aCGH) for molecular diagnostics of mental retardation. Dr Svetlana Madzunkova was trained in the Cochin Institute, CNRS and University Paris Descartes, Paris, France. She had the opportunity to perform aCGH experiments aiming to identify the genes and molecular defects involved in neurodevelopemental and neuromuscular diseases. Mrs Katerina Popovska-Jankovic has participated in the EMBO Practical Course on miRNA profiling: From *in situ* Hybridization to Next-Generation Sequencing held at the EMBL, Heidelberg, Germany, where she had the opportunity to perform microarray-microRNA profiling and qPCR experiments. Finally, Dr Katarina Davalieva attended the EuroGentest Workshop: Best Practice in High Resolution Melting

Curve Analysis, where she acquired knowledge about the basic principles, applications, data analysis of the high resolution melting methodology.

Dr Katarina Davalieva and Mrs Sanja Kiprijanovska attended the Ettan 2-D DIGE and Ettan DIGE Analysis courses, held within the GE Helthcare Commercial Center in Munich, Germany. Both of them have also been trained in 2D DIGE analysis in the Proteomic Platform of the Institute Cochin, CNRS and University Paris Descartes, Paris, France. During these visits they have acquired knowledge about the theory of the 2D DIGE system, and had the opportunity to perform all steps of the 2D DIGE analysis and to work with the DeCyder software.

During the reporting period, several expert visits were organised. Some of them were primarily aiming to establish closer professional contacts and facilitate collaboration. Dr Dijana Plaseska-Karanfilska has visited the Wilhelm Johannsen Centre for Functional Genome Research, and the Division of Genetics and Bioinformatics, both part of the University of Copenhagen, Denmark. Academician Georgi D. Efremov visited several institutions in Paris, France, namely Institute Cochin, INSERM, University Paris Descartes, Depatment of Biochemistry and Genetics, and Hospital Henry Mondor, Cretail, with the aim to establish collaborations with institutions that have expertise in microarray and 2D DIGE technologies. In other cases the main objective was to present and promote MACPROGEN along with the RCGEB. This was achieved through educational activities, such as a visit of Dr Lyubomira Chakalova at the University Joseph Fourier and Institute Albert Bonniot, Grenoble, France and the Faculty of Biology, Sofia University, Sofia, Bulgaria.

The first visits of EU partner scientists were realised within the 1st Genomics & Proteomics Workshop, November 22-26, 2010. Six scientists from the EU partnering institutions visited RCGEB.

Since the starting date of the project, researchers on the MACPROGEN team have applied for a total of 10 research projects. All but one were collaborative projects between researchers from RCGEB and other institutions, either from the Republic of Macedonia, foreign institutions or both. Three of the project applications were successful, five were not selected for funding and the remaining two are awaiting the decisions of the respective funding bodies. Work on funded projects has commenced in accordance with the respective grant agreements.

The objective of **WP4: Workshops and Symposia** for the first reporting period was the organisation of one workshop. This work package is leaded by Dr Katarina Davalieva. The 1st Genomics and Proteomics Workshop was organised in month 20. The theoretical part of the workshop included six lectures given by scientists from our partner institutions. The lectures given within the theoretical part were attended by more than 100 scientists from the Republic of Macedonia, mainly members of the Macedonian Biochemical Society and Macedonian Society of Human Genetics. The practical part of the Workshop was attended by all RCGEB scientists as well as 24 scientists from several Macedonian research institutions. The practical part of the workshop included demonstration of several protocols using the major new equipment, such as the real-time PCR system, the ABI 3130 Genetic Analyzer, the microarray and 2D DIGE platforms. The practical part was assisted by RCGEB scientists, EU partners and local representative from the Applied Biosystem company. A laboratory manual, including the protocols demonstrated during the workshop was given to all participants in the workshop.

The **WP5: Promotion and Dissemination** is leaded by Dr Emilija Sukarova Stefanovska. The objectives of the work package 5 are to: 1) promote the activities and potential of the National Reference Centre for Genomics and Proteomics; 2) increase and strengthen the collaboration with institutions from the country, the wider region and the EU; and 3) increase the participation of scientists

from Macedonia in the 7th Framework Programme. These objectives have been accomplished as planned for the first reporting period.

The website of the National Reference Centre for Genomics and Proteomics ***(/www.manu.edu.mk/macprogen)*** was launched during the second month of the realisation of the MACPROGEN project. It is hosted by the web server of the Macedonian Academy of Sciences and Arts. The website comprises information related to the MACPROGEN project, such as the project general structure and main objectives, participants, EU partners, work packages, equipment purchased, researchers hired, expert visits, trainings, publications, workshops etc. The website has been regularly updated to reflect the progress of project activities. Leaflets containing relevant information on MACRPOGEN have also been published and distributed during events, such as meetings, lectures, etc. Copies of the leaflets were offered to RCGEB visitors and were sent to the collaborating institutions.

Meetings with clinicians, health professionals and research scientists from several institutions have been organised periodically to discuss the Centre's policies for achieving optimal translation of its potential. These meetings represented an opportunity to promote the field of genomics and proteomics among the scientific community in the country. In most instances these meetings resulted in initiation of new collaborative programmes, activities and projects. RCGEB scientists have also promoted the potential of the Centre by giving several lectures among the members of the Macedonian Biochemical Society and Macedonian Society of Human Genetics.

During the first reporting period of MACPROGEN, RCGEB scientists have participated in several scientific meetings and published 16 conference abstracts. The meetings include the European Human Genetics Conference 2009 and 2010, the 8th Balkan Meeting of Human Genetics and the 35th FEBS Congress. These events were an opportunity to promote the MACPROGEN project and to exchange ideas with colleagues from different countries. MACPROGEN researchers have also published 10 papers in international and national journals including Balkan Journal of Meical Genetics, Contributions MASA, Applied Biochemistry and Microbiology, Diversity, Journal of Genetics.

During this reporting period of MACPROGEN project, the Director of the RCGEB, Academician Georgi D. Efremov has given several interviews and participated in a television debate. The main aim of these activities has been to communicate science- and medical-related issues to the lay public and to popularise the RCGEB and its central role in biomedical research and education.

The summary of the MACPROGEN activities provided above indicates that some of the project objectives have already been achieved, while others are being pursued according to the schedule outlined in the Grant Agreement. Ongoing activities ensure that all necessary factors are in place for successful completion of the project by the end of the second reporting period.

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