

BIOSPECIMEN RESEARCH (BR) CATEGORY

BR-01

Biobanking as a Basis for Personalized Medicine Program (PMP) at Sheba Medical Center

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Background: The main benefit of coordinated biobanking is accelerated progress to personalized medicine. Sheba biobank serves as an efficient tool which allows PMP. Current technology permits an unbiased massive analysis of mutations in tumor DNA. The main goal of this analysis is to identify personal mutations in order to match medical treatment to a patient; especially when 1st/2nd line therapies have failed or when rational therapy is the gold standard for treatment.

Methods: The Sheba biobank, (since 2008), has demonstrated high expertise in collecting, processing & storing high quality biospecimens. These skills are now being used for the benefit of patients. A new program for personalized medicine offers patients a new approach for diagnosis & tailored treatment, including a unique service of consultancy & comprehensive diagnosis using genetic tools. The patient is accompanied by the biobank team at the stages of specimen-collection, processing, analysis & discussion of genetic-results.

Using NGS technology we determine the patient's genetic profile for a defined set of cancer related genes or for the whole-genome/exome.

Results: The analysis is being performed on DNA

obtained from 2 sources: tumor tissue & peripheral blood (=normal tissue). DNA is extracted by the biobank team following a pathologist approval for tumor content & QA/QC procedures for DNA quality. So far we have performed analysis on dozens of patients.

Conclusions: Following results, a specialized Tumor-Board discusses the patient's clinico-pathological & genetic status and designs recommendations for future-treatment. Genetic information is rapidly transforming the future of healthcare by enabling accurate & affordable diagnosis, prognosis & targeted treatments.

BR-02

Low-temperature- induced alterations in antioxidant activity of placenta extract and cord blood serum

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Nowadays there is a growing interest towards natural antioxidant. It is partially due to increase in the data supporting free radical accumulation as a contributing factor into various diseases as well as aging process. Human placenta extracts (HPEs) as well as cord blood serum appears to possess antioxidant properties due to a high concentration of bioactive substances. Successful application of such therapeutic agents in clinic is significantly limited by a short term of storage in functionally active state. Widening perspectives of their usage may be due to cryogenic technologies. Despite these facts till recently there were a very few data about freezing processes influence on non-enzymatic antioxidant activity of complex protein containing systems. In the present work the data concerning the influence of freeze-thawing on isolated proteins,

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Pulmonary Biobank Consortium CIBERES (PBP) is a non-profit network of 10 hospital biorepositories to promote biomedical research by collecting and distribution samples to national and international researchers, essentially lung tissue and blood derivatives. Mainly the lung tissue samples are collected from lung cancer surgeries, lung explants from transplants and organ healthy donors. In all cases, samples are obtained and processed following consensus standard operation protocols (SOP) and monitoring the cold ischemia time (CIT). Several methods have been validated to control and register the CIT according to the local hospital casuistry. The formation of the personnel involved and the adaptation of the current technology available to accomplish this objective has been the most important challenge. Focusing on research requirements, the Quality Management System of PBP has been established according to International Organization for Standardization, and since January 2012, all its activity has been certified according ISO 9001:2008. Since 2012 has been registered the CIT in 84% of the surgeries (n=384), being less of 30 minutes in 87% of cases. In addition, the warm ischemia time is also registered in some hospitals. All sample information is registered on a common database with relevant respiratory clinical data and CT scans. This strategy allows a real-time coordinated management of the activity, biospecimen research development and responding effectively to the researcher requests. Working under a quality management system allows a real standardization of procedures performed in several hospitals. And a well-established infrastructure with a robust management system allows facing complex challenges.

OP-34

Biobanking Human Endothelial Progenitor Cells for Epidemiological Studies

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Creative Scientist, Inc. has developed a cell-based platform to assess functional effect of drugs and environmental stressors at a population-wide scale. Our method employs CD31+/CD34+ circulating endothelial progenitor cells, also called endothelial colony forming cells (ECFCs). Our studies indicate that environmental stressors (i.e., ionizing radiation, cadmium, Bisphenol A) inhibit proliferation of ECFCs and alter their production of reactive oxygen and nitrogen species. We propose that large-scale biobanking of donor-specific ECFCs will enable population-wide analysis of ECFCs' response to potential biohazards. For this purpose, we adopted a standard operational procedure, which affords (a) successful ECFCs' isolation from small blood volumes, (b) efficient cell expansion in culture, and (c) their cryopreservation with a minimal loss of viability. Creative Scientist will commence a collection of ECFCs together with the School of Public Health at Georgia State University (Atlanta, GA, USA) and the Institute of Natural Sciences at Ural Federal University (Yekaterinburg, Russia). These collections will help to assess: 1) functional effects of environmental stressors in newborns and pregnant women; 2) effects of early exposure to environmental stressors on developmental and chronic diseases; and 3) the extent of vulnerability of certain population groups to biohazards. We suggest that ECFC-based screenings, similar to allergy tests, will be used in the future to inform patients and healthcare providers which drug or stressor can be especially harmful to a particular person. Thus, the biobanking of ECFCs will help to ensure better protection of human health.