

Biobanking 2016

ABSTRACTS



5th - 7th January 2016
London, UK

EuroSciCon 

This three day event brings together biomedical and biopharmaceutical researchers, regulators, biorepository managers, and practitioners to look at current practices regarding the banking of biospecimens used for basic research through clinical trials

With discussions ranging from best methods for collection, processing, storage, and tracking of biospecimens to ethical and legal considerations, this event promises to be packed with discussion and debate and is an ideal opportunity to discover what is new in the field.

This event has [CPD accreditation](#)

This abstract book will be finalised two weeks prior to event
<https://www.regonline.co.uk/banking2015>

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Invited Speakers Abstracts

Biobanking for exposome research: opportunities and challenges

Dr Toby Athersuch, Imperial College London, London, UK

The human exposome - that complements the genome - is currently being explored in large-scale environmental health studies. Small molecule metabolites mediate exposures and subsequent responses, and profiles that capture the metabolome are valuable in characterising the human exposome. Biobanks are thus fundamental resources for exposome studies; understanding the factors that influence biobank sample quality in the context of multi-platform omics analysis is critical for establishing usage and selection criteria for archived sample. New collection protocols that are optimised for omics analyses will benefit future exposome studies/collections, and ultimately human health through the identification of environmental determinants of chronic disease

Prolonged platelets preservation up to 18 days under bloodbank compatible conditions

Dr Bahram Alamdary Badlou, PhD Hematology/Transfusion Medicine-Platelets and Drs Medical Biology/Transplantation Sciences- Heart, BBAadvies and Research Healthy Ageing, Platelets and PRP Technologies, Zeist, The Netherlands.

In this study whether metabolic suppression can be used to preserve platelet (PLT) function during prolonged storage was investigated. Metabolic suppression before storage at 4 degrees C contributes to better preservation of pooled PCs aggregation function after 18 days storage.

The patient is the only source of data: the patient view

Dr. Helen Bulbeck, Brainstrust – the brain cancer people, Cowes, Isle of Wight, United Kingdom

Creating the environment for greater engagement with the patient, and therefore a more efficient use of an essential resource, is key to successful biobanking. We know there is a desperate need for human tissue for research so how do we close the circle so that everyone's needs and expectations are met? Individuals who are informed about biobanking are much more likely to participate and give broad consent. This talk will outline how increased patient awareness and understanding around the collection of tissue and seeking authorisation for tissue collection from patients can make it meaningful and create space to talk.

Challenges in establishing a useful and relevant biobank

Dr John Gill, S Alberta HIV clinic, Sheldon M Chumir Health Centre, Departments of Medicine and Microbiology & Infectious Diseases, University of Calgary Alberta Canada Canada

Clinical specimen biobanks are well known to be, at times, immensely valuable in answering both efficiently and quickly questions regarding disease pathogenesis and transmission. There are, however, many challenges that require difficult but essential forward planning involving optimal specimen selection, consent and ethical issues, funding for future (as yet unspecified) research, specimen storage and ensuring essential clinical links to enhance the ability to interpret results of any subsequent research. Structures and approaches to enhance the potential value of biobanks in advancing knowledge quickly and cost effectively need to be developed.

Basic Principles of Cryopreservation for Biobanking

Dr. Charles John Hunt, UK Stem Cell Bank, NIBSC, Herts, UK

An essential pre-requisite for biobanking is suitable and effective protocols for cryopreservation and long-term storage. Whilst effective methods exist for the cryopreservation of a wide variety of cell type, many cell types (including some stem cells) still prove refractory to freezing, or yield unacceptably low rates of survival. Effective cryopreservation requires an understanding of the basic physical principles that underly the freeze/thaw process and the cells response to the imposition of such a process. Basic principles of cryopreservation and storage and their application under GMP/GLP conditions will be discussed.

Legal and ethical problems of biobanks for the patient-physician relationship

Dr Jörg Haier, Coord. Director of the Comprehensive Cancer Center Muenster Head International Patient Management University Hospital Muenster, Muenster, Germany

Donors of biomaterials are frequently patients or less frequent healthy subjects, but in most cases physicians are directly and/or indirectly involved in these donations. Physicians may act as treating doctors, clinical or experimental researchers. Their involvement results in interfaces with various legal frameworks that can be contradictory in many issues, such as personality rights of the patients, certainty of projects (health data

protection rules), insurance questions, physician responsibilities and liabilities, ownership of specimens, among others. Moreover, legal regulations can differ between various countries that interfere with the donor/physician relationship in biobanking and influence international exchange of biospecimens and associated data.

The craniosynostosis biobank: a platform for implementing research, refine diagnosis and improve treatments of craniofacial malformations

Wanda Lattanzi, M.D., Ph.D, Institute of Anatomy and Cell Biology, Università Cattolica del Sacro Cuore, School of Medicine - "A. Gemelli" Hospital, Latium Musculoskeletal Tissue Bank, Rome, Italy

Craniosynostosis (CS), the premature fusion of one or more cranial sutures, is the most prevalent craniofacial malformation worldwide (1/2500 live births). Nonsyndromic forms (NCS, i.e., without unrelated, major birth defects or developmental delay) represent 85% cases and are heterogeneous conditions, classified according to the involved suture. Gene mutations have been reported in very few cases, thus the etiopathogenesis of this disorder is still largely unclear.

Our research group based in Rome started collecting calvarial suture specimens and peripheral blood from CS patients. This allowed creating a biological repository that currently includes samples from over 250 patients, from the whole Italian territory including 195 (84%) NCS cases. For each patient, we extract genomic DNA from blood for mutational screening in CS-associated genes, along with total tissue RNA and calvarial cells, for expression profiling, flow cytometry and in vitro assays. DNA from parents has been also collected to create a significant sample of case/parent trios for whole exome sequencing. Biobanked cells are being used to study the molecular mechanisms involved in the aberrant function of the osteogenic niche, underlying this developmental disorder. Overall, the CS biobank may represent a valuable research platform suitable for studying the genetics, along with the molecular and cellular events orchestrating osteogenic differentiation and calvarial morphogenesis. The results obtained through in vitro assays will be discussed.

Familial melanoma and donor-conceived people: the case for updates of family health history through biobanks

Sean Nurmsoo, Pediatrics Department, Dalhousie University, Halifax, NS, Canada

This paper proposes routine periodic family health updates for persons without family medical history, through periodic tissue sampling from biological parents who do not have contact with their offspring. Public acceptance of biobanking as a mechanism for the transfer of family health history is more likely to be effective when parents are aware of the significance of their participation for health and medical of their offspring. Effective teaching of the benefits of participation in health update biobanks will require an understanding of the state of prospective participants' knowledge about genetic inheritance, and the ways and contexts in which they learn about it. In addition to making the case for a more proactive approach to maintaining a viable family medical history for donor-conceived people, this paper will review how patients learn about genetic inheritance and the relevance of family health history to personalized medicine.

Indigenous Perspectives on Biobanking: Ethical and Policy Implications

Dr Barry Smith, Population Health Analyst, Planning and Funding Division and Chair Research and Ethics Committee, Lakes District Health Board, Rotorua, Newzealand

Indigenous peoples generally suffer poorer health status and experience poorer health outcomes. Research linked to the use of biobanks can potentially afford a way to generate benefits to this segment of our populations. However, 'first nation' peoples are not always comfortable with the processes and the ethics surrounding the functioning of biobanks and this paper explores a number of factors that shape these attitudes.

Using breast milk for epigenetic research and beyond

Dr Natalie Schenker, Imperial College London, UK

Breast milk is an under-researched biofluid, despite its critical role as the recommended sole source of nutrition for infants up to 6 months of age. Recent work has established the feasibility of using cells derived from breast milk for molecular profiling that can explore an individual's risk of developing breast cancer. A population cohort study is currently being established at Imperial College that will help to understand how epigenetic profiles can predict high-risk individuals. Furthermore, future studies will aim to understand the role of breastfeeding in breast cancer risk reduction is not understood, aiming to develop new therapeutic approaches.

Cell and tissue damage prevention by a hibernation inducer

Dr. Stef Stienstra, Beek-Ubbergen, Netherlands

Background

A chemical compound is synthesized, which brings mammalian cells in a phase of hibernation, like the squirrel and Syrian hamster during their winter sleep. In hibernation, mammalian tissue and (blood) cells are protected against oxidative stress damage as metabolism changes towards minimal need for oxygen and nutrition.

Study design

The bioregulator is used cooling down human cell lines, tissue and as proof of principle it has been added to standard fresh platelet concentrates. The platelet concentrates could be stored for 21 days without flat-bed shaking in standard blood bank bags in a refrigerator at 4°C. After rewarming, ex-vivo vitality tests were performed with an aggregometer, haematology analyzer and with a flowcytometer, which indicated that the platelets have similar properties compared to fresh apheresis platelets for transfusion.

The compound is tested for toxicity. Similar experiments followed in which human tissue cells, tissue and organs got the treatment to induce hibernation.

Results

The developed compound initiates a phase of hibernation in human blood platelets, which enables the storage of platelets at 4°C without suffering the so-called cold activation. Similar results were obtained with mammalian cells, tissue and with organs. Organs could survive long periods of cooling by forcing them into a hibernation phase with the described chemical compound.

Conclusion

This technology enables protection of cells, tissue and probably whole organs from cold storage damage. It looks to be a promising technology to prevent cell damage during (air)evacuation of wounded persons in area without proper medical care by cooling down the wounded area in the presence of the hibernation inducing compound. The technology is also promising for storing cells, which have to be used in a later stage for tissue engineering or to store the engineered tissue before therapeutic use.

Human Tissue Research: An R&D's perspective

Dr Nana Theodorou, Research Coordinator, Sheffield Teaching Hospitals NHS Foundation Trust, UK

This talk will focus on the regulatory requirements relating to human tissue research. The presenter will start of with an introduction to the Research Governance Framework and current UK legislation. There will be an overview of the R&D approval process; pre-authorisation, post-authorisation and after study end. The ethical issues and dilemmas surrounding human tissue research will be presented alongside some selected case examples. Finally the approval and management of Tissue Banks and Biorepositories will be described from an R&D perspective.

Human milk banking and the use of donor human milk

Gillian Weaver, Queen Charlotte's & Chelsea Hospital, Imperial College Healthcare NHS Trust, London, United Kingdom

There are currently over 500 human milk banks operating around the world of which 210 are established in 23 countries of Europe. They collect, screen, process, store and issue donated breastmilk. This talk will introduce delegates to the recruitment and screening of donors, the testing and processing of the donated milk and the delivery and use of donor human milk on neonatal units. The role of human milk banks in the support of wide ranging clinical and non clinical research will be discussed.

Day 1:

Oral Presentation Abstracts

Oral presentations will be added after the submission deadline

DIABETIC MESENCHYMAL STEM CELLS THERAPY TO REPAIR DIABETIC HEART

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Mesenchymal stem cells (MSCs) possess the unique properties for the treatment of diabetic cardiomyopathy. However, age and disease declines the repair capability of MSCs. MSCs isolated from diabetic animals show impaired survival, proliferation, and differentiation; hence, a strategy require to augment the function of MSCs. This study was design to develop a preconditioning strategy to improve the ability of MSCs from diabetes patients to repair the diabetic heart.

In-vivo diabetic mice model was develop by injecting streptozotocin injections (55 mg/kg) for 5 consecutive days in C57BL/6 (6 to 8 weeks) mice. MSCs isolated from diabetic animals were preconditioned with medium from cardiomyocytes exposed to oxidative stress and high glucose (HG/H-CCM).

The HG/H-CCM preconditioning upregulated the expression of VEGF, ANG-1, GATA-4, NKx2.5 MEF2c, PCNA, and eNOS confirmed by reverse transcriptase/polymerase chain reaction (RT-PCR). Concurrently, increased AKT phosphorylation, proliferation, angiogenic ability, and reduced levels of apoptosis were observed in HG/H-CCM-preconditioned diabetic MSCs compared with nontreated controls. HG/H-CCM-preconditioned diabetic-mouse-derived MSCs (dmMSCs) were transplanted in diabetic animals and demonstrated increased homing concomitant with augmented heart function. Gene expression of angiogenic and cardiac markers was significantly upregulated in conjunction with paracrine factors (IGF-1, HGF, SDF-1, FGF-2) and, in addition, reduced fibrosis, apoptosis, and increased angiogenesis was observed in diabetic hearts 4 weeks after transplantation of preconditioned dmMSCs compared with hearts with nontreated diabetic MSCs. Preconditioning with HG/H-CCM enhances survival, proliferation, and the angiogenic ability of dmMSCs, augmenting their ability to improve function in a diabetic heart.

ShARM - SHARED AGEING RESEARCH MODELS – SHARING RESOURCES TO ACCELERATE RESEARCH INTO AGEING

A Duran, P Potter, S Wells, T Kirkwood, T von Zglinicki, A Corcoran, Q Meng, G de Haan, M Peffers, I Bellantuono

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ShARM is a not for profit organisation, funded by Wellcome Trust. It was created to facilitate the sharing of tissues and information from aged mice in order to improve aged animal welfare and accelerate research into ageing without the need for additional mice.

Research is urgently needed to gain a better understanding of the biology of ageing and to identify new interventions to manage the rise in life expectancy and the subsequent increase in age related diseases. Mice are important models of ageing, however, the time and cost needed to rear ageing colonies can limit research outputs. To ensure maximum research capacity is achieved from each aged mouse, ShARM collects surplus tissues that are either flash frozen or formalin fixed and paraffin embedded. Tissues are stored in the biorepository and information, available online allows researchers to select appropriate samples to purchase (at cost) and use in their own studies. For bespoke collections, an online database provides details of living colonies which can be accessed by researchers upon request.

Since launching in July 2012 ShARM has attracted more than 180 members, collected over 17,000 tissues and has in excess of 1,000 mice registered in live ageing colonies. ShARM has supplied more than 400 tissues to investigators who have used data from these samples in publications such as *Ageing Cell* (Nocchi et al., 2014) and to generate preliminary data for grant applications.

ShARM also provides MICEspace; an online, collaborative environment, for discussion and knowledge exchange on research subjects and animal welfare. Information on the top 10 welfare concerns is available and forum topics currently include fighting in males and excess scratching. MICEspace will facilitate the production of guidelines on best practice, ensuring the very highest standards of welfare are achieved for aged animals.

By bringing together the collective resources, knowledge and experience of individuals, we can reduce the number of animals used in research, improve animal welfare and allow more research to be undertaken on current cohorts of mice.

Nocchi, L., Daly, D. M., Chapple, C., & Grundy, D. (2014). Induction of oxidative stress causes functional alterations in mouse urothelium via a TRPM8-mediated mechanism: implications for aging. *Aging cell*, 13(3), 540-550.

Day 2:

Oral Presentation Abstracts

HUMAN AMNIOTIC MEMBRANE AS SCAFFOLD FOR GROWTH OF MSCs DERIVED FROM DIFFERENT SOURCES

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Stem cells are considered the valuable tool in regenerative medicine. Their unique characteristics of self-renewal and ability to differentiate into cells of multiple lineages make them good candidate to repair damaged tissues. Stem cells have been isolated from various tissues in body including adult organs, fetuses, embryos and birth-associated tissues. In present study we isolated stem cells from tissues of Placenta (PD-MSCs), Umbilical cord (UC-MSCs) and Adipose (ASCs). Characterization of PD-MSCs, UC-MSCs and ASCs by flow cytometry analysis revealed their mesenchymal nature. Growth kinetics, cell viability, cytotoxicity and proliferation assays of these cells demonstrated that they are highly viable, less cytotoxic and very proliferative. Further, we made biobank of human amniotic membrane (HAM) and used it as supporting matrix for culturing of Mesenchymal stem cells from different sources. All these findings propose HAM as good supportive matrix for cell growth and cell delivery scaffold. In conclusion, we suggest that stem cells from different sources like PDMSCs, UCSCs and ASCs can be cultured on HAM for better growth and improved stem cells banking.

Poster Presentation Abstracts

Poster abstracts will be finalised weeks before the event

COMPREHENSIVE GENETIC SCREENING OF GJB2, GJB6 AND SLC26A4 AMONG NON- SYNDROMIC HEARING LOSS PATIENTS IN EASTERN PART OF INDIA

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Abstract

Genetically caused deafness is highly heterogeneous disorder, affecting one in 500 new born. The diversity of genes and genetic loci implicated in hearing loss defines the complexity of the genetic basis of hearing. In spite of this large heterogeneity, mutations in the genes GJB2, GJB6 and SLC26A4 are major contributors. The mutation spectrum of these genes varies among different ethnic groups. Few studies have focused on the southern and western regions of India related to this disease, however, no such data is available from the eastern part of our country. Mutations in GJB2, GJB6 and SLC26A4 genes were screened by bidirectional sequencing from 215 congenital non-syndromic hearing loss patients. The study revealed that 4.65% and 6.97 % patients had mono-allelic and bi-allelic GJB2 mutations respectively. Six mutations were identified, p.W24X being the most frequent one accounting for 71.05% of the mutated alleles. Mutations in GJB6 including the previously identified deletion mutation (GJB6-D13S1830) were not identified in our study. Further, no patients harbored bi-allelic mutations in the SLC26A4 gene or the common inner ear malformation Enlarged Vestibular Aqueduct (EVA).The mutation profile of GJB2 in our study is distinct from other parts of India, suggesting that the mutation spectrum of this gene varies with ethnicity and geographical origin. The absence of GJB6 mutations and low frequency of SLC26A4 mutations suggest that additional genetic factors may also contribute to this disease.

EFFECTIVE BIOBANKING OF RETINAL PIGMENT EPITHELIUM AFTER LIMBAL APPROACH-SUBRETINAL INJECTION OF VIRAL VECTORS FOR GENE THERAPY

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The eye is a small and enclosed organ which makes it an ideal target for gene therapy. Recently various strategies have been applied to gene therapy in retinopathies using non-viral and viral gene delivery to the retina and retinal pigment epithelium (RPE). Subretinal injection is the best approach to deliver viral vectors directly to RPE cells. Before the clinical trial of a gene therapy, it is inevitable to validate the efficacy of the therapy in animal models of various retinopathies. Thus, subretinal injection in mice becomes a fundamental technique for an ocular gene therapy. Herein, we provide the easy and replicable technique for subretinal injection of viral vectors to experimental mice and suggest the effective biobanking of RPE, which would be modified from the widely used technique in ophthalmology clinics.

EFFECTIVE BIOBANKING OF RETINAL VESSEL OF DIABETIC RETINOPATHY ANIMAL MODEL FOR VALIDATION OF ANGIOPOIETIN-2 MEDIATED PERICYTE LOSS

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Pericyte loss is an early characteristic change in diabetic retinopathy (DR). Despite accumulating evidence that hyperglycemia-induced angiopoietin 2 (Ang2) has a central role in pericyte loss, the precise molecular mechanism has not been elucidated. Recently, we investigated the role of Ang2 in pericyte loss in DR, where we demonstrated that pericyte loss occurred with Ang2 increase in the diabetic mouse retina and that the source of Ang2 could be the endothelial cell. Furthermore, Ang2 induced pericyte loss in C57BL/6J mice retina in vivo, where intravitreal injection of anti-integrin $\alpha 3$ and $\beta 1$ antibodies attenuated Ang2-induced pericyte loss. Therefore, to suggest that glycemic control or blocking Ang2/integrin signaling could be a potential therapeutic target to prevent pericyte loss in early DR, the effective biobanking of retinal vessel of diabetic retinopathy animal model for validation of Ang2-mediated pericyte loss is needed, which would be provided in this presentation.

CORD BLOOD IS A NECESSITY OR GUARANTEE EFFORT IN CELULAR THERAPIES?

(Cord Blood Banking with History of 25 Years)Mukadder GÜN*

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Abstract

Regenerative medicine is rapidly developing and increasingly attractive today. Stem cells which (SC) for cellular therapy especially umbilical cord blood (UCB) 's use of the last 20-30 years has been tempting as a source of hematopoietic stem cell (HSC). UCB has been used to as tertiary source then "bone marrow" and "peripheral blood" In order to transfer cells in the treatment of many diseases. The first clinically documented use of cord blood stem cells was in the successful treatment of a six-year-old boy afflicted by Fanconi anemia in 1988. Since then, UCB has become increasingly recognized as a source of stem cells that can be used in stem cell therapies.

Umbilical cord blood is the blood left over in the placenta and in the umbilical cord after the birth of the baby. Material which was thrown as a waste UCB ; it is used particularly in patients weighing 20 kg as a source of stem cell in the recent past. UCB transplantation is possible for with a limited number adult patients. With it's possibilities of cord blood (as a source of UCB) can be used who have a preference, a source of hope for practitioners and patients.

During of this paper, which contains an evaluation on the cord blood's usage as a source of stem cells in cellular therapies from past to the present. In addition the current study aims to presenting information about UCB's stocking and like this biological material's ownership ethical evaluations.

Key Words: Cellular therapy, cord blood, necessity banking.

SKIN CANCER AND MISSING FAMILY MEDICAL HISTORY: A ROLE FOR BIOBANKS?

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Incomplete or missing family medical history affects millions of donor-conceived and adopted people worldwide. To ensure this population's access to genetic and personalized medicine, there may be a role for biobanks in providing periodic family health updates through periodic tissue sampling from biological parents who do not have contact with their offspring. This proposal has implications for cancer diagnosis and treatment, as well as other diseases with a heritable component.