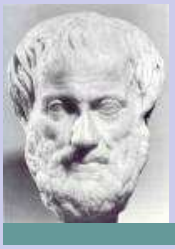

OsteoCord

'Bone from Blood'

Issue 1, July 2006 www.bonefromblood.org STREP Project No. 018999

A Specific Targeted Research Project from the EU 6th Framework Programme

Bones from blood: Breaking new ground on fractures

Stem cells are 'blank' cells that can replicate themselves indefinitely, or given the right triggers, grow into specialised cells for specific areas of the body. Mesenchymal stem cells (MSCs) are found in adult bone marrow. They are able to form tissues such as bone and cartilage and therefore may be used to help treat damage and disease that affect the skeleton. Some evidence suggests that MSCs may also be able to generate non-skeletal tissues such as brain and liver and do not provoke immune reactions when transplanted into unmatched recipients. These are valuable cells, but extracting them from marrow can be difficult and painful. Recent work indicates that MSCs can also be found in umbilical cord blood, which can be extracted and banked following relatively simple protocols.

The OsteoCord project involves experts in stem cell technology, molecular biology, proteomics, biotechnology and tissue engineering from across Europe. Our aim is to generate three dimensional bone-like replacement structures using cord blood as the source for MSCs.

The Real Possibilities

There is a clear clinical requirement for appropriate bone substitutes that are able to replace current grafting procedures for the repair and regeneration of diseased or damaged skeletal tissues . There are also burgeoning socio-economic implications. Across Europe, the current estimated cost for treating patients for just one year after a hip fracture is €14.7 billion, which is likely to be a fraction of total care expenses, with a higher female bed occupancy than diabetes, myocardial infarction and breast cancer[1]. World populations are ageing at an unprecedented rate. It is predicted that the global median age will rise from 26.1 years in 1998 to 37.8 in 2050[2]. The major area predicted to suffer these demographic challenges is Europe, with a projected median age of 47.4 by 2050, with 1 in 3 people being over the age of 60[2]. As the population ages, it is forecast that the incidence of bone related disorders, in particular osteoporosis, will escalate rapidly. It is anticipated that over the next 50 years the number of hip fractures in the European Union will rise from 414,000 per year to 972,000[3,4], unless new and improved therapies are devised now to treat and prevent bone-related disorders.

Appropriate cell-based treatments are increasingly demanded and there is a successful therapeutic model to follow. Adult haematopoietic stem cells (HSCs)

Continued on Page 2

Inside this issue:

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OsteoCord Statistics:

8 partner organisations in 4 European Countries

30+ scientists

€2.5 million over 3 years

Continued from Page 1

have been used for transplants for over a decade, with 16,700 HSC transplants performed in Europe in 2001[5]. However, the HSC field is advanced are there are several HSC recognition markers and optimised protocols for the isolation and expansion of HSCs. This is not the case for MSCs and cell sourcing limitations have hindered progress. The advantages of using cord blood as a source of stem cells are its non-invasive procurement and its abundance. In several countries around the world, including a number in Europe, cord blood is collected and banked in public banks for general use, or stored by private companies for private use.

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2. United Nations Population Division, World Population Prospects, 1998 revision.

3. Report on Osteoporosis in the European Community – Action for prevention. Published by the European Commission (11 languages). 1998. ISBN 92-828-5333-0.

4. Osteoporosis in the European Community – Action Plan. A report of the key next steps towards a Europe free from fragility fractures. European Union Osteoporosis Consultation Panel. 2003.

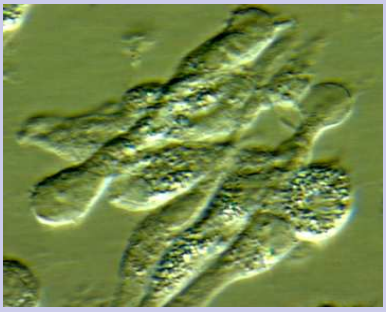
5. Gratwohl A, Baldomero H, Passweg J et al. Hematopoietic stem cell transplantation for hematological malignancies in Europe. Leukemia. 2003;17:941-959.

The Unfolding of the Project

The OsteoCord project is divided into four overlapping phases:

Phase 1: Defining the stem cell source

Characterising and understanding Cord Blood (CB)-MSCs and Bone Marrow (BM)-MSCs while developing techniques for the isolation and growth of these cells. Understanding how they proliferate, their longevity and their growth. characteristics.



Phase 2: Characterising osteogenic induction

Focusing on the potential of CB-MSCs to develop bone. Comparing and characterising cells from differentiated cord-blood lines and BM-MSCs using transcriptomics, proteomic and bioimpedence technologies.

Phase 3: Tissue engineering bone

Applying the work of phases 1 and 2 towards tissue engineering, including scale-up procedures, generation of CB-MSC cell lines and development of framework technology upon which to grow bone tissue, optimising the release of growth factors.

Phase 4: Project synthesis, assessment and ethical and social evaluation

Documentation, exploitation and dissemination of activities in the first three phases. Ethical monitoring and review of the work and a social science assessment to identify the expectations, prospects and potential of the work and field in general.

OsteoCord Partners

The University of York, UK (Co-ordinator)

University Hospital of Odense, Denmark

University of Southern Denmark

Fraunhofer Institut Biomedizinische Technik

Fraunhofer Institute for Biomedical Engineering, Germany

The University of Nottingham

University of Nottingham, UK

Fakultät für Klinische Medizin Mannheim

DRK-Blutspendedienst Baden-Württemberg - Hessen

Ruprecht-Karls Universität Heidelberg, Germany

ecbio

ECBio, Portugal

RegenTec advancing tissue regeneration technologies

RegenTec Ltd, UK