Leipzig, Germany
21-23 October 2015

World Conference on
Regenerative Medicine
This year’s World Conference on Regenerative Medicine brought together international experts from the diverse and interdisciplinary branches of regenerative medicine. Here, we explore key highlights of the event.

Congress Center Leipzig was home to the seventh World Conference on Regenerative Medicine (WCRM), organised by the Fraunhofer Institute for Cell Therapy and Immunology.

The biannual event saw researchers, medical practitioners and company representatives from all corners of the world come together to present and discuss the latest developments and findings in the fields of stem cell research, cell therapy, biomaterials and tissue engineering.

Over the course of three days, around 800 participants from 50 nations took part in a series of poster presentations and workshops, sharing and debating findings in these fields.

Successfully combining different disciplines in regenerative medicine, the event has evolved into an outstanding platform for international networking and become one of Europe’s largest and most interdisciplinary conferences in the field.

WCRM 2015 focused on ways of applying findings from cell research into regenerative medicine practice. One of Germany’s most renowned stem cell researchers, Professor Oliver Brüstle from the University of Bonn, spoke at the event about current developments concerning the biomedical application of programmed cells. Other speakers included Dr Robert Passier from Leiden University, Netherlands, and Dr Nenad Bursac from Duke University, USA, who discussed the use of stem cells in the development of new medicines for heart disease.

Alongside sessions on tissue engineering and cell therapy, interesting innovations in the field of 3D printing were also presented. Boris Chichkov from the Laser Zentrum Hannover focused his talk on printing techniques used to produce 3D scaffolds from biological material, which may serve as a model for grafts to print living cells for tissue generation.

The 2015 WCRM’s poster awards winners were presented by the Fraunhofer Institute for Cell Therapy and Immunology and the Theracur Foundation:

**FIRST PLACE**
MARTA ADAMIACK, Poland, ‘Transcriptomic and proteomic profiling identifies extracellular vesicles from iPS cells as potential therapeutic tool for cardiovascular disease’

**SECOND PLACE**
LILIANA MENDONÇA, Portugal, ‘Generation of gene-silenced human iPS-derived NSC for transplantation in Machado Joseph Disease’

**THIRD PLACE**
ANKE DIENELT, Germany, ‘Application of peripheral blood derived CD3+ cells for the treatment of biologically impaired bone healing in the aged’
This year’s WCRM highlighted recent advances in regenerative medicine. Are there any research areas that you are particularly interested in within this field?

I’m keen to see the advancement of pluripotent cells into clinical trials. We’ve waited a long time to see these cells come into the clinic, and we’re now finally seeing a significant advancement in the field towards clinical translation. A couple of years ago, there was only a single example of pluripotent cells reaching the clinic, and today we have at least eight ongoing clinical trials with pluripotent cell-derived products worldwide. This means that the road to the clinic becomes increasingly more accessible as pioneering groups are leading the way.

You have just presented your project on bringing human embryonic stem cells (hESCs) to the clinic for treating Parkinson’s disease at WCRM. What main points were you hoping to raise on this topic?

I wanted to inform the public about the progress of our work, and to explain all the complicated, tedious and sometimes surprising steps one has to go through to create an embryonic stem cell product at a quality that is suitable for clinical trial. Since there are few examples of approved clinical trials with pluripotent cell-derived products worldwide, there are still no clear guidelines with each other, so that we as a community can jointly form guidelines for future clinical trials.

In your view, what are the main advantages of using hESCs compared with adult stem cells?

I actually don’t believe adult stem cells are an option for the treatment of Parkinson’s disease. We have known for many years that there is no type of adult stem cell that can give rise to authentic dopaminergic neurons upon grafting to the brain. Although there have been many indications that it’s possible to generate dopaminergic-like cells in vitro, this does not hold up when the cells are grafted to the brain. It’s crucial that we treat patients with a cell type of 100 per cent correct midbrain dopaminergic phenotype, as this is the only cell type that can properly communicate and regulate dopamine production in the brain.

What role do events like WCRM play in communicating with other researchers and scientists across the world?

Scientific conferences and meetings are in general very important for scientists to exchange ideas and start new collaborations across normal boundaries.
Therapies for fighting cancer

A keynote speaker at the event, **Professor Jonathan Bramson** discusses his team’s novel technology for targeting cancer cells.

**What have been some of your key successes in the development of novel immune therapies for cancer?**

We have developed novel and powerful strategies to trigger antitumour immunity using oncolytic virus vectors that also serve as robust vaccines. To complement this powerful vaccine, we have also developed a novel technology, known as T-cell antigen coupling (TAC) receptors, which can direct any T cell to attack and destroy tumour cells.

**In your keynote speech you discussed the process of engineering white blood cells for fighting cancer. Could you explain how this technique works and what benefits it has for modifying cancer cells?**

Our novel technology is used to redirect T cells to attack and destroy cancer cells. We engineer T cells to express TAC receptors using lentivirus vectors but, presumably, any gene transfer vector can be used. The TAC receptors offer two advantages over the chimeric antigen receptor: improved tumour-killing properties and diminished production of inflammatory cytokines.

**Looking ahead, are there any particular developments in cell therapy and immunotherapy that you believe have strong potential?**

The future of cell therapies for cancer looks bright. Data emerging from clinical trials of leukaemia and melanoma have revealed unprecedented responses in patients with cancers that are resistant to all previous lines of therapy. Current trials seeking to combine cell therapies with immune checkpoint inhibitors are expected to yield even more powerful outcomes.

**Can you summarise the main points of your talk at this year’s WCRM?**

My presentation focused on the biology of TAC receptors and the antitumour properties of TAC-engineered T cells in preclinical models of breast and ovarian cancer. In my presentation, I demonstrated that TAC-engineered T cells display robust antitumour activity in vitro and in vivo and diminished toxicity compared with CAR-engineered T cells.

**By what means does the WCRM facilitate communication and research between scientists and clinicians across the globe?**

WCRM represents an excellent platform for disseminating scientific results. The conference is highly attended by scientists from across Europe and neighbouring countries. The social media reporting further amplifies the communication by making information available to scientists who were unable to attend the meeting.

In the round

Turning a once improbable idea into reality, researchers from Case Western Reserve and UT Southwestern Medical Center have developed a new drug to accelerate the repair process of damaged liver, colon and bone marrow tissue, and are hoping to start human trials in three years. As new avenues and research studies are developed, we asked the key speakers at WCRM which specific area of stem cell and regenerative medicine they feel most excited about.

“Of course discoveries like these are very promising, and it will be interesting to see the progress of this drug candidate to the clinic. However, in general I think one has to be careful about expecting a regenerative therapy serving as a ‘one-size-fits-all’ therapy – especially when it comes to stem cell transplantation therapies. In our experience, each type of disease needs its own carefully designed and carefully tested regenerative therapy, since each disease involves different cell types with different properties.”

**DR AGNETE KIRJEBY**
LEADER, LUND UNIVERSITY, SWEDEN

“To my mind, currently the most exciting developments are the so-called trans-programming bypassing the iPScell state on the way from one differentiated cell to another differentiation line and the latest developments in anti-cancer cell therapies. While the first topic is still in the area of basic research, it is remarkable that the latter is already under ambitious clinical investigation.”

**PROFESSOR FRANK EMMRICH**
PRESIDENT WCRM AND DIRECTOR, FRAUNHOFER INSTITUTE FOR CELL THERAPY AND IMMUNOLOGY