Opt!STEM

Optimization of Stem cell
Therapy for degenerative
Epithelial & Muscle Diseases

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2009–
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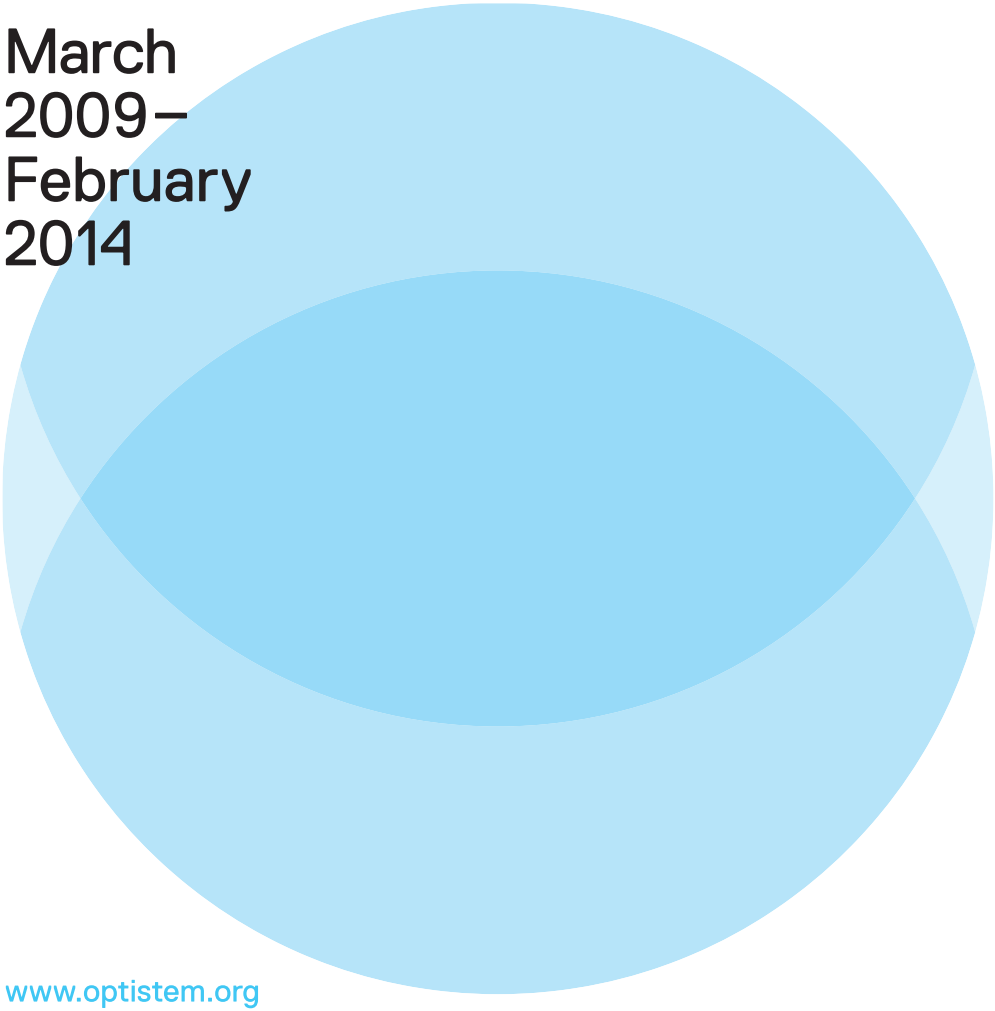

www.optistem.org

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Using stem cells to treat degenerative diseases

OptiStem is a large-scale integrated project funded by the European Commission to test new stem-cell-based approaches to treating degenerative diseases of the skeletal muscle, and diseased or damaged epithelial tissues such as skin or the surface of the eye.

A pan-European partnership

OptiStem brings together leading scientists, companies and clinicians with expertise in basic stem cell biology, immunology, pre-clinical research and clinical trials to drive progress towards the clinic. Our 18 partner institutions span six countries:

- 12 academic institutions
- 1 national charity
- 2 research networks
- 2 small-to-medium sized businesses
- 1 large biotech company

Progress founded on basic research

Our basic research investigates the cellular and molecular processes that regulate stem cell behaviour in the healthy body and examines physiological and immunological issues related to stem cell transplantation. This work provides a vital knowledge platform for future clinical developments.

The road to the clinic

Optistem's pre-clinical work bridges the gap between fundamental stem cell biology and clinical trials. It includes detailed analysis of what happens to transplanted cells, complemented by studies on the immune response and microsurgical techniques. Results of this work allow us to optimize procedures and therapy development while progressing to clinical trials, and lay the foundation for continued and sustained innovation.

Clinical trials

Optistem's major aim is to carry out 4 different clinical trials:

1. A phase I/II clinical trial based on transplantation of mesoangioblasts (a type of blood-vessel-associated stem cell) from healthy HLA-identical sibling donors into pediatric patients affected by Duchenne muscular dystrophy.

2. The pre-clinical work towards a phase I/II clinical trial based on transplantation of Duchenne muscular dystrophy patients with genetically corrected mesoangioblasts from their own bodies.

   These trials aim to determine the safety and efficacy of mesoangioblasts in improving patients' muscle function.

3. A phase I/II clinical trial using epithelial stem cells from patients' own bodies, cultured in the laboratory and then transplanted into the patients to reconstitute their oral mucosa after severe injury.

   This trial aims to determine the safety and efficacy of cultured epithelial stem cells in treating patients with severe oral damage.

4. A clinical study that aims to translate an extensively tested treatment for corneal damage into protocols for widespread use across Europe. The treatment uses epithelial stem cells to reconstruct the cornea after severe injury.

   This study builds on a significant body of data accumulated from clinical trials involving hundreds of patients, with 10 years of follow-up (see Rama P et al, N Engl J Med. 2010 Jul 8;363(2):147-55).

OptiStem and You

Public engagement

OptiStem is committed to dynamic, interactive engagement with stakeholders in stem cell research and regenerative medicine including the public, patients and regulators. As one of the partners in EuroStemCell – the European Consortium for Communicating Stem Cell Research – we also support the development of **www.eurostemcell.org** into Europe's reference point for news, views, educational resources and discussion on stem cells and regenerative medicine.

> Find out more about stem cells at **www.eurostemcell.org**

EuroStemCell

Training and knowledge exchange

We run an active programme of knowledge exchange and high-level specialist training, aimed at consortium members and the wider research community. Our aims are to resource young researchers for future challenges; to foster a culture of collaboration across all research sectors – basic, clinical and commercial – and to stimulate the development of new collaborative research and clinical approaches.

> Look out for our events postings on **www.eurostemcell.org**
> For information on collaborative opportunities, please contact the **Project Office**

Publications

The outstanding research of the OptiStem partners is demonstrated by a number of publications in top-tier journals, produced in the first 18 months:

Bonfanti P et al. **Nature** 2010, e-pub Aug. 19.
Rama P et al. **N Engl J Med**. 2010 Jul 8;363(2):147-55
Messina G et al. **Cell** 2010 Feb 19;140(4):554-66
Corada M et al. **Dev Cell** 2010 Jun 15;18(6):938-49
Mitchell KJ et al. **Nat Cell Biol**. 2010 Mar;12(3):257-66
Lagha M et al. **Dev Cell** 2009 Dec;17(6):892-9
Sambasivan R et al. **Dev Cell** 2009 Jun;16(6):810-21

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SEVENTH FRAMEWORK PROGRAMME

Opt!STEM
Optimization of Stem cell Therapy for degenerative Epithelial and Muscle diseases

The Road to the Clinic

Basic research

OptiStem is researching the processes that regulate the behaviour of muscle and epithelial (e.g. skin, eye, mouth) stem cells in the healthy body. We are also examining physiological and immunological issues related to the transplantation of these cells.

1. Where are we headed?
What symptoms and diseases could be addressed, reversed or repaired by stem cell therapy?

2. Planning the route
Which stem cells are right for the disease we want to treat? How much can we find out using laboratory experiments?

Pre-clinical work

OptiStem is analysing what happens to transplanted cells in model systems, studying the immune response and developing microsurgical techniques.

3. Paving the way
What are the best models/ laboratory experiments that can be used to study the disease? Do the cells work in these models? Do we need new models?

4. Checking for road blocks
What does the law say? Are there any ethical issues to consider? What are the risks we face in the clinic and how do we minimize them? Can we make enough cells of the right type?

Clinical trials

OptiStem will carry out several clinical trials:

Phase I/II trials using mesoangioblasts (a type of blood-vessel-associated stem cell) in different approaches to treatment of Duchenne muscular dystrophy.

A phase I/II trial using epithelial stem cells to reconstitute the oral mucosa of patients with severe injuries.

A clinical study that aims to translate an extensively tested treatment for corneal damage into protocols for widespread use across Europe.

5. Phase I clinical trials
A first test on a small group of people. Is the procedure safe? Are there any side effects? Can we go on to investigate whether the treatment works?

6. Phase II clinical trials
A trial run with a larger group of patients than at Phase I. Is the treatment effective? Are we still confident the treatment is safe?

7. Phase III clinical trials
Treatment of a large group of patients. Can we confirm effectiveness of the treatment compared to standard treatments?

8. Final approval & widespread distribution
What systems need to be put in place to make the therapy widely available? How will it be funded? Has regulatory approval been given?

Checkpoints

Peer review by experts

Regulatory checks and approvals

Informed consent of patients