

TS059

The use of embryos in stem cell research: scientific practices, political views and citizens' expectations in Portugal

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The use of embryos in stem cell research depends on permissive policies, availability of stem cell research centers and citizens willing to donate embryos. This paper compares the views, actions and expectations mobilized by three different agents in Portugal: (i) *in vitro* fertilization (IVF) heterosexual couples in their decisions to donate embryos for scientific research; (ii) legislation and political debate about stem cell research; and (iii) scientific projects on embryonic stem cell research. The analysis of the interrelationships between science, politics and citizenship concerning the use of embryos in stem cell research was grounded on the content analysis of the following sources: (i) interviews conducted with 451 IVF patients (267 women and 184 men) at Hospital de São João (Porto, Portugal), between August 2011 and June 2012, about reasons underlying the donation of embryos for research; (ii) arguments used by the Portuguese Government to justify the approval of a new permissive regime for embryonic stem cell research on February 24, 2011 and the parliamentary discussions about assisted reproductive technologies conducted in January 2012; (iii) the scientific fields, topics and aims of research, as well as composition of the teams, in all embryo research projects funded by Foundation for Science and Technology (major research funding state agency in Portugal) between 2000 and 2009. Scientists, stakeholders and IVF patients were very receptive to medical and technological progress, revealing expectations concerning the regenerative and therapeutic power of embryonic stem cells that are founded on high levels of trust and hope on science and technology and on health professionals. While IVF patients justified the donation of embryos for research grounded on feelings of reciprocity towards science, responsibility on contributing to improve fertility treatments and altruism, stakeholders emphasized the human embryonic stem cell research contributions for economic activity and progress of the country, and scientists highlighted the human health as the justification for funding embryonic stem cell research projects. We conclude that it is needed to maximize the available information on the scientific projects using embryonic stem cells for dissemination among IVF patients and health professionals and to monitor stakeholders and citizens' knowledge and expectations about the upcoming therapies within regenerative medicine. The debates about research ethics and regulation of embryonic stem cell research should include the views and expectations of scientists, stakeholders and IVF couples, as well as other citizens, aiming to ensure wide participation and to achieve a consensus decision making process.

TS060

3D functionalized collagen/hydroxyapatite scaffold seeded with MSC for bone defect regeneration *in vivo*

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Objectives: The aim of this study was to develop the ideal scaffold for bone defect regeneration.

Materials and Methods: In our experiment was prepared a scaffold from Collagen type I (Col)/ Hydroxyapatite (HA) and combined with Poly-ε-caprolactone (PCL) nanofibres. Three variants of this scaffold were prepared. The scaffold seeded with autologous Mesenchymal Stem Cells (MSCs) in osteogenic differentiation media (Group1) or scaffold enriched with platelet rich plasma (PRP) (Group 2) or scaffold enriched with both MSCs and PRP (Group 3). All groups of scaffolds were implanted to the rabbit femur condyles where critical size defect 6 mm in diameter and 10 ± 0.5 mm in depth was made. Empty defects were used as a control (Group 4). 12 weeks later rabbits were sacrificed and the femoral condyles were examined by histological analysis. The aim was to analyze the volume fraction and distribution of bone within an experimental defect.

Results and Discussion: The highest bone volume fraction within the healing defect was found in samples with scaffolds enriched with both MSC and PRP. Bone volume fraction was comparable between the samples with PRP-enriched scaffolds, and MSC-enriched scaffolds, while samples without any scaffold contained the lowest bone volume fraction. Only samples containing both MSC and PRP showed uniform bone deposition in whole volume of defect. The moduli of elasticity under compressive test significant increased at the Col/ HA/ PCL scaffold compared to Col/ HA scaffold without PCL nanofibres.

Conclusion: This smart composite scaffold enriched with PCL nanofibres, MSCs and PRP present new possibilities for bone defect regeneration.

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