

Progress and prospects in neurorehabilitation: clinical applications of stem cells and brain–computer interface for spinal cord lesions

Mariana Gongora · Caroline Peressutti ·
Sergio Machado · Silmar Teixeira ·
Bruna Velasques · Pedro Ribeiro

Received: 11 September 2012 / Accepted: 18 October 2012 / Published online: 17 November 2012
© Springer-Verlag Italia 2012

Abstract Spinal cord injury (SCI) is a disease that affects millions of people worldwide, causing a temporary or permanent impairment of neuromotor functions. Mostly associated to traumatic lesions, but also to other forms of disease, the appropriate treatment is still unsure. In this review, several ongoing studies are presented that aim to provide methods of prevention that ensure quality of life, and rehabilitation trends to patients who suffer from this injury. Stem cell research, highlighted in this review, seeks to reduce damage caused to the tissue, as also provide spinal cord regeneration through the application of several types of stem cells. On the other hand, research using

brain–computer interface (BCI) technology proposes the development of interfaces based on the interaction of neural networks with artificial tools to restore motor control and full mobility of the injured area. PubMed, MEDLINE and SciELO data basis analyses were performed to identify studies published from 2000 to date, which describe the link between SCI with stem cells and BCI technology.

Keywords Spinal cord injury · Regeneration · Neurorehabilitation · Neural tissue · Stem cells · BCI

M. Gongora (✉) · C. Peressutti · S. Teixeira · B. Velasques · P. Ribeiro
Brain Mapping and Sensory Motor Integration Laboratory, Institute of Psychiatry of the Federal University of Rio de Janeiro (IPUB/UFRJ), Rua Cel. Moreira Cesar, 375/802, Icaraí, 24230-054 Niterói, RJ, Brazil
e-mail: marianagongora@gmail.com

C. Peressutti · B. Velasques · P. Ribeiro
Institute of Applied Neuroscience (IAN), Rio de Janeiro, Brazil

S. Machado
Panic and Respiration Laboratory, Institute of Psychiatry, Federal University of Rio de Janeiro, Rio de Janeiro, RJ, Brazil

S. Machado
Quiropraxia Program of Faculty of Health Sciences Central University, Santiago, Chile

S. Machado
Institute of Philosophy, Federal University of Uberlândia (IFILO/UFU), Uberlândia, Brazil

S. Machado
Physical Activity Sciences Postgraduate Program, Salgado de Oliveira University (UNIVERSO), Niterói, Brazil

S. Machado
National Institute of Translational Medicine (INCT-TM), Rio de Janeiro, RJ, Brazil

S. Teixeira
Laboratory of Physical therapy, Veiga de Almeida University of Rio de Janeiro (UVA/RJ), Rio de Janeiro, Brazil

B. Velasques
Neuromuscular Research Laboratory, National Institute of Traumatology and Orthopaedics (INTO), Rio de Janeiro, Brazil

B. Velasques
Neurophysiology and Neuropsychology of Attention, Institute of Psychiatry of the Federal University of Rio de Janeiro (IPUB/UFRJ), Rio de Janeiro, Brazil

P. Ribeiro
Bioscience Department (EEFD/UFRJ), School of Physical Education, Rio de Janeiro, Brazil