



Editorial

## The Promise of Regenerative Medicine and Stem Cell Research for the Treatment of Autism

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Finding a cure for previously untreatable injuries and diseases is the main aim for the regenerative medicine. This promising medical field tries to restore or establish normal structure and function of damaged tissues and organs. To achieve this goal, a great opportunity is offered by stem cell therapy. Indeed, stem cells could represent the future of molecular and regenerative medicine [1]. Using several types of stem cells is a real way to provide a valid approach to curing some untreatable human diseases. In addition, stem cell therapy is suitable for developing new cell-based drugs for the future molecular and regenerative medicine [2].

Autism spectrum disorders (ASDs) are heterogeneous complex neurodevelopmental pathologies characterized by abnormalities in social interactions, with the presence of impaired communication, restricted interests, and repetitive stereotypic behaviours [3]. Prevalence rate of autism is quickly increasing [4]. Despite much research efforts, there are still no defined mechanisms of ASDs pathogenesis, rendering autism management very difficult, without defined standard approach [5,6]. Current pharmacological treatments are directed at the associated behavioural symptoms, without affecting all core symptoms of ASDs [7,8].

New perspectives for ASDs therapy are provided by stem cells [9]. Indeed, novel findings on the molecular, cellular, neuroimmunological, and environmental of ASDs suggest that stem cell therapy could be a unique and potent tool for the treatment of autistic syndromes [10,11].

Three properties defining stem cells make them potential therapeutic agents for ASDs. These characteristics are: 1) their self-renewal ability with the capacity to generate more identical stem cells, 2) their capacity to give rise to more differentiated cells, and 3) their

paracrine and regulatory functions [12]. Indeed, in ASDs treatment, the positive effects mediated by stem cells could be achieved through their paracrine and immunomodulatory properties [10]. Interestingly, ASDs are associated with severe immune alterations and pro-inflammatory cytokines overproduction. Stem cells are able to affect immune system cells, likely through secretion of large amounts of several biomolecules with anti-inflammatory properties (paracrine activity). In this way, they are able to counterbalance the immune system aberrant alterations and activate endogenous restorative mechanisms within damaged tissues contributing to recovery of function lost [10].

Before stem cell transplantation can become a successful reality for ASDs, researchers need to more complete and exhaustive investigations. Some issues on stem cell biology have to be further clarified: proliferative capacity, life span, senescence, exact stem cell dose, times and sites of injections, as well as eventual side effects and long term safety [9]. Besides several National State Country laws need to be modified to let autistic children to undergo to stem cell transplantation.

### References

1. Siniscalco D, Giordano A, Galderisi U (2012) Novel insights in basic and applied stem cell therapy. *J Cell Physiol* 227: 2283-2286.
2. Siniscalco D, Pandolfi A, Galderisi U (2012) State-of-the-art on basic and applied stem cell therapy; Stem Cell Research Italy-International Society for Cellular Therapy Europe, Joint Meeting, Montesilvano (PE)-Italy, June 10-12, 2011. *Stem Cells Dev* 21: 668-669.
3. Butler MG, Youngs EL, Roberts JL, Hellings JA (2012) Assessment and treatment in autism spectrum disorders: a focus on genetics and psychiatry. *Autism Res Treat* 2012: 242537.
4. Russell G (2012) The Rise and Rise of the Autism Diagnosis. *Autism* 2: e104.
5. Kim KY, Jung YW, Sullivan GJ, Chung L, Park IH (2012) Cellular reprogramming: a novel tool for investigating autism spectrum disorders. *Trends Mol Med* 18: 463-471.
6. Siniscalco D, Sapone a, Giordano C, Cirillo a, de Novellis V, et al. (2012) The expression of caspases is enhanced in peripheral blood mononuclear cells of autism spectrum disorder patients. *J Autism Dev Disord* 42: 1403-1410.
7. Benvenuto A, Battan B, Porfirio MC, Curatolo P (2012) Pharmacotherapy of autism spectrum disorders. *Brain Dev*.
8. Canitano R, Scandurra V (2011) Psychopharmacology in autism: an update. *Prog Neuropsychopharmacol Biol Psychiatry* 35: 18-28.
9. Siniscalco D (2012) Stem cell research: an opportunity for autism spectrum disorders treatment. *Autism* 2: e106.
10. Siniscalco D, Sapone A, Cirillo A, Giordano C, Maione S, et al. (2012) Autism spectrum disorders: is mesenchymal stem cell personalized therapy the future? *J Biomed Biotechnol* 2012: 480289.
11. Ashwood P, Corbett BA, Kantor A, Schulman H, Van de Water J, et al. (2011) In search of cellular immunophenotypes in the blood of children with autism. *PLoS One* 6: e19299.
12. Siniscalco D, Bradstreet JJ, Antonucci N (2012) Cell therapies for Autism Spectrum Disorders. Nova Science Publishers, Hauppauge, NY 6: 129-142.

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