Insights in Stem cells

Extended Abstract
Vol. 6, Iss. 3
2020

Live Fetal Stem Cells Therapy, Anti-Neu5Gc Responses and Impact on Human Heart, Brain and Immune System

Balbir Bhogal [1,2*], Daniel Royal[2] , Robert Boer[2] , James Phillips[3] , Ann Knight[1]
[1] Stem Cell Applied Technologies, Eastern Ave, USA; [2]THB Clinics, USA; [3]First Cyte Biologics, USA

Stem cells Stem cells are undifferentiated cells found in all tissues of the body. Although these cells are normally kept in a quiescent, nondividing state, they proliferate and differentiate to replace naturally dying cells (senescent cells) within tissues and to perform the repair to injury. Human Embryonic Stem Cells (hESCs), due to their proliferative nature and their implicit ability to regenerate tissue, have the potential to treat a variety of degenerative diseases as well as aging. Several embryonic stem cell lines generated from blastocyst stage (4 to 5 days post gamete fusion) be self-renewing and able to produce approximately 298 types of the cells in the body through the process of differentiation and are exemplary pluripotent stem cells. The immune system has evolved to seek out and eliminate or neutralize non-self-immunogens and pathogens. As such, transplantation of cells or tissues from genetically non-identical individuals activates immune responses that reject the transplanted cells and tissues. To prevent rejection immunosuppressive drugs are often used in clinical practice. The side-effects of long-term use of immunosuppressive drugs include such reactions as opportunistic infections, drug-related toxicities, cancer and immune dysregulation/autoimmunity/ immune enhancement with associated cytokine storm, and diseases like diabetes and Graft Versus Host Disease (GVHD). Thus, the immune rejection of transplanted stem cells remains a hurdle and this could be a much bigger problem in a xenogeneic situation. One would think that embryonic stem cells may provoke less or no immune response; however, this may not be true of the differentiated tissue derived from the embryonic stem cells and for cells processed or exposed in in vitro culture media containing animal products. Stem cells are contaminated with animal components, such as Neu5Gc, when grown or processed in culture media containing animal products. Therefore, Major Histocompatibility Complex (MHC) antigen expression, and therefore, immunogenicity, will depend upon the cell type into which the stem cells differentiate, and their immunogenicity is increased in the presence of inflammation and an autoimmune response or signals that up-regulate costimulatory molecules and attract Antigen-Presenting Cells (APCs). The available large body of data suggests that Neu5Gc glycan cannot be viewed anything but a foe for human health and the immune system and the friendly face of Neu5Gc glycan has not yet been translated in regenerative medicine for its regenerative effects. There is some speculation that Neu5Gc may be a potential target to treat some malignancies. However, the Neu5Gc targeting strategy is complicated by the absence of functional CMAH, the enzyme required for Neu5Gc sialic acid biosynthesis in humans. Neu5Gc has been overwhelmingly criticized for its adverse effects. A wealth of scientific evidence has been published to show that consumption of red meat (beef, pork, and lamb) causes the incidence of carcinomas, atherosclerosis, type 2 diabetes, brain tumors, and death. Humans carry natural, diet-induced, Anti-Neu5Gc antibodies, and when undertaking medical treatments or receiving transplants or devices that contain animal-derived products they can cause immunological reactions affecting pharmacology, immune tolerance, and severe side-effects like Serum Sickness Disease (SSD). Injections of animal cells expose human subjects to a large amount of Neu5Gc antigen and it is estimated that the average number of cells/g of tissue is 1.2 × 10 8 cells, and amount of Neu5Gc in animal cells is about 4 g to 5 g per 250 g of red meat and is likely to induce an immune response in humans. Even though stem cells obtained from Specific Pathogen-Free (SPF) animals may reduce the risk of transmission of certain pathogens to the host, such cells and their derivatives may still pose an increased risk of transmission of retroviral oncogenes. Neu5Gc like glycans have been shown to result in cancer progression especially if the xenogeneic cells also migrate away from the site of transplantation. In the context of immune responses to xeno-antigens (e.g., Neu5Gc and other glycan antigens) presented by animal stem cells, and the peptides derived from animal cells, a recent publication advances an argument to justify the clinical use of animal stem cells in humans. These authors believe that the lack of dendritic cells in fetal tissue makes the animal fetal

tissue less or non-immunogenic. Immunologically, this is a false and unsubstantiated argument to justify the use of animal stem cells in humans