

Clinical Application of Stem Cell Research Literatures

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Abstract: The stem cell is the origin of an organism's life that has the potential to develop into many different types of cells in life bodies. In many tissues stem cells serve as a sort of internal repair system, dividing essentially without limit to replenish other cells as long as the person or animal is still alive. When a stem cell divides, each new cell has the potential either to remain a stem cell or become another type of cell with a more specialized function, such as a red blood cell or a brain cell. This article introduces recent research reports as references in the related studies.

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Key words: stem cell; clinical; life; research; literature

Introduction

The stem cell is the origin of an organism's life that has the potential to develop into many different types of cells in life bodies. In many tissues stem cells serve as a sort of internal repair system, dividing essentially without limit to replenish other cells as long as the person or animal is still alive. When a stem cell divides, each new cell has the potential either to remain a stem cell or become another type of cell with a more specialized function, such as a red blood cell or a brain cell.

The following introduces recent reports as references in the related studies.

Hinoshita, E. "[Guideline for the human stem cell clinical research]." Nihon Rinsho. 2003 Mar;61(3):515-20.

The regenerative researches using human stem cells will be able to solve problems such as incurable diseases and the supply of human organs for transplantation which run short. These researches are also expected to produce business. On the other hand, there are various levels of human stem cells researches from already established to primitive in both safety and ethics. In this situation, a guideline for the human stem cell clinical research will be expected to perform appropriate clinical researches. Then, the Ministry of Health, Labour and Welfare composed a special committee about clinical research using human stem cells in the health, labour and welfare science council, technology section, and will decide upon a guideline on January 29, 2002.

Horwitz, E. M. and W. R. Prather "Cytokines as the major mechanism of mesenchymal stem cell clinical activity: expanding the spectrum of cell therapy." Isr Med Assoc J. 2009 Apr;11(4):209-11.

Mesenchymal stem cells, or mesenchymal stromal cells, have emerged as a major new cell technology with a diverse spectrum of potential clinical applications. MSCs were originally conceived as stem/progenitor cells to rebuild diseased or damaged tissues. Over the last 14 years, since the first report of MSC infusions in patients, the cells have been shown to suppress graft vs. host disease, stimulate linear growth in a genetic disorder of bone, and foster engraftment of haplo-identical hematopoietic stem cells. In all cases, few, if any, MSCs were identified at the site of clinical activity. This experience suggests a remarkable clinical potential, but a different general mechanism of action. Systemically infused MSCs seem to exert a therapeutic effect through the release of cytokines that act on local, or perhaps distant, target tissues. Rather than serving as stem cells to repair tissues, they serve as cellular factories that secrete mediators to stimulate the repair of tissues or elicit other beneficial effects. Since both the tissue source of MSCs and the ex vivo expansion system may significantly impact the cytokine expression profile, these parameters may be critically important determinants of clinical activity. Furthermore, cell processing protocols may be developed to optimize the cell product for a specific clinical indication. For example, MSC-like cells isolated from placenta and expanded in a three-dimensional bioreactor have recently been shown to increase blood flow in critical limb ischemia. Future efforts to understand the cytokine expression profile will undoubtedly expand the range of MSC clinical applications.

Illes, J., J. C. Reimer, et al. "Stem cell clinical trials for spinal cord injury: readiness, reluctance, redefinition." Stem Cell Rev. 2011 Nov;7(4):997-1005. doi: [10.1007/s12015-011-9259-1](https://doi.org/10.1007/s12015-011-9259-1).

A wealth of scientific and clinical research has focused on the use of stem cells as a potential therapy for spinal cord injury (SCI), culminating most recently in the initiation of clinical trials. However, with the urgency that scientists and clinicians have undertaken to move forward with novel therapies for this devastating injury, the perspectives of stakeholders who live with a SCI have been left behind. Translational research in this rapidly growing field therefore overlooks a critically important viewpoint. We address this concern with a qualitative study of the perspectives on experimental stem cell treatments from individuals who have actually suffered a spinal cord injury. Using focus groups and interviews, we engaged individuals with thoracic and cervical SCIs at sub-acute and chronic stages post-injury. We found four major themes that inform the progression of stem cell research to clinical trials: 'readiness', 'the here and now', 'wait and see', and 'informed hope'. Taken together, the data suggest a profound difference related to target timing of stem cell clinical trials and the perspectives about timing from those who are the end-beneficiaries of therapy. To bridge this gap, we conclude with a number of considerations for the timing disparity of trials and recommendations for improving informed consent.

King, W. D., G. E. Wyatt, et al. "Pilot assessment of HIV gene therapy-hematopoietic stem cell clinical trial acceptability among minority patients and their advisors." J Natl Med Assoc. 2010 Dec;102(12):1123-8.

Clinical trials involving technologically involved novel treatments such as gene therapy delivered through hematopoietic stem cells as human immunodeficiency virus (HIV) treatment will need to recruit ethnically diverse patients to ensure the acceptance among broad groups of individuals and generalizability of research findings. Five focus groups of 47 HIV-positive men and women, religious and community leaders and health providers, mostly from African American and low-income communities, were conducted to examine knowledge about gene therapy and stem cell research and to assess the moral and ethical beliefs that might influence participation in clinical trials. Three themes emerged from these groups: (1) the need for clarification of terminology and the ethics of understanding gene therapy-stem cell research, (2) strategies to avoid mistrust of medical procedures and provider mistrust, and (3) the conflict between science and religious beliefs as it pertains to gene therapy-stem cell research.

Li, M. D., H. Atkins, et al. "The global landscape of stem cell clinical trials." Regen Med. 2014

Jan;9(1):27-39. doi: 10.2217/rme.13.80. Epub 2013 Nov 18.

AIM: To provide a comprehensive analysis of clinical trials (CTs) listed in worldwide registries involving new applications for stem cell-based treatments and account for the role of industry. MATERIALS & METHODS: We developed a data set of 4749 stem cell CTs up to 2013 in worldwide registries. We defined 1058 novel CTs (i.e., trials that were not observational in nature; did not involve an established stem cell therapy for an established indication, such as hematopoietic stem cells for leukemia; and did not investigate supportive measures). Based on trial descriptions, we manually coded these for eight additional elements. RESULTS: Our analysis details the characteristics of novel stem cell CTs (e.g., stem cell types being tested, disease being targeted, and whether interventions were autologous or allogeneic), geotemporal trends, and private sector involvement as sponsor or collaborator. CONCLUSION: The field is progressing at a steady pace with emerging business models for stem cell therapeutics. However, therapeutic rhetoric must be tempered to reflect current clinical and research realities.

Lo, B. and L. Parham "Resolving ethical issues in stem cell clinical trials: the example of Parkinson disease." J Law Med Ethics. 2010 Summer;38(2):257-66. doi: 10.1111/j.1748-720X.2010.00486.x.

Clinical trials of stem cell transplantation raise ethical issues that are intertwined with scientific and design issues, including choice of control group and intervention, background interventions, endpoints, and selection of subjects. We recommend that the review and IRB oversight of stem cell clinical trials should be strengthened. Scientific and ethics review should be integrated in order to better assess risks and potential benefits. Informed consent should be enhanced by assuring that participants comprehend key aspects of the trial. For the trial to yield generalizable knowledge, negative findings and serious adverse events must be reported.

Thomsen, G. M., G. Gowing, et al. "The past, present and future of stem cell clinical trials for ALS." Exp Neurol. 2014 Dec;262 Pt B:127-37. doi: 10.1016/j.expneurol.2014.02.021. Epub 2014 Mar 6.

Amyotrophic lateral sclerosis (ALS) is a devastating neurodegenerative disorder that is characterized by progressive degeneration of motor neurons in the cortex, brainstem and spinal cord. This leads to paralysis, respiratory insufficiency and death within an average of 3 to 5 years from disease onset. While the genetics of ALS are becoming more understood in familial cases, the mechanisms

underlying disease pathology remain unclear and there are no effective treatment options. Without understanding what causes ALS it is difficult to design treatments. However, in recent years stem cell transplantation has emerged as a potential new therapy for ALS patients. While motor neuron replacement remains a focus of some studies trying to treat ALS with stem cells, there is more rationale for using stem cells as support cells for dying motor neurons as they are already connected to the muscle. This could be through reducing inflammation, releasing growth factors, and other potential less understood mechanisms. Prior to moving into patients, stringent pre-clinical studies are required that have at least some rationale and efficacy in animal models and good safety profiles. However, given our poor understanding of what causes ALS and whether stem cells may ameliorate symptoms, there should be a push to determine cell safety in pre-clinical models and then a quick translation to the clinic where patient trials will show if there is any efficacy. Here, we provide a critical review of current clinical trials using either mesenchymal or neural stem cells to treat ALS patients. Pre-clinical data leading to these trials, as well as those in development are also evaluated in terms of mechanisms of action, validity of conclusions and rationale for advancing stem cell treatment strategies for this devastating disorder.

The above contents are the collected information from Internet and public resources to offer to the people for the convenient reading and information disseminating and sharing.

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