GLOBAL JOURNAL OF MEDICINE AND PUBLIC HEALTH

Regenerative medicine: A ray of light for medical science

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ABSTRACT

The perimeters of medical science have expanded to include regenerative medicine as a translational science, which has the potential to revolutionize the treatment of incapacitating diseases and chronic disorders.

Keywords: Regenerative medicine, gene therapy, biologics, tissue engineering, cell therapy, small molecules

GJMEDPH 2016; Vol. 5, issue 4

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Conflict of Interest—none

Funding—none

INTRODUCTION

Medicine, as an expansive complex science, has time and again proved its potential in curing the majority of devastating diseases occurring in the world populace. It has branched out into different divisions targeted to treat innumerable afflictions in the human body. Regenerative medicine is one such field that has ascended as a prospective game-changer in the field of medical science. Researchers and doctors are engaged in trying to decipher the astounding potential promised by regenerative technologies through rigorous clinical trials. By altering the way a person heals, regenerative medicine market has opened up new avenues for wound management. The cutting-edge pioneering research has provided hope for treatment of debilitating diseases, chronic disorders, and trauma emergencies. The industry is set for a marked growth with cell therapies, biologics, and tissue engineering finding prominence in patient recovery.

Technological advancements have influenced medical science and prompted the growth of new therapies in regenerative medicine. The emergence of cell therapy, gene therapy tissue engineering, wound repair, biologics, and reconstructive surgery has helped in expanding the scope of the market. Analysts at Allied Market Research have extensively studied the regenerative medicine market segments and outlined that the fields of biologics and gene therapy are the fastest growing ones. Even if regenerative medicine is still at a nascent stage, the improvements in research are expanding its frontiers.

Gene Therapy – Direct Targeted Treatments

Flawed genes that do not function properly and cause different diseases are now addressed with a genetic engineering approach. Gene therapy involves very precise procedures, intended to fix a genetic problem at its source. The promise of direct therapeutic effects through correction of genetic mutations has augmented the demand for this segment. DNA alterations and genetically engineered materials have the capacity to treat many diseases such as cystic fibrosis, cancer, Parkinson's, and Alzheimer's diseases, amyotrophic lateral sclerosis, and arthritis. Genetic engineers and scientists are extensively engaged in trying to tap the massive potential promised by gene therapies. As it alters the gene at a very basic level and precisely engineers it to function properly without disrupting the other body mechanisms, gene therapy could be the future of regenerative medicine. The regenerative medicine market is expected to grow by leaps and bounds in

the next few years, with an estimated CAGR of 33.5%.[1]

New Gene Therapies give hope to Oncology Treatment

Cancer is a devastating disease for any patient afflicted with it. Many treatments and chemotherapy sessions targeted at treating the different types of cancer are only palliative in nature. However, gene therapy can turn this around and aid in curing cancers. Research is specifically targeted to direct the focus of genetic engineering to provide an imminent remedy. For instance, leading scientists at MIT (Massachusetts Institute of Technology) have developed a gene therapy technique that prevents metastasis in breast cancer patients. It inhibits the growth of malignant cells in the body. The treatment, along with chemotherapy can help treat early-stage breast cancer tumors before they spread. This was done by the research teams through an extensive bioinformatics analysis.

Through in vitro experiments on cells, researchers discovered that application of two microRNAs, miR-96 and miR-182, decreased appearance of Palladin. Palladin, which plays a major role in migration of breast cancer cells will be diminished; its migration and ability to invade other tissue can be contained. This gene therapy can mean significant progress in the field of oncology.

In the words of Natalie Artzi, a principal research scientist at MIT's Institute for Medical Engineering and Science (IMES) and an assistant professor of medicine at Brigham and Women's Hospital, "The idea is that if the cancer is diagnosed early enough, then in addition to treating the primary tumor [with chemotherapy], one could also treat with specific microRNAs, in order to prevent the spread of cancer cells that cause metastasis."[2]

Biologics opens new avenues for Pharmaceuticals

Another segment that has grabbed quick attention with its rapid progress is the field of biologics. Advancements in biological products, following closely after cell therapies, are the second largest growing segment in regenerative medicine market. The development of chemically synthesized drugs from biological sources and living cells has captured the interest of the pharmaceutical industry. As these biologics are complex and are manufactured inside a living system, it is easier to predict their behavior in curing targeted disorders in humans. Rather than being a form of therapy in itself, biopharmaceutical products merely accelerate the rate at which a patient heals. Due to their complex molecular structure, these biologics created by pharmaceutical companies are comparatively difficult to replicate, and are usually protected by a strong patent.

The intricate molecular structure of biologics attracts the attention of regulatory authorities not just during the clinical trials but also during the manufacturing process. The Center for Biologics Evaluation and Research (CBER), which is a part of FDA oversees the entire procedure for assuring the purity, potency, safety and effectiveness of biologics and similar drugs. FDA has already approved a series of biopharmaceutical drugs that can possibly stop inflammatory aftereffects of psoriatic disease. These include Remicade, Humira, Enbrel, and Cimzia that block a protein called TNF-alpha. TNF-alpha prompts the body to trigger the inflammatory cycle of psoriatic disease. Companies such as Integra Lifesciences Corporation, Medtronic Plc, Stryker Corporation, and CryoLife, Inc., are employing their best resources to come up with unique biologics to clamor for approval and gain a patent to protect their biological drug formulations. This has ensured that the regenerative medicine market gets its fair share of competitive strategies and industry dynamics.[3]

The world regenerative medicine market is set to conquer new heights with advancements in technology. The increasing incidence of chronic disorders, trauma cases, and debilitating diseases have propelled the need for regenerative technologies. There are extensive R&D projects and investments being undertaken by clinical scientists and companies in developed nations. This is done to tap the natural wound-healing mechanisms of the human body and turn the tides in favor of this path-breaking medicine. Even if the regenerative technology is at a nascent stage, North American and European regions are positively adopting the therapies proposed by regenerative medicine. With extremely high stakes involved, in terms of patients'

lives and capital invested in research projects, the world regenerative medicine market promises to improve life expectancies, and eventually turn fear into hope.

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