



## Effects of Electromagnetic Fields on Adult Stem Cells in Therapy

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### DESCRIPTION

On human body, the Electro Magnetic Field (EMF) has a significant effect. It has been used successfully in physiotherapy to treat osteoarthritis and bone problems, as well as to regenerate cartilage or relieve pain. EMFs have recently been used in *in vitro* studies on cell and stem cell cultures. Almost all of the tissues in the human body include stem cells, which are capable of a variety of things. These cells play a crucial role in maintaining homeostasis and regulating regeneration and healing. However, stem cells that develop into cancer stem cells may have an impact on the pathological situation. In this article, they cover the most recent information on how electromagnetic fields affect biological processes like cell cycle, differentiation, and proliferation in human adult stem cells. They outline the features of the EMFs employed in various tests. The majority of research has been done thus far on mesenchymal stem cells that are differentiating into osteogenic and chondrogenic tissues. It has been established that the effects of EMF stimulation rely on the level, frequency, and duration of the EMF. Other elements, like as growth stimulants, reactive oxygen species, and other things, could, nevertheless, have an impact on these processes. Investigating this field of study could increase the creation of EMF-based medical technology, which would better tissue engineering and stem cell-based therapy.

Adult stem cells, adult tissue stem cells, and progenitor cells, which are important for tissue regeneration and repair after injury, are assumed to exist in many, if not all, bodily tissues. In their *in vivo* microenvironment, adult stem cells are affected by a

variety of biochemical and biophysical stimuli, such as fluid shear stress, hydrostatic pressure, substrate stresses, trophic factors, the Electro Magnetic Field (EMF), and others. Stem cells can develop into the intended tissues or not depending on their environment, including the biochemical and biophysical cues. These aspects are crucial because they can lead to a variety of pathological disorders, with cancer being the most well-known one. Pathological conditions can result from deregulation of tissue regeneration and homeostasis. The conditions that lead to adult stem cells developing into cancer stem cells, or tumor-initiating cells, which take part in carcinogenesis and metastasis, have been the subject of numerous researches. The processes behind the hypothesized shift and the nature of the interaction between adult and cancer stem cells, however, are still poorly understood. Adult stem cells are thought to be present in the early stages of the disease process. The simultaneous involvement of external environmental elements in disease processes is well established, making the preservation of homeostasis a challenging task. In adult stem cells, biophysical cues may trigger downstream signaling that leads to pleiotropic processes.

The EMF is prevalent in the environment and appears to have a great deal of potential as a therapeutic tool thanks to technical advancements. It is vital in biological processes involving adult stem cells, including embryogenesis, regeneration, and wound healing, as well as in cell migration, DNA synthesis, and gene expression. It has major impacts on cells, tissues, and numerous processes inside organisms. However, there is conflicting evidence regarding how the EMF affects adult stem cell biology.

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