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Regenerative potential of meditation: An integrated module for enhancement of regeneration process towards the future of regenerative medicine

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As per the traditional *vedic* texts of India, meditation is a practice during which there is no focusing but an expansive mental state is reached effortlessly, leading to absolute silencing of the mind which transcends the realms of time and space. These traditional texts describe various occasions where the advanced meditation-masters could regenerate any organ of the body at will, and that even diseases which are present since birth could be cured through realization of this state of existence. In this review, we explored the ancient *vedic* literature of India, to collect all the information related to the process of regeneration and its relation to the cognitive phenomena taking place in the mind of the mediators. We also reviewed the available scientific literature to understand the probable mechanisms of action of these cognitive-behavioral techniques at the cell biological level. For e.g., it has been shown in many studies that meditative states slow down the metabolic processes in the body (suspended animation) which includes reduction in the breathing rate, ECG (electro-cardiogram) and EEG (electro-encephalogram) activities, and the blood flow respectively. This reduces tissue oxygenation and promotes hypoxia in the cellular micro-environment throughout the body. Hypoxia-induced signaling is primarily mediated by the hypoxia-inducible factor-1 (HIF-1), a molecular determinant of the response of mammalian cells to hypoxia and a regulator of O2 homeostasis. It is well known that stem cells are critically dependant on hypoxic environment and HIFs for survival, self-renewal and growth. Thus, meditation may enhance stem cell functioning. Another mechanism through which meditation may help regeneration and healing is through the enhanced release of an extremely important pleiotropic substance called melatonin, which is produced by the body (the pineal gland, the bone marrow, circulating immune cells, and other sources) and has anti-inflammatory, immune-stimulating, anti-oxidant and regeneration-enhancing properties. Studies also show that meditation may have salutary effects on telomere length by reducing cognitive stress and stress arousal and increasing positive states of mind and hormonal factors that may promote telomere maintenance and thereby slow down the rate of cellular ageing. Thus, finally, through this exploration into the traditional and modern scientific literature we come up with evidence based integrated module to enhance the process of regeneration further, towards the future of regenerative medicine.

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