Yogic Exercises as an Ergonomic Approach to Set Stem Cells in Motion

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Yoga integrates breath control, meditation and physical exercise to promote physical, mental, and spiritual well-being, fostering a harmonious union of mind, body, and spirit. For a very long time, it has been thought that a healthy soul leads to a healthy body and Yoga is a medium to strengthen the bond between the mind and body. Evidently, yoga is believed to be beneficial for patients with depression, asthma, anxiety, back pain and hypertension. While there is a wealth of literature scoring the tremendous health advantages of yoga, the specific mechanism by which it improves overall functioning is still not fully understood. Mechanical stimulation through Yoga and pranayama may be mobilizing stem cells from their depots to peripheral circulation, facilitating organ remodelling and pattern creation. This has been shown to be induced through rapid changes in gene expression, potentially underpinning their positive effects on cell biology and overall health.

Stem cells experience controlled movement throughout their developmental stages into adulthood, playing a crucial role in the organogenesis of developing organs. This migratory process is likely to continue postnatally, contributing to tissue regeneration. It is suggested that the presence of undifferentiated stem cell populations in postnatal organs results from the trafficking of stem cells from the bone marrow. Apart from the bone marrow, various other organs, including the endometrium, placenta, and breast milk, also demonstrate the occurrence of stem cell trafficking. It has been observed that mobilization of Hematopoietic Stem Progenitor Cells (HSPCs) can occur naturally, without the need for pharmacological interventions. Specifically, the quantity of HSPCs in peripheral blood varies over the course of the day, regulated by circadian rhythms. Similarly, the HSPC levels in peripheral blood can experience a swift and temporary surge in response to acute physiological stress. Substantial evidence supports the idea that exercise has the potential to mobilize HSPCs into circulation (1), but the lasting impact on quantity is yet to be fully understood.

Individuals undergoing Common Yoga Protocol (CYP) for a period of three months resulted in a significant increase in stem cells and notable changes in brain-derived neurotrophic factors (BDNF), indicating neurogenesis. This resulted in improved general health, enhanced visual and executive functions, and reduced stress levels (2). Furthermore, hypoxia provides a suitable environment for stem cells to survive, proliferate and renew. A notable illustration of the significance of a hypoxic environment in regulating stem cell function is evident in the maternal womb. In this low-oxygen environment, the emergence of new life occurs as a result of the activity, differentiation, and proliferation of stem cells. Hypoxia has demonstrated enhanced effectiveness in improving the transplantation outcomes of cardiac progenitor cells and mesenchymal stem cells in animal models of myocardial infarction (3). Likewise, Intermittent hypoxia generated through various pranayama is supposed to mobilise stem cells for quicker regenerative mechanisms providing multitude of health benefits through various molecular mechanisms (4).

To conclude, although protective mechanisms of yoga therapy in terms of stem cell trafficking are evidently speculated but understanding the molecular mechanisms and its associated pathways in this context would be open arm of the field for deeper exploration. Moreover, to achieve the complete benefit of yoga practices, many factors play a crucial role like age, health status of an individual, frequency and duration

of practice and adherence to a routine. The field is growing where in coordination with clinical studies, it can provide a direct translational value.

References

1. Shree N, Bhonde RR. Can yoga therapy stimulate stem cell trafficking from bone marrow? J Ayurveda Integr Med. 2016;7(3):181–4.
2. Sharma K, Maity K, Goel S, Kanwar S, Anand A. Common Yoga Protocol Increases Peripheral Blood CD34+ Cells: An Open-Label Single-Arm Exploratory Trial. J Multidiscip Healthc. 2023;16(June):1721–36.
3. L N Maslov, Iu K Podoksenov, A G Portnichenko AVN. Hypoxic preconditioning of stem cells as a new approach to increase the efficacy of cell therapy for myocardial infarction. "Vestn Ross Akad Med Nauk. 2013.
4. Malshe P. Nisshesha rechaka pranayama offers benefits through brief intermittent hypoxia. AYU (An Int Q J Res Ayurveda). 2011; 32(4):451.

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