

4th World Congress on Cell Science & Stem Cell Research

June 24-26, 2014 Valencia Conference Centre, Valencia, Spain

Intermittent hypoxia and stem cells: From mechanisms to clinical application

Tatiana V Serebrovskaya
Bogomoletz Institute of Physiology, Ukraine

Intermittent hypoxia (IH) treatment is gaining attention as a clinical modality due to its capacity to protect cells, tissues, organs, and the whole organism from more intense or sustained hypoxia/ischemia. On the other hand, IH plays pathogenic roles in many disease states. Potential mechanisms underlying both beneficial and adverse effects of IH have been described. The responses of stem cells (SCs) to hypoxia are pivotal to many of the resultant adaptations. But until now there is no exact evidence about the precise mechanism for switching adaptive or maladaptive responses of SCs to hypoxic impact. Modern studies show that IH pre-treatments of cultured SCs ameliorate their function after the transplantation. However, there is another approach to SCs stimulation, notably the adaptation of the whole organism to IH via intermittent inhalation of hypoxic gas mixtures, periodic exposure to altitudes etc. Important link between the factors that regulate stem and progenitor cell behavior and the hypoxia-inducible factors was shown, providing a molecular framework for the hypoxic control of differentiation and cell fate. Nevertheless, wide array of different protocols and measurements makes the results difficult to harmonize. Our investigations on humans have shown that a two-week program of normobaric, cyclic 5 min exposures to 10% O₂ modulates circulating hematopoietic stem and progenitor cells (HSPC) and augments humeral and cellular components of innate immunity. These results raise the possibility that IH induced HSPC emigration from niches into the circulation, followed by homing and sequestration in target tissues during post-IH recovery. Findings support the potential for eventual application of IH for treatment of many diseases.

Biography

Tatiana V Serebrovskaya is Professor of Physiology, Doctor of Biology, from Academician of Int. Acad. Sci., and Principal Researcher of the Bogomoletz Institute of Physiology, Kiev, Ukraine. She is the author of more than 300 scientific publications, including two monographs.

- 1) Lei Xi & Tatiana V. Serebrovskaya (Eds). Intermittent Hypoxia and Human Diseases / Springer, UK, 2012, 316 pp.
- 2) Lei Xi & Tatiana V. Serebrovskaya (Eds). Intermittent Hypoxia: From Molecular Mechanisms to Clinical Applications / Nova Science Publishers, NY 11788, 2009, 602 pp.

tsereb@voliacable.com