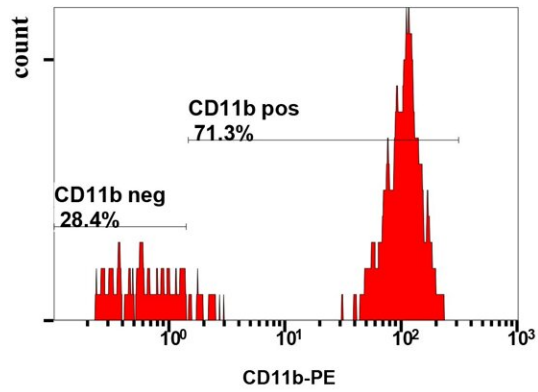
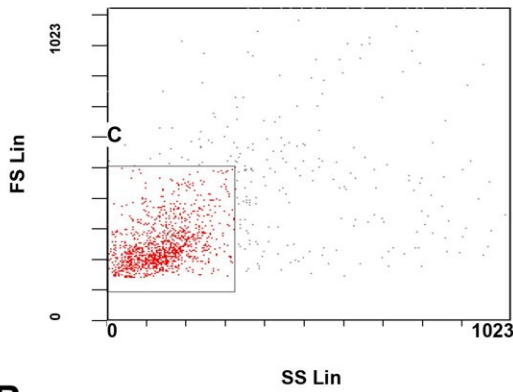


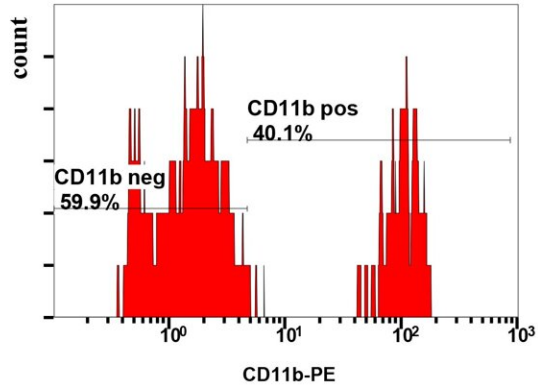
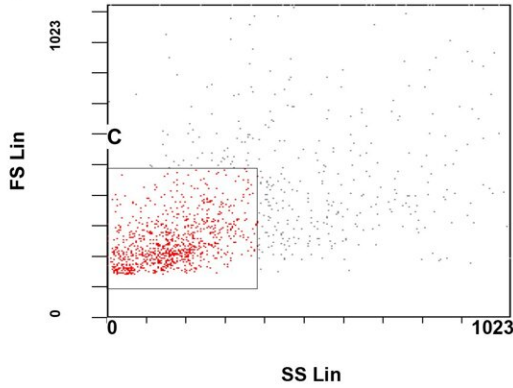
For personalized treatment of inflammation, sensitivity to hypoxia must be considered: Study

January 16 2024

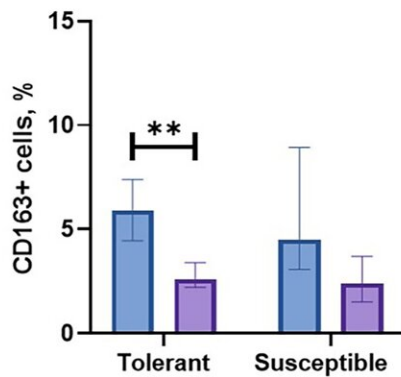
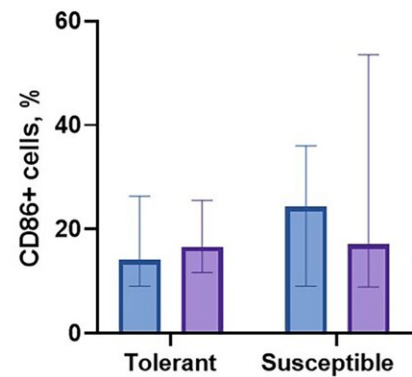
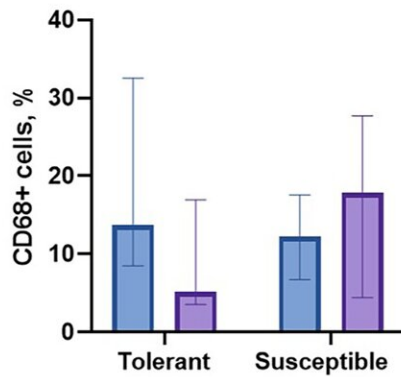
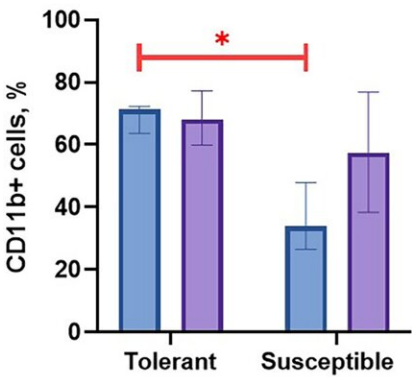
A





B



C



 Non-activated macrophages
 LPS-activated macrophages

Flow cytometry for monocytes surface markers applied to non-activated and LPS-activated macrophage cultures obtained from rats with different hypoxia tolerance. (A) CD11b in non-activated cultures from hypoxia-tolerant rats; (B) CD11b in non-activated cultures from hypoxia-susceptible rats; (C) CD11b, CD68, CD86 and CD163 in non-activated and LPS-activated cultures from tolerant and susceptible to hypoxia rats. Credit: *PeerJ* (2023). DOI: 10.7717/peerj.16052

If the oxygen level in organs and tissues falls below normal, hypoxia occurs. Then the body launches defensive responses. In many ways, they coincide and overlap with the response to inflammation, because this process is accompanied by local hypoxia.

In particular, macrophage [immune cells](#) depend on proteins that are activated by [hypoxia](#). They can promote inflammation or suppress it, depending on what "awakened" them. For example, HIF-1 proteins appear during hypoxia and provoke the appearance of pro-inflammatory macrophages.

RUDN University doctors have found that even when the [oxygen level](#) is normal, inflammation and the reaction to hypoxia are connected. The key is individual sensitivity to hypoxia. Their results are [published](#) in *PeerJ*.

"Individual tolerance to hypoxia affects the course and outcome of infectious and [inflammatory diseases](#). Macrophages, which play a central role in the [inflammatory response](#), are also driven by hypoxia. The characteristics of macrophages, which depend on the body's resistance to oxygen deficiency, can determine the severity of infectious and inflammatory diseases.

"Our goal was to compare the molecular and functional characteristics of macrophages at normal [oxygen](#) levels in rats with different sensitivity to hypoxia," Dzhuliia Dzhaliilova, a researcher at the Research Institute of Molecular and Cellular Medicine, RUDN University said.

The experiment was carried out on 50 [laboratory rats](#). First, the animals were assigned to 1 of 3 groups depending on their sensitivity to hypoxia. To do this, they were placed in an environment with rarefied air, which corresponds to an altitude of 11,500 meters. In 12 individuals, increased resistance to hypoxia was found, and in 13, decreased resistance was noted. The remaining rats were excluded from the study. A month after this test, the animals' blood samples were taken and levels of immune-related proteins and other parameters were compared.

In rats with increased sensitivity to hypoxia, doctors discovered a tendency to form pro-inflammatory macrophages. This is evidenced by the increased content of Hif1a and CCR7 proteins compared to the other group. It is the first time such results have been obtained.

"The differences found indicate that rats susceptible to hypoxia are prone to the formation of pro-inflammatory macrophages. This finding may become the basis for new personalized approaches to the treatment of inflammatory diseases, depending on individual resistance to hypoxia," Dzhuliia Dzhaliilova, a researcher at the Research Institute of Molecular and Cellular Medicine, RUDN University said.

More information: Dzhuliia Dzhaliilova et al, Molecular and phenotypic distinctions of macrophages in tolerant and susceptible to hypoxia rats, *PeerJ* (2023). [DOI: 10.7717/peerj.16052](https://doi.org/10.7717/peerj.16052)

Provided by RUDN University

Citation: For personalized treatment of inflammation, sensitivity to hypoxia must be considered: Study (2024, January 16) retrieved 6 May 2024 from <https://medicalxpress.com/news/2024-01-personalized-treatment-inflammation-sensitivity-hypoxia.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.