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SBI Pharmaceuticals Co., Ltd.

Announces Publication of a Research Paper on 5-ALA from Tokyo University of Science in *Life*
- Antifatigue Effects of 5-Aminolevulinic Acid Chronic Treatment on Mice -

SBI Pharmaceuticals Co., Ltd. (Head office: Minato-ku, Tokyo; Representative Director & President: Yoshitaka Kitao; “SBI Pharmaceuticals”), a subsidiary of SBI Holdings, Inc., engaged in research and development of medical devices and pharmaceuticals using 5-aminolevulinic acid (5-ALA) (*1) and Tokyo University of Science (Katsushika-ku, Tokyo; President: Masatoshi Ishikawa) hereby announces the publication of a research article entitled “Antifatigue Effects of 5-Aminolevulinic Acid Chronic Treatment on Mice” in an international scientific journal, *Life*. This publication is the joint research findings between Professor Akiyoshi Saitoh at Faculty of Pharmaceutical Sciences, Tokyo University of Science and SBI Pharmaceuticals.

Journal	<i>Life</i>
Title	Antifatigue Effects of 5-Aminolevulinic Acid Chronic Treatment on Mice
Authors	Chinatsu Ohmori, Eiko Kumamoto, Satoka Kasai et. al., Faculty of Pharmaceutical Sciences, Tokyo University of Science, Japan
URL	https://doi.org/10.3390/life15091465
Abstract	<p>5-ALA has been reported to reduce fatigue in clinical studies. However, the mechanism of the anti-fatigue of 5-ALA was unknown.</p> <p>Therefore, our team at Tokyo University of Science investigated the mechanism underlying the anti-fatigue effect of 5-ALA using fatigue mouse models.</p> <p>C57BL/6N mice were orally administered 5-ALA hydrochloride or distilled water for 8 weeks. Fatigue mouse models were developed by housing the mice in a cage filled with water for 4 days. Fatigue was evaluated through running distance via a treadmill test. The decrease in the running distance was significantly increased in the mice administrated with 5-ALA. 5-ALA administration ameliorated the decreased blood glucose levels in fatigue mouse models. Decreased levels of noradrenaline (NA) turnover ratio (*2) in the frontal cortex (FCX) were improved to non-fatigue levels after 5-ALA treatment. Therefore, the anti-fatigue effect of 5-ALA in mice could be related to the activation of the NA neuronal systems in the FCX and the increase in energy production through glycogenesis activation in peripheral adipose tissue.</p>

	These results suggest that 5-ALA may reduce fatigue by regulating both the central nervous system and peripheral tissues.
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(*1) 5-aminolevulinic acid is an amino acid produced in mitochondria. It is an important substance that serves as a functional molecule related to energy production in the form of heme and cytochromes, and its productivity is known to decrease with age.

(*2) Noradrenaline turnover ratio in the FCX is used as an indicator of noradrenaline metabolism. Noradrenaline acts as a neurotransmitter in the brain and regulates emotions and arousal reactions.

This new release is an introduction to the research publication. It does not recommend the use of unapproved drugs.

For further information:

SBI Pharmaceuticals Co., Ltd.

E-mail: info_ala@sbigroup.co.jp