

Free radicals maybe good for you

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Fear of free radicals may be exaggerated, according to scientists from Karolinska Institutet. A new study, published in The Journal of Physiology, shows that free radicals act as signal substances that cause the heart to beat with the correct force.

Free radicals are [molecules](#) that react readily with other substances in the body, and this can have negative effects on health in certain circumstances, through the damage caused to [cells](#). Free radicals can be counteracted by substances known as 'antioxidants', which are common ingredients in many dietary supplements. The idea that free radicals are generally dangerous and must be counteracted is, however, a myth, according to scientists who have conducted a new study of the role that free radicals play in heart physiology.

"As usual, it's a case of everything in moderation. In normal conditions, free radicals act as important signal substances, but very high levels or long-lasting increases can lead to disease", says Professor Håkan Westerblad, who has led the study.

When the body is subject to different types of stress, the sympathetic nervous system stimulates receptors known as beta-adrenergic receptors on the surface of heart muscle cells. This leads to several changes inside the cells, one of which is the phosphorylation of proteins. This leads to the contractions of the cells becoming stronger and the heart beats with greater force.

In the current study, the scientists show that stimulation of the beta-

adrenergic receptors also leads to increased production of free radicals in the [mitochondria](#) of the cells, and these then contribute to stronger contractions of the cells. When the scientists exposed the cells to [antioxidants](#), a major part of the effect of beta-adrenergic stimulation of the [heart muscle cells](#) disappeared.

The results reveal a previously unknown regulatory mechanism of the force production in the heart, and may lead to a better understanding of various types of heart deficiency.

"Free radicals play an important role, since they contribute to the heart being able to pump more blood in stress-filled situations", says Håkan Westerblad. "On the other hand, persistent stress can lead to heart failure, and chronically increased levels of [free radicals](#) may be part of the problem here."

More information: Daniel C Andersson, Jérémy Fauconnier, Takashi Yamada, Alain Lacampagne, Shi-Jin Zhang, Abram Katz & Håkan Westerblad, Mitochondrial production of reactive oxygen species contributes to the beta-adrenergic stimulation of mouse cardiomyocytes, *The Journal of Physiology*, online 28 February 2011, paper issue 1 April 2011 jp.physoc.org/

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