



Heart Attack Shown to be 'Systemic Condition'



An acute heart attack (myocardial infarction) is a "systemic" condition with an impact upon the whole body and triggers responses in other organs, such as liver and spleen, according to new research published in the journal *Oncotarget*. The study is the first to scientifically describe the full picture of a myocardial infarction, enhancing our understanding in terms of systems biology, authors say.

"A myocardial infarction is not an isolated event – the rest of the body responds as well," said PhD candidate Matthias Zimmermann, who conducted the study under the supervision of Hendrik Jan Ankersmit and Michael Mildner at the Division of Thoracic Surgery at the Departments of Surgery and Dermatology of MedUni Vienna.

Using a large animal model, researchers were able to show that thousands of genes are involved in a heart attack: the heart attack changes the expression of nearly 9,000 genes in the heart but also 900 in the liver and around 350 in the spleen tissue within 24 hours of the infarction. At the same time, they were able to ascribe a major role to the transcription factor Klf4 (a protein that is important for activating many other genes) – this "large animal insight" was also confirmed by histological tests performed on human autopsy material.

"Myocardial ischaemia, that is to say a heart attack, does not end with the damaged heart muscle. Our results show that many more organs are affected and there is considerable evidence that a number of different organ systems are involved in the body's response to the infarction," according to the authors.

Hitherto, standard science has usually attempted to understand the molecular and cellular processes following a heart attack (triggered by a circulatory problem) using a mono-causal approach rather than taking an holistic view. Equally, very little was known about the impact upon the tissue surrounding the seat of the infarction and upon other organs.

The study highlights the need to "rethink our tunnel vision that focuses solely on the heart in the event of a heart attack," said Zimmerman.

While the new findings do not call into question the current acute treatment for heart attacks, they do open up the debate as to whether future treatment should be viewed systemically and should address different areas of the body.

Source: [Medical University of Vienna](#)

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