

## The influence of low-frequency infrasound and vibration on living organisms

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### Fundamentals of fine blood circulation Den 28.07.2024

Both publications (1) 2023 and (2) 2024 are based on the knowledge gained in recent years in scientific research on the control of *vital functions of our fine capillary network - also known as microcirculation*. Vital control functions are performed by endothelial cells, which are the inner wall cells of all blood vessels. They are essentially a kind of control centre for the exchange of nutrients and oxygen, salts and fluids as well as the removal of metabolic end products .

Since 2021 at the latest, it has been known that certain receptors (sensory receptors) exist at the skin level, but also specifically on the *endothelial cells* and thus in all organs and tissues, which *absorb both sound and vibration (Nobel Prize in Medicine for the decoding of the PIEZO-1 and -2 channels 2021)*. This proved that *all organisms not only hear with their ears, but also absorb forces and sound with their entire body*. These channels are present in *all multicellular organisms, including crustaceans and insects, amphibians, reptiles, fish, birds and whales, as well as all other mammalian species*.

According to current scientific knowledge, a whole series of *vital functions of organisms are controlled by the transmission of physical forces to the vascular wall cells of the capillary network (endothelial cells) and their mechano-sensors (i.e. pressure receptors)*. The most important of these functions include the *release of nitric oxide, the regulation of blood pressure, the formation of new blood vessels, embryonic development, growth, the regulation of inflammation in the direction of healing (the opposite is chronic inflammation and cancer), immune reactions and coagulation*.

Every organism can react to the *decent forces in the capillaries* on the one hand and *to external forces such as gravity, pressure and swelling* on the other in fractions of a second, which is a vital ability of all organisms (e.g. the flight of insects, the dances of bees, orientation in space).



These tasks are autoregulated, for example, in the capillaries of the adult over an area of 7000m<sup>2</sup>. The *prerequisite for optimal fulfilment of these tasks is the integrity of the entire organ endothelium* (totality of all endothelial cells). The blood flow in the capillaries is normally **uniform** and *not turbulent*, corresponding to the small size of a capillary.

An overview of the current findings on microcirculation and endothelial cells: Link: <https://link.springer.com/book/10.1007/978-3-662-66516-9>

### **The interaction of low frequencies and vibration of technical systems with organisms**

Statements and hypothesis with a high level of evidence

Short-term low-frequency events also occur in the natural environment (e.g. earthquakes). The microcirculation has an immediate opportunity to recover.

*Increasingly low-frequency, impulsive effects on living organisms, such as in large wind turbines, but also to a lesser extent e.g., in biogas plants, combined heat and power plants and heat pumps, lead to recognisable disturbances of the microcirculation with energy and food deficits. The range of low frequencies that are virtually impossible to attenuate is very long (e.g. a current wind farm with 60 turbines up to around 100 kilometres). The viscoelastic tissue of organisms is suitable for transmitting sound waves, including to the capillary system. The consequences can create not only increasing mechanical stress in the capillaries, but also increasing oxidative stress. This is because if the release of NO (nitric oxide) does not take place as required and is overlaid by incorrect information, NO loses its antioxidant properties. Mechanical stress and oxidative stress are the prerequisites for a "diseased" endothelium.*

This means that *emissions become increasingly dangerous with decreasing frequency*, as endothelial cells have been shown to preferentially pass very low frequencies. The existing sound pressure seems to play a subordinate role. *There is an obvious incompatibility with the functions of living organisms.*

*The first publication presented the possible consequences of the conflict for the first time in (1) 6/23.*

*The second publication (2) 06/24 on the topic is essentially based on the first (1) and specifically expands on important aspects of the topic, e.g.:*

*1) the possible effects on the NO metabolism [19,20,22] with a strong increase in oxidative and oscillatory stress*

*2) the role of the endothelium as a central organ for inflammatory development as the basis e.g. of arteriosclerosis [2,22] or blood pressure disease*

*3) the outstanding importance of PIEZO channels [49] for numerous functions of organ organisms*

*4) the associated risk to all living organisms in terms of a threat to biodiversity on land and in water*

As you can see in the corresponding chapter 5 of the book (2), *an open review policy was implemented by several publicly appointed high-ranking scientists. The reviews to be read attest to the scientific rigour, the broad relevance to the scientific community and the quality of the sources used.*

**Extract:**

#### **Peer-Review History**

This chapter was reviewed by following the *Advanced Open Peer Review policy*. This chapter was thoroughly checked to prevent plagiarism. As per editorial policy, a minimum of two peer-reviewers reviewed the manuscript. After review and revision of the manuscript, the Book Editor approved the manuscript for final publication. Peer review comments, comments of the editor(s), etc. are available here: <https://peerreviewarchive.com/review-history/727>

This provides a high level of evidence for the high damage potential of low frequencies with a high acceleration profile under chronic exposure. Low frequencies have not yet been categorised in this respect, nor have indoor measurements.

### **The categorisation of the acoustic hearing threshold as an effective threshold for low frequencies**

The recording of sound and vibration via various mechano-sensors, the most important of which *are the PIEZO channels*, is *generally recognised internationally*. Since the current state of science on endothelial force transmission (mechano-transduction) is one of the essential foundations of the work presented in (1) and (2), valid scientific sources can be found.

*As a consequence, further adherence to an acoustic perception threshold is no longer legally possible and should be an immediate cause for action.*

### **Recent studies and observations:**

1. the study (3) shows an unexplained above-average increase in cardiovascular diseases in rural areas compared to urban areas.

2. in Papenteich, Lower Saxony, an increase in leukaemia cases is now being observed between 2016 and 2021, which has led to investigations by the district office due to its statistical relevance. According to the conclusions from the peer review studies (1) and (2), increased incidences of cancer due to damage to endothelial functions caused by the environmental factor of low-frequency chronic impulsive noise emissions are conclusive, as is the increased incidence of cardiovascular diseases. (Emissions of microplastic abrasion from wind turbines, which are classified as toxic and/or *carcinogenic*, could have an over-additive effect).Link:

[https://www.focus.de/gesundheit/news/was-leukaemie-so-tueckisch-macht\\_id\\_260166181.html](https://www.focus.de/gesundheit/news/was-leukaemie-so-tueckisch-macht_id_260166181.html)

3. report dated 17.07.24 from Sweden on the failure of chickens to breed after the commissioning of several wind turbines about 1000 metres away.

PDF attached.

The reports mentioned under 2. and 3. do not have the status of a verified study, but they are alarming data in connection with wind turbines and disturbed endothelial functions, which have led to the involvement of the local authorities.

### **Sources:**

1) Bellut-Staeck UM. (2023) *Impairment of the endothelium and disorder of microcirculation in humans and animals exposed to infrasound due to irregular mechano-transduction*: Journal of Biosciences and Medicine. 2023; 11(6). DOI: 10.4236/jbm.2023.116003 Link: <https://www.scirp.org/journal/paperinformation?paperid=125553>

2) Bellut-Staeck UM. (2024) *Medical Research and Its Applications Vol. 8, Chap. 5 Chronic Infrasound Impact is Suspected of Causing Irregular Information via Endothelial Mechanotransduction and Far-reaching Disturbance of Vascular Regulation in All Organisms*. FIRST EDITION 2024 ISBN 978-81-975566-2-3 (Print), ISBN 978-81-975566-5-4 (eBook) DOI: <https://doi.org/10.9734/bpi/mria/v8>

3) Ebeling M, Mühlichen M, Talb "ack, Rau R, Goedel A, Klüsener S. (2024) *Disease incidence and not case fatality drives the rural disadvantage in myocardial-infarction-related mortality in Germany*. Preventive Medicine 179 (2024) 107833. 0091-7435/© 2024 The Authors. Published by Elsevier Inc. <https://doi.org/10.1016/j.ypped>.