

Is climate change increasing the risk of infection from vibrios?

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From now on, those going for a bath in the sea at the height of summer might have to pay more attention. Bacteria of the genus *Vibrio* multiply at high water temperatures and can enter the human body via small, unnoticed wounds. There they can cause wound infections. Another way of infection is the consumption of fish and seafood that are eaten raw or not sufficiently heated. In this case, vibrios can cause diarrhoea. Scientists assume that the number of *Vibrio* infections will increase. The reason for this could be climate change and the associated increase of sea temperatures.

What are vibrios? Where are they found?

Vibrios are rod-shaped, salt-tolerant bacteria that are prevalent worldwide in maritime waters and estuaries (brackish water, badden/lagoons). Bodies of freshwater are usually not affected. Vibrios are the main cause of bacterial diarrhoea in many countries in Asia and America.

How can people become infected?

Consumers can become infected by consuming contaminated shellfish (notably from consuming raw oysters and/or shellfish and fish products that have not been sufficiently heated) or from the intake of contaminated water. Most foodborne *Vibrio* infections are caused by the three species *Vibrio parahaemolyticus*, *Vibrio cholerae* and *Vibrio vulnificus*. As well as diseases caused by food, many vibrios can also trigger wound and ear infections, which occur through contact with water containing vibrios. One such bacteria is *Vibrio vulnificus*, which can induce life-threatening blood poisoning (sepsis) in people with weakened immune systems, especially elderly people. Such infections can occur during very long periods of heat after swimming in the sea or walking in seawater along the shoreline.

What are the symptoms of a *Vibrio* infection? How is it treated?

The BfR deals with risks from microorganisms in food and on consumer goods. The Robert Koch Institute (RKI) is the competent authority for questions concerning human diseases and their therapy. Information on *Vibrio* infections can be found on the RKI website: <https://www.rki.de/SharedDocs/FAQ/Vibrionen/FAQ-Liste.html>.

How many cases of *Vibrio* infections are there? Do they have to be reported?

There is a mandatory notification for *Vibrio* infections in place in Germany since 2020. The public health authorities have to report infections to the RKI. However, so far *Vibrio* infections have occurred rarely. According to the RKI, up to 20 cases per year from German coasts were reported between 2002 and 2019. They occurred mainly between June and September during hot summers. Elderly people with pre-existing medical conditions were mainly affected. According to the RKI, some patients died from the infection.

What should people consider when bathing in the North Sea and Baltic Sea?

People with open or slow-healing wounds should avoid warm summer seawater (from 20 degrees water temperature). This applies even more to those who suffer from pre-existing medical conditions or a weakened immune system. The German Environment Agency (UBA) and its Bathing Water Committee are responsible for microbial risks in bathing waters. The UBA provides further information in the internet:

<https://www.umweltbundesamt.de/themen/wasser/schwimmen-baden/badegewaesser/schadstoffe-belastungen-in-badegewaessern>

Who analyses the seawater in Germany for vibrios? Has the occurrence of vibrios changed in recent years?

Contacts for *Vibrio* exposure in German waters (especially beaches) are the following state authorities:

- The State Office for Health and Social Affairs in Mecklenburg-Western Pomerania:
<https://www.lagus.mv-regierung.de/Gesundheit/InfektionsschutzPraevention/>
- The State Health Authority for Lower Saxony:
https://www.nlqa.niedersachsen.de/startseite/infektionsschutz/krankheitserreger_krankheiten/vibrio_vulnificus/vibrio-vulnificus-19317.html
- The Ministry of Social Affairs, Health, Youth, Families and Senior Citizens in Schleswig-Holstein:
<https://www.schleswig-holstein.de/DE/Themen/B/badegewaesser.html>

Are there any rapid tests that can be used to check water for vibrios?

The BfR is not aware of any commercially available rapid tests for vibrios. Laboratories can detect vibrios, but the bacterial samples must first be cultivated and can only then be identified using methods such as mass spectrometry or PCR (polymerase chain reaction). Furthermore, vibrios represent a large group of bacteria with many species that are natural inhabitants of marine ecosystems. Therefore, a general rapid test for vibrios would not be useful. The species of *Vibrio* responsible for most dangerous seawater infections is *Vibrio vulnificus*. The BfR is not currently aware of any simple test for this species of bacteria.

Is the number of vibrios in water increasing because of climate change?

An increase in *Vibrio* infections may be expected because of global warming and the associated increase of seawater temperatures. This is particularly true for surface water and in-shore seawater. The consequences are likely to be less severe for fishing in deeper layers of water on the open sea. Fish and fishery products are mostly not consumed raw, but are heated or processed. Therefore, the safety of these foods with regard to vibrios does not need to be reassessed. However, this does not apply to seafood that is eaten raw, like oysters. Oysters are considered to be a high-risk food and are in many countries of the world associated with diarrhoea caused by vibrios.

The risk assessment for infections that develop due to direct exposure of humans to seawater containing vibrios must be looked at differently. Vibrios can be absorbed through small, unnoticed skin lesions when swimming, walking or wading along the shoreline. Global warming and the associated increased water temperatures may lead to higher *Vibrio* concentrations, resulting in a likely increase in infections. Local authorities are responsible for monitoring beaches.

To what extent does the BfR deal with vibrios?

The "Consiliary Laboratory for *Vibrio* Species in food" is part of the BfR. Its task is to develop methods for detecting vibrios in shellfish and fishery products for food monitoring authorities, and to advise and support testing laboratories in the detection of these bacteria. Furthermore, the Consiliary Laboratory conducts research in cooperation with other institutions or research facilities on the occurrence of vibrios in food and in the environment.

What is VibrioNet?

VibrioNet is an international group of scientists and was founded to study the biology of these bacteria and to investigate possible risks. The VibrioNet research association was initiated by the BfR, which coordinated the research activities of several German laboratories during a funding phase by the Federal Ministry of Education and Research. More international scientists joined the VibrioNet association in 2015, so that a scientific "*vibrio* community" was created.