Stretchable graded multichannel self-powered respiratory sensor inspired by shark gill

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Description

Gills are respiratory organs that many aquatic organisms use to extract dissolved oxygen from water and expel carbon dioxide. Some species of gill hermit crabs, such as the following, have adapted to be able to breathe on land if kept moist. The microscopic structure of the gills provides a large surface area to the external environment. Blanccia is the name of a zoologist for gills. With the exception of some aquatic insects, filaments and lamellae contain blood or coelomic fluid, from which gases are exchanged through thin walls. Blood carries oxygen to other parts of the body. Carbon dioxide enters the water from the blood through the thin gill tissue. Gills, or gill-like organs on different parts of the body, are found in various groups of aquatic animals, including *mollusks*, *crustaceans*, insects, fish, and *amphibians*. Semi-terrestrial sea creatures such as crabs and mudskippers have gill chambers that can store water and use the dissolved oxygen available on land. Many microscopic aquatic animals, and some larger, sedentary animals, can take up enough oxygen over their entire body surface that they can breathe well without gills. However, more complex or active aquatic organisms usually require gills or gills. Many invertebrates and even *amphibians* use both their body surface and gills for gas exchange. The gills are usually composed of thin filaments of tissue, lamellae, branches, or fine tufted appendages with highly folded surfaces to increase surface area. The delicate nature of the gills is possible because the surrounding water provides grip. Blood or other bodily fluids must be in intimate contact with respiratory surfaces to facilitate diffusion. Early clinical signs in affected fish are anorexia and lethargy. As a result of respiratory failure in these fish, the inability to breathe despite sufficient dissolved oxygen is often seen in schools behind supplemental aerators and in early morning shallow waters along the shores of ponds. Mortality is often severe in the early stages of the disease; usually he clears after 2 weeks.

Juvenile fishes are usually more susceptible to PID, but larger fish are also susceptible. However, lesions in food fish may not reflect clinical severity of disease. Histologically, PID is characterized as granulomatous dandritis. In acute infection, there is hypertrophy and hyperplasia of the gill epithelium, as well as congestion and hemorrhage, and a mixed inflammatory infiltrate consisting of mononuclear inflammatory cells. As a result, the stratified troughs are closed and disappear. Cartilage dissolves and fractures and cartilage defects become visible. The parasitotrophotype, which is most commonly strongly stained with basophils, can be detected in inflammatory settings. Achondroplasia involves callus-like formations that bridge cartilage defects. The gill cords regenerate, and deformed foci of cartilage are often the only signs of infection. Parasitoid trophozoites are found in other tissues outside the branches, but usually without associated inflammation. As this review of the literature shows, the unnatural appearance and microscopic lesions of this organ are evidence of poor fish health or reflect changes in the aquatic environment. Morphological studies of gills are excellent tools for assessing disorders in fish culture and do not require large investments.

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Conflict of Interest

The author declares there is no conflict of interest in publishing this article.

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