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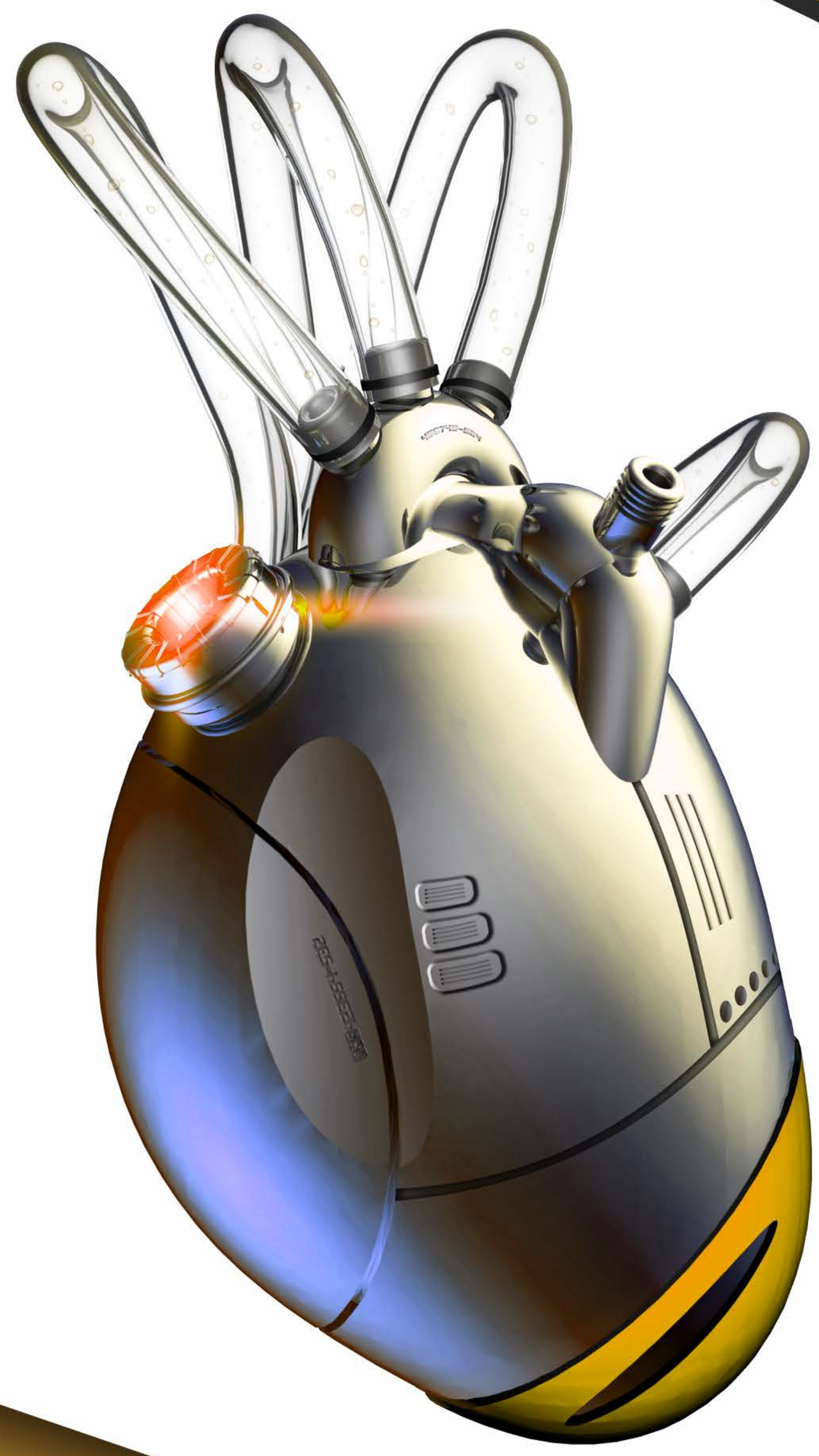

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IN MEMORIAM

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Eren TÜRKUŞAĞI

“Always in our hearts”

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Generative Artificial Intelligence in Scientific Publishing

Generative artificial intelligence is rapidly changing the future of scientific publishing. Due to both its potential use in editorial processes and the speed and efficiency it brings to research, generative AI services have become one of the most prominent technologies of the past year. With the increasing use of generative AI in academic texts, researchers are once again faced with new questions and challenges at the edge of technological change. One of the most frequently discussed topics in this context is the ethical use of generative artificial intelligence in the academic writing process and the need for updated ethical principles. It is clear that all organizations involved in scientific publishing will need to revise their policies accordingly. Accepting this transformation as a milestone and adapting to it may be considered a strategic step for remaining competitive in the future of digital publishing.

In this context, we are pleased to announce that IJABE will update its principles on the use of generative artificial intelligence as of 2026. IJABE supports the ethical and transparent use of generative AI within clearly defined ethical frameworks, provided that the creation and reasoning processes of the study are primarily carried out by humans.

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The Importance of Neoplasia Research in Fish

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Abstract

Neoplasia is observed in fish, which constitute the lowest group of vertebrates, as in other vertebrate species. Although neoplasia (also referred to as fish oncology) is not very common, it can occur in different tissues and due to various factors in fish. Investigating, diagnosing, and treating neoplasia in fish is particularly challenging, as fish spend their entire lives in aquatic environments. Environmental factors and pollution are known to be among the major causes of neoplasia in fish. Therefore, an increase in neoplastic cases may render fish useful as indicators of environmental pollution. In addition, fish can be used as model and experimental animals in oncological research for humans and other vertebrates. The relatively low incidence of neoplasia in cartilaginous fish does not indicate resistance to cancer. Nevertheless, there is a clear need for more detailed research on neoplasia in fish.

Keywords: Fish; Neoplasia; Environmental; Pollution

1. Introduction

As is well known, fish constitute the lowest group of vertebrate animals. They represent the largest number of groups among vertebrates, with reported species numbers ranging between 21,000 and 30,000 according to different evaluations. In cartilaginous fish, the number of species is approximately 650 [1]. The position of fish as the lowest vertebrate group is particularly important in comparative studies. Their poikilothermic (variable body temperature) nature distinguishes them from birds and mammals. Fish were the first vertebrates to appear on Earth and are widely distributed. Research on fish has increased in recent years; however, studies related to neoplasia remain limited [2].

The term neoplasm refers to new growth or reformation and is often used in the context of fish oncology. Neoplasia is not frequently observed in fish populations and does not cause economic losses due to the absence of epidemic characteristics [3]. While neoplasia describes the disease, neoplasm defines the tissue damage resulting from the disease [4]. Tumors in fish are similar to those observed in other vertebrates; however, the incidence of neoplasia in fish is lower compared to other vertebrate animals [5]. Neoplasia in fish may arise due to various factors, among which water quality and toxins are prominent. In this respect, fish can often be considered environmental indicators. Factors influencing neoplasia development in fish include: A) Age: neoplasia is more commonly observed in older fish. B) Sex: no significant correlation has been identified between sexes. C) Temperature: increasing temperatures enhance the effects of chemical carcinogens. D) Genetic predisposition: some studies have demonstrated the importance of genetic structure [3].

As aquatic organisms, fish cannot avoid carcinogens present in water. Similar to other vertebrates, chemotherapy, radiotherapy, surgical interventions, and their combinations can be applied in the treatment of neoplasia in fish. Surgical procedures, in particular, require thorough knowledge of anatomy and physiology. Chemotherapy and radiotherapy methods used in mammals are generally impractical in fish.

Accurate diagnosis of neoplasia in fish is critical, as other lesions may be confused with neoplasia. Due to its low incidence, these lesions must be clearly distinguished. Diagnostic methods include cytological, histological, ultrastructural, and direct examination techniques. Water analyses are essential during the diagnosis and treatment of neoplasia in fish, as this is also important from a public health perspective. Although neoplastic formations in fish do not directly affect human health, water quality remains a critical factor. Tumors in fish may be malignant or benign, similar to other vertebrates; however, hyperplasia and hypertrophy must be distinguished from neoplastic growths. This brief review discusses neoplasia in fish and its significance.

2. Neoplasias Observed in Fish

Tumors are named according to their tissue of origin. Common tumor types observed in fish include: a) Epithelial tissue tumors: papilloma, odontoma, adenocarcinoma b) Mesenchymal tumors: fibroma, osteoma, lipoma, chondroma, sarcoma, liposarcoma, osteosarcoma, chondrosarcoma c) Nervous tissue tumors: neuroma d) Pigment cell tumors: melanoma e) Hematopoietic tumors: lymphoma, lymphosarcoma

Aflatoxins may cause malignant liver tumors, referred to as hepatoma, in fish. Tumors observed in organs such as gills and swim bladders are specific to fish. The malignancy of neoplasias in fish is generally lower than that observed in mammals [2].

3. Possible Causes of Neoplasia Development

Although the exact causes of neoplasia in fish are not fully understood, several possible factors have been identified [2]. Creosote and polycyclic aromatic hydrocarbons have been shown to cause pancreatic and hepatic neoplasia in certain fish species [6]. In natural environments, particularly in lakes, carcinogens have been implicated in skin neoplasias observed in native fish populations [7]. In aquaculture systems, dioxins and aflatoxins accumulated in feed may lead to neoplasia, especially in the liver [8]. Genetic predisposition and ultraviolet radiation have also been reported to influence neoplasia development [8]. Experimental studies have demonstrated that carcinogens such as N-methyl-N-nitrosourea and nifurpirinol can induce neoplasia [9]. In koi fish, significant correlations have been identified between neoplasia and environmental factors as well as certain medications, although definitive causality could not be established [10]. While parasites and viruses have been suggested as possible causes of neoplasia in some fish species, conclusive evidence remains lacking [7, 8].

4. Neoplasia in Cartilaginous Fish

The relatively lower incidence of neoplasia in cartilaginous fish compared to bony fish has led to the assumption that this group is more resistant to cancer [11]. Subsequent studies suggested that cartilage might have potential therapeutic effects against neoplasia [12]. These findings increased interest in cartilaginous fish, but also contributed to declines in their populations [13]. Nevertheless, cancer has been reported in 21 shark species belonging to nine families [13, 14]. Numerous studies have demonstrated a correlation between neoplasia and environmental pollution in aquatic organisms [15]. In marine mammals, neoplasia cases have shown a notable increase over the past 20 years [16].

5. Conclusion

Detecting neoplasias in fish, which spend their entire lives in aquatic environments, is highly challenging. Although skin neoplasias may cause visual deformities, they do not pose a direct risk to human health. Treatment of neoplasias in fish is also difficult. However, neoplasia research in fish is important because: a) An increase in neoplasia within a fish population may be associated with environmental factors, allowing fish to be used as indicator organisms and evaluated from a public health perspective. Fish can also serve as model and experimental animals for neoplasia research in other vertebrates and humans, particularly for identifying initiating and triggering factors [17].

Recent studies have shown that the belief that cartilaginous fish do not develop neoplasia is incorrect. Nevertheless, further detailed research is required. In Türkiye, studies on fish oncology remain very limited. The difficulty of conducting oncological research in aquatic organisms, especially in natural environments, is well recognized. Worldwide, research on this topic continues, and confirmed neoplasia cases are reported to the Exotic Tumor Database. Fish oncology research, which may also contribute to human oncology, remains insufficient and should be encouraged both globally and nationally.

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