

NOTE

Branchial hamartoma in a farmed Atlantic salmon (*Salmo salar* L.)

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Abstract

A hamartoma was identified in the gills of a 5 kg farmed Atlantic salmon reared for 1.5 years in a sea cage. Histological examination identified the hyperplasia of cartilage tissue, epithelial and mucous cells. In addition fibrosis, adipose tissue, focal hemorrhages, inflammation, necrosis and scarce cell proliferation could be seen. To the best of our knowledge, histological features of branchial hamartoma in salmonids have not been previously described.

The gills are the main respiratory organ which serves for gaseous exchange, acid base regulation and excretion in fishes. Typically, salmonids gills are composed of two sets of four paired cartilaginous gill arches placed on either side of the head. Each gill arch supports a holobranch with its two hemibranchs and the double vertical rows of gill filaments. Hemibranchs consist of a row of long thin filaments, the surface area of which is increased by the formation of semi-lunar folds across its dorsal and ventral surface termed as secondary lamellae. Four gills on each side surround the pharynx in salmonids. Each gill is composed of cartilage core, covered by connective tissue, blood vessels, nerves, eosinophilic granulocytes and immune cells. The gill tissues are in contact with the surrounding environment (i.e. water), and therefore are vulnerable to non-infectious and infectious diseases (Amin et al., 1992; Kvellestad, 2013). Tumours of gills are usually sporadic findings in individual

farmed fishes (Martineau and Ferguson, 2006).

Tumours are rare incidental findings in farmed fishes due to many reasons including the relatively short fish life span at farms where tumours may not get enough time to grow and thus are eventually not reported. A hamartoma (from Greek word *hamartia* meaning "fault or defect" and *-oma*, denoting a tumour or neoplasm) is a benign (non-cancerous) tumour-like malformation made up of an abnormal mixture of cells and tissues found in areas of the body where growth occurs. Although hamartomas are developmental abnormalities rather than true neoplasms, they are often described as a neoplastic lesion because of their appearance as localised tissue masses (Seth et al., 2015; Stedman, 1982; Stevens and Lowe, 1994). Few individual cases of tumours have been identified in farmed Atlantic salmon including liver carcinoma, adenocarcinoma in intestine, gan-

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