

X-Cell Tumors

I. Causative Agent and Disease

X-cell tumors are xenomas composed of enlarged host cells containing a replicating protozoan parasite belonging to the superphylum Alveolata and phylum Perkinsozoa as determined by molecular studies. There are at least two highly distinct X-cell clades of protozoa in the Family Xcellidae comprising the genera *Gadixcellia* and *Xcellia*. The former genus includes pseudobranchial parasites of Gadiformes (cod and blue whiting), and the other is composed of gill and epidermal X-cells from Perciformes and flatfish Pleuronectiformes. Both genera together are sister to *Perkinsus* spp., pathogens of bivalve mollusks, and are the first such perkinssids known to cause pathology in fish.

II. Host Species

X-cell disease is reported worldwide in one freshwater fish species (hardhead catfish) and various marine demersal fish including: dab, cod, rockfish, walleye pollock, flatfishes, gobiids, and icefish in the Antarctic.

III. Clinical Signs

Papillomatous or fibroma-like growths on the fins, skin or as tissue masses involving the pseudobranchs or gill filaments and lamellae. Ulceration may occur but generally all forms are limited to the dermal/epidermal layers of the skin. Molecular probes have occasionally shown a few X-cells in visceral organs including liver or kidney where they do not appear to proliferate.

IV. Transmission

The current mode of transmission is unknown. Infection by co-habitation and transplantation of xenomas have been unsuccessful.

V. Diagnosis

The presence of apparent tissue masses on the skin, fins or in the branchial cavities of demersal fish species is suggestive of X-cell tumors. Three types of X-cell xenomas are described indicating tissue and host specificities: *Type 1*- pseudotumors on the branchial lamellae in the common dab from the Atlantic; *Type 2*- lesions primarily on the pseudobranchs of cod and related species in the Atlantic and Pacific; *Type 3*- lesions on the skin reported for various species of flatfishes, a gobiid fish in the Pacific and in a hardhead catfish (LA, USA). Histologic/ultrastructural features of X-cells are uniform consisting of large rounded to polygonal cells having faint eosinophilic cytoplasm, a centrally located enlarged nucleus with a prominent nucleolus. Host granulation tissue may infiltrate the X-cell mass where the cells may be irregular in size and multinucleated plasmodial X-cells have been observed in the xenomas of Atlantic and Pacific cod.

VI. Prognosis for Host

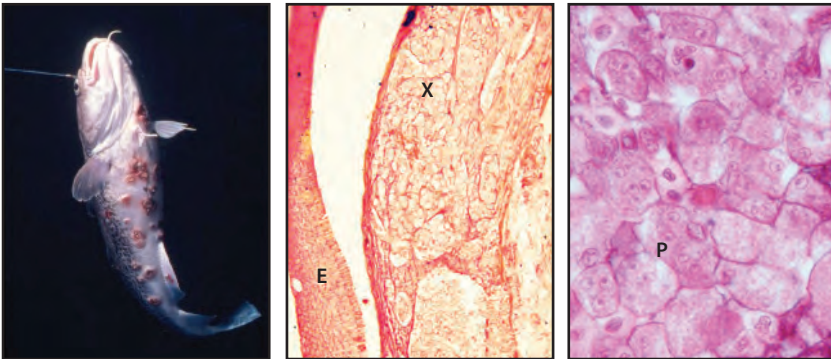
X-cell xenomas are not reported to be fatal, however, ulceration can lead to secondary infection by other pathogens and involvement of gill and pseudobranch tissues seriously debilitates respiration in fish hosts. There is evidence that host cell response may cause regression of X-cell xenomas in some infected fish.

VII. Human Health Significance

This parasite infects only fish. There are no human health concerns associated with X-cell tumors.



Left: X-cell xenomas forming white plaques in and around the branchial chamber of a black rockfish; **Right:** close-up view of xenomas causing white thickened gill tissues of a dusky rockfish.



Left: Ulcerated X-cell xenomas on skin of Pacific cod (photo: Ruth Fairell); **Center:** Histologic section of cod lesion with epidermis (E) and focus of degenerative X-cells (X) in dermis beneath, X 200; **Right:** Multinucleated plasmodial X-cells (P), X 1000.