Proliferative Lesions and Neoplasia

I. Causative Agent and Disease

Reports of abnormal proliferation of tissues in marine decapod crustaceans have been extremely rare. There have been less than a dozen cases in the literature of which only four have shown convincing evidence of cancer. Cancers or neoplasms are growths of abnormal cells that proliferate uncontrollably and have no useful function as opposed to cells that are normal that may proliferate excessively (hyperplasia) due to some functional demand or stimulus.

II. Host Species

Reports of neoplasia have included lymphosarcoma of hematopoietic tissues in two cultured penaeid white shrimp from Hawaii, a carcinoma of the hindgut and an adenocarcinoma of the antennal gland in Alaskan red and blue king crabs, respectively, and embryonal carcinoma in developing embryos of cultured grass shrimp in Taiwan. Additional studies in Alaska have discovered two other cases of probable tegmental gland adenocarcinoma in a blue and golden king crab.

III. Clinical Signs

Clinical signs of proliferative diseases can include obvious external tissue growths but more frequently the abnormal tissues are found during routine necropsy and histological examination.

IV. Transmission

Certain proliferative lesions may be simple hyperplasia and inflammation in response to an infectious agent or foreign body. Most neoplasms or cancers are considered spontaneous resulting from environmental contamination, congenital malformation, age or genetic predisposition and are not transmissible in nature. Exceptions are cancers caused by infectious viruses of which none have been documented as causing neoplasia in decapod crustaceans. There have been three cases of probable tegmental gland adenocarcinoma in two blue and one golden king crab in which an aquabirna-like virus (discussed elsewhere) was observed in one affected crab but the true etiology of that neoplasm is not known.

V. Diagnosis

Neoplasms are diagnosed and classified using histological methods to determine the cell or tissue of origin and are further grouped based on benign or malignant characteristics. Benign tumors are often well-differentiated, grow slowly, are well circumscribed without invading surrounding normal tissue and do not metastasize. Most benign neoplasms usually end in the suffix "oma". Exceptions are benign neoplasms of the brain and some endocrine organs in higher vertebrates that can be life threatening due to their location and deleterious physiological effects on the host. Malignant tumors are often not well differentiated, may grow rapidly, infiltrate normal tissues and tend to metastasize. The names of these neoplasms are often preceded by the word "malignant" or with the suffixes "sarcoma" or "carcinoma". Three of the four neoplasms observed in Alaskan king crabs are considered to be tegmental gland adenocarcinomas affecting the antennal gland, midgut, hepatopancreas and muscle tissues and appear to metastasize. These neoplasms range in histological appearance from: mostly inflammatory with hemocyte infiltration, fibroplasia and cell necrosis to a highly cellular

mass of streaming and nested fibroblastic cells surrounding glandular basophilic acinar-like structures or a highly cellular solid mass of large basophilic cells with bizarre nuclei that also form occasional glandular acinar-like structures. The underlying neoplastic cell present in varying frequencies in all presentations is an anaplastic large basophilic cell with a large clefted bizarre shaped nucleus having one to three eosinophilic nucleoli. These cells sometimes form multinucleated giant cells and occasionally are observed inside phagocytic host cells. Mitotic figures in acinar-like structures are present.

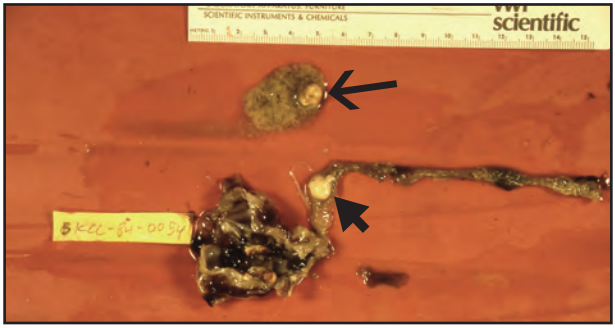
VI. Prognosis for Host

Proliferative lesions of an inflammatory or hyperplastic nature are generally reversible and not life threatening depending upon the tissue location and if the irritating cause can be removed. True neoplasia usually results in death of the affected animal.

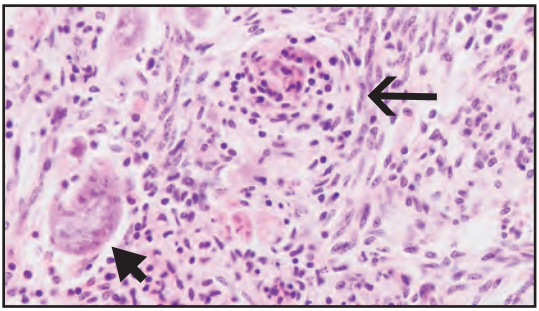
VII. Human Health Significance

Although aesthetically disturbing, there are no zoonotic human health concerns associated with proliferative lesions or neoplasia in decapod crustaceans. Proliferative inflammatory lesions may suggest an infectious agent that could negatively affect the desirability of the meats for human consumption. Cancer is an extremely rare event in decapod crustaceans and, therefore, should neoplasia be found to occur more frequently in a population, an indirect human health concern would be whether the cause is linked to environmental contamination.

Note: all figures are of suspected tegmental gland adenocarcinomas in blue and golden king crabs



White neoplastic nodular masses on hepatopancreas (arrow) and midgut (arrowhead) of a blue king crab



Histological section of midgut neoplasm above showing streaming fibroblasts (arrow) and acinar-like structures (arrowhead)

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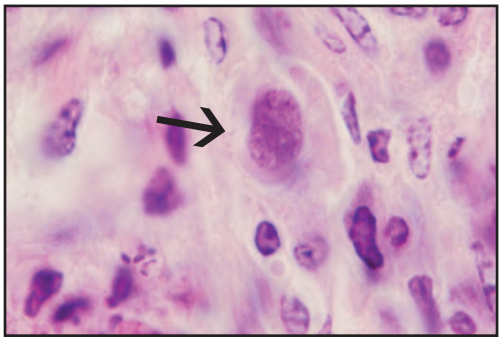
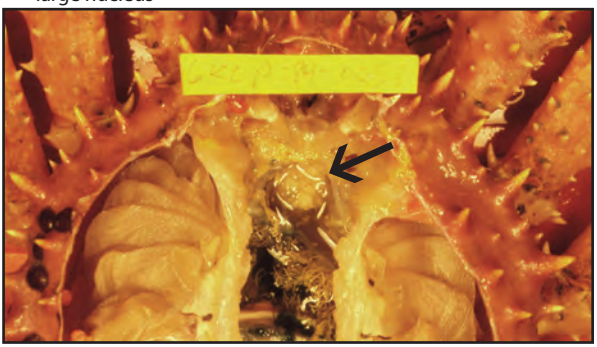
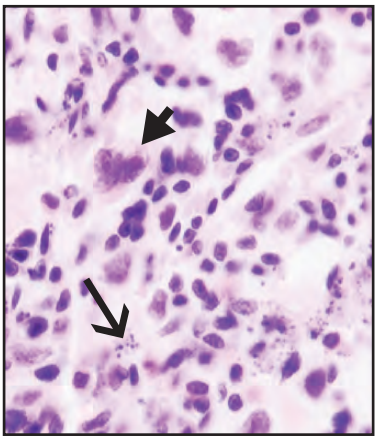


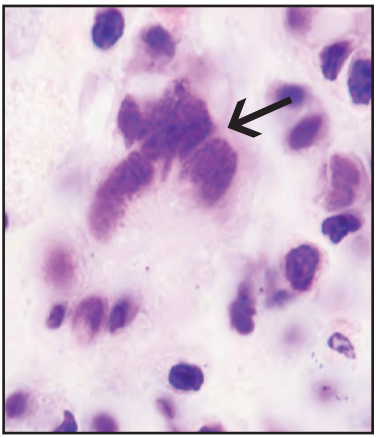
A second histological section of nodule on previous page showing occasional large anaplastic cell (arrow) with large nucleus



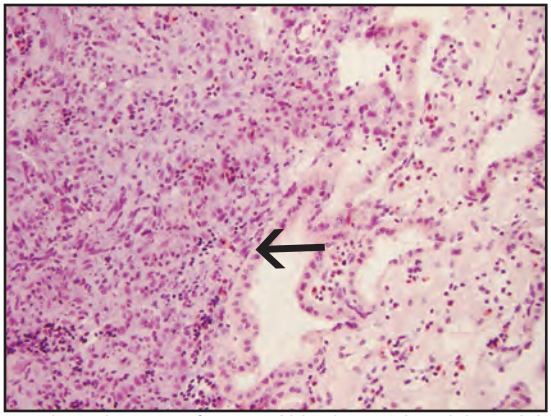
Golden king crab with a white nodular neoplasm in dorsal connective tissue and musculature (arrow)



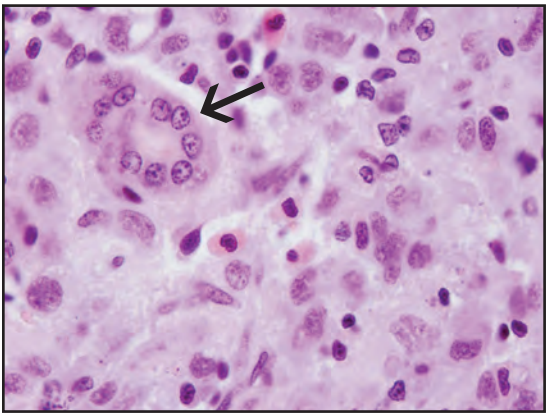
Histological section of Inflammatory cells, necrotic debris (arrow) and large cells with bizarre-shaped nuclei (arrowhead) from golden king crab nodular mass



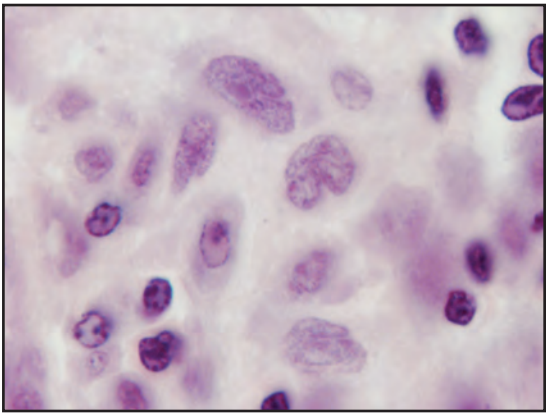
Same neoplasm showing multinucleated giant cell (arrow)



Histological section of a second blue king crab with basophilic cellular neoplasm (arrow) in antennal gland (published report)



Large cells with bizarre-shaped clefted nuclei and occasional acinar-like structures (arrow) from blue king crab neoplasm above



Higher magnification of same neoplastic cells with bizarre nuclei