



An Update on Green Turtle Fibropapilloma

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Green turtle fibropapilloma was first reported approximately 50 years ago (Smith and Coats, 1938; Lucke, 1938). The tumors were identified in green turtles (*Chelonia mydas*) from the Florida Keys and were seen as papillary, arborizing masses on the body surface. In another report, a nodule was found in the lung of one turtle and was composed of cells similar to those in the dermal portion of the cutaneous tumors (Schlumberger and Lucke, 1948). Over the last four years I and several other investigators, including Dr. Lew Ehrhart (University of Central Florida), George Balazs (National Marine Fisheries Service, Honolulu Lab, Hawaii) and Dr. Sidney Simpson (University of Illinois, Chicago), have been working cooperatively to unravel the cause(s) of this disease. A paper describing the pathology of the disease on a light and electron microscope level and attempts at identification of a viral agent has recently been published (Jacobson et al., 1989). To date, no viral agent has been isolated, but on a comparative basis a virus seems to be the most likely cause of this disease. In mammals and birds, herpesvirus, poxvirus, and papillomavirus have been incriminated as causes of papillomas of different types.

Green turtle fibropapilloma is more than just an aesthetically displeasing disease; it is life-threatening to affected turtles. Affected turtles are anemic compared to normal turtles and serum globulin values are lower than those of healthy turtles. In many cases, tumors grow on the conjunctivae, cornea, and palpebrae, resulting in blindness and turtles starving to death. Several cases of internal tumors have been seen in the lungs, intestinal surface, and kidneys. Over the last three years I have received several small grants from private organizations interested in the welfare of sea turtles. However, because of limited funding, progress in understanding the cause of this disease has been extremely slow. Currently, electron microscope evaluations of 30 biopsy specimens of green turtle fibropapilloma from the Indian River Lagoon System of east central Florida, the Florida Keys, and Hawaii are being completed and may shed some additional light on the cause(s) of this condition.

The fibroblastic component of the tumor has been cultured *in vitro* and a paper describing the ultrastructure of these cells was recently published (Mansell et al., 1989). Culturing the epidermal cell component of the tumor has been difficult and the work is currently ongoing in the laboratory of Dr. Sidney Simpson. Eventually both the fibroblasts and epidermal cells derived from tumors will be used in transmission studies. These studies will be done in 1990 and will be necessary to demonstrate that this is an infectious disease. A previous study was conducted at the Museum of Marine Science (Clearwater, Florida) in which cell-free and cellular material derived from cultured tumor fibroblasts was injected into several groups of juvenile green turtles. At the conclusion of a one-year study, no tumors developed. In 1990 various combinations of cultured fibroblasts and epidermal cells will be used. Further, pieces of whole tumors will also be used in the transmission studies. Hopefully, if the disease can be transmitted, it may be easier to identify the causative agent in recently developing tumors.

The increased incidence of this disease in the Indian River Lagoon System (Florida) and in Hawaii is of concern to biologists working with these populations. Turtles showing evidence of fibropapillomas have also been reported from the Bahamas, Panama, Indonesia, the Netherlands Antilles, and Japan. If cases of fibropapillomas have been seen in any other populations, please contact Dr. Elliott Jacobson (address above). Although a virus is believed to be the causative agent, pollutants may be involved in the expression of the disease. Affected turtles are generally found in offshore foraging areas. For instance, over 50% of juvenile green turtles in the Indian River Lagoon System are affected whereas tumors have not been found in green turtles in the Atlantic Ocean, only a few miles from these populations. Clearly, a lot of work needs to be done to better understand the patho-ecology of this disease.

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