

Searching for transmissible cancers in aquatic vertebrates

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Cancer has been reported in many species of aquatic vertebrates. Although most such cancers are likely spontaneous, the observation of tumours occurring at high prevalence in certain populations suggest that infectious, genetic, or environmental drivers may sometimes be involved in the aetiology of disease. One intriguing possibility is that some cancers in aquatic vertebrates may in fact be transmissible, spread by the transfer of living cancer cells themselves. Such transmissible cancers are rare, but have been reported in mammals and bivalve molluscs [1]. Moreover, recent evidence strongly suggests that this type of disease may be more widespread across the tree of life than previously thought.

In this project, we will investigate the occurrence of transmissible cancers in aquatic vertebrates. We will first survey the literature for reports of tumours occurring at high prevalence in aquatic species. Next, we will form collaborations with researchers working with species of interest, and sample tumours and matched normal tissue from these. We will develop genetic screens to investigate whether cancers are transmissible; this will be based on screening for genetic discordance between the DNA of tumours and that of matched normal tissue sampled from the same individual. If new transmissible cancers are found, we will survey the extent of these in populations and seek to understand transmission mechanisms.

Overall, this project may reveal a new class of transmissible cancers. This finding would open new avenues of research into the origin and evolution of transmissible cancer, and would provide information of relevance to animal health and welfare, as well as to fisheries and aquaculture. The student will have the opportunity to gain skills in cancer and population genetics, comparative genomics, and molecular biology techniques.

Prof Murchison and Dr Baez-Ortega are researchers in the field of transmissible cancer. Their groups study the genetics and evolution of transmissible cancers in mammals and bivalve molluscs. Please contact them for more information about this project:

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Links to team websites:

<https://www.tcg.vet.cam.ac.uk/>

<https://www.zoo.cam.ac.uk/groups/bivalve-transmissible-neoplasia-group>

References

1. Metzger MJ, Goff SP (2016). A Sixth Modality of Infectious Disease: Contagious Cancer from Devils to Clams and Beyond. *PLOS Pathogens* 12 (10): e1005904. doi:10.1371/journal.ppat.1005904