

# LYMPHANGIOGRAPHY IN FERRETS INFECTED WITH BRUGIA MALAYI

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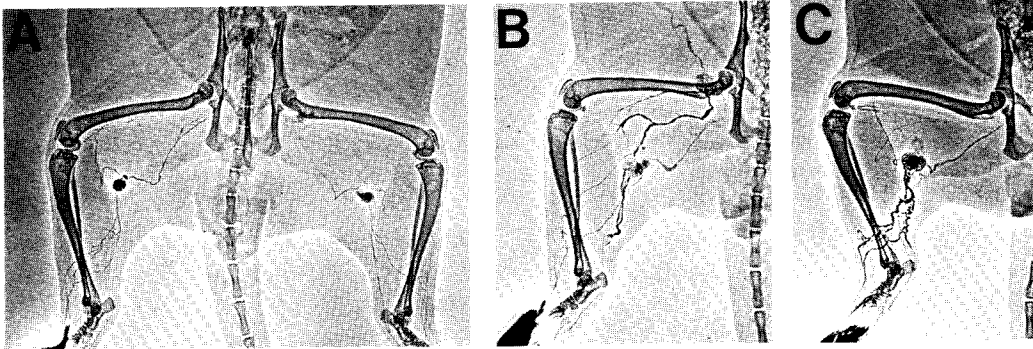
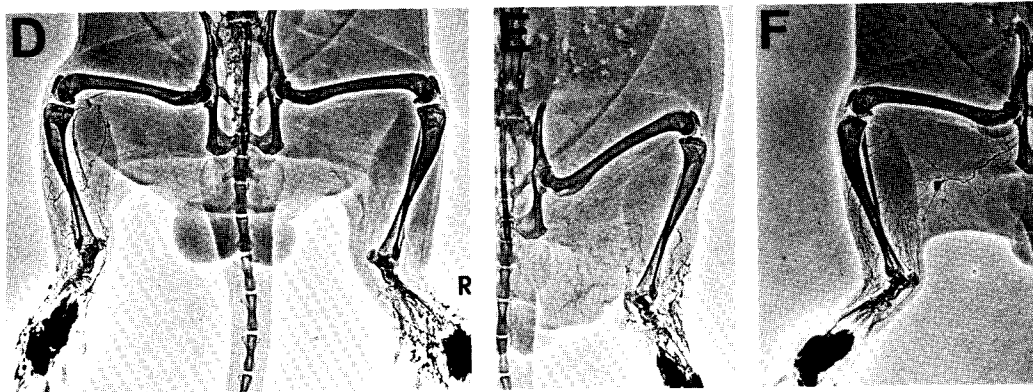


Fig. 1: Water-soluble contrast lymphangiogram of the hind limbs of ferrets infected with *Brugia malayi* by single or multiple injections of infective larvae in the hind paws.

A. uninfected ferret lymphangiogram

B. dilated lymphatics afferent to enlarged popliteal and inguinal nodes 2 months after a single infection

C. increased tortuosity of vessels at two months after single infection



D. moderate, persistent (6 months) edema in a right leg (R) and paw two years after 4 injections of larvae. No afferent lymphatic collecting channels are visualized and there is a meshwork of irregular, short vessels in the area of the diatrizoate injection. The left non-edematous leg received one

injection of larvae and shows collateral vessels.

E. a non-edematous leg one year after multiple infections shows disrupted lymphatic drainage similar to that in edematous legs

F. non-edematous leg 2 years after a single infection shows numerous anastomosing collateral vessels

## EXPERIMENTAL INFECTIONS

Adult, male ferrets (*Mustela putorius furo*) were infected with *Brugia malayi* (subperiodic strain) by subcutaneous inoculation with infective larvae into the dorsal surface of the hind paws. A previous study has established that this infection procedure results in localization of adult filariae primarily within the lymphatic vessels of the hind limb, afferent to the popliteal and inguinal lymph nodes (1). In long term infections, more than half of the ferrets repeatedly inoculated with infective larvae have developed lymphedema in the inoculated paw and lower leg. In this study, 3 of 10 ferrets inoculated two or more times with 70 infective larvae have exhibited unremitting edema for over 1 year and 4 other ferrets of this group have had clinical episodes of edema. Singly inoculated ferrets have rarely shown obvious edema. In this investigation xeroradiographs of the hind legs were obtained after a subcutaneous injection of diatrizoate sodium (Hypaque-50R, Winthrop Laboratories, New York) into the hind paws.

## COMMENT

In endemic areas, *Wuchereria bancrofti*, *Brugia malayi* and *Brugia timori* are important causes of lymphatic disease that can progress to chronic lymphedema and elephantiasis. The pathophysiology and immunopathology of these infections are not well understood (2) and adequate animal models are required for critical study. Histopathologic and lymphangiographic studies in dogs and cats infected with *Brugia malayi* or *Brugia pahangi* have established that these experimental infections are useful models for investigation of lymphatic filariasis (3-5). More economic animals models, however, would be valuable. The ferret is a small, commercially available carnivore that is increasingly used in biomedical research as a replacement for dogs and cats (6). Ferrets infected with *B. malayi* exhibit histopathologic changes in the lymphatic system similar to those described in man (7). The present study demonstrates that water-soluble contrast lymphangiography in the ferret can be applied to the study of lymphatic filariasis and shows similar lymphangiographic changes to those in man and in experimentally in-

fecting cats and dogs. These changes include dilation and tortuosity of lymphatic channels, lymphadenopathy, occlusion of collecting ducts, and the appearance of anastomosing collaterals. With chronic edema, no patent collecting afferent trunks were found and dermal back-flow of contrast in affected areas was demonstrated. These abnormalities in lymphatic architecture were observed following multiple infections even before the development of conspicuous edema. Although experience with lymphangiography in the ferret is limited, the results of this investigation suggest that the ferret is a promising experimental animal for the study of lymphatic pathology in filariasis and particularly in the development of persistent lymphedema.

## ACKNOWLEDGMENT:

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