

**Case 2**

**Outbreak of post-tattooing aural fibropapillomas in a group of 14 beef calves**

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**Signalment and History:** Within 2 months after ear tattooing at a 4H event, this 4-month-old black Angus steer developed markedly raised, smooth surfaced, and superficially crusted dermal lesions, which were strictly confined to and covered the entire tattooed regions.

**Histopathological Findings:** In a biopsy from the ear, the dermis is expanded by a moderately cellular proliferation of plump spindle cells haphazardly arranged in sheets and bundles supported by moderate collagenous stroma. These spindle cells have indistinct borders, a moderate amount of pale eosinophilic cytoplasm, and oval to elongate vesiculate nuclei with 1-2 distinct nucleoli and mild anisokaryosis. There are 4 mitotic figures per 10 high power (400x) fields. Within the superficial to mid dermis admixed with the spindle cell population, there are occasional mild perivascular infiltrates of histiocytes and fewer lymphocytes, plasma cells, and neutrophils. The overlying epidermis is moderately hyperplastic, covered by thick layers of compact ortho- to parakeratotic hyperkeratosis, and forms numerous long, broad rete pits that interdigitate with the expansile spindle cell population. In segmental regions, the stratum granulosum is prominent and contains many large and irregularly shaped keratohyalin granules. Few keratinocytes within the stratum spinosum, stratum granulosum, and extending into the stratum corneum are rounded, and have abundant lightly basophilic cytoplasm and large, vesiculate to open faced nuclei.

**Additional Findings:** Immunohistochemistry demonstrated strong nuclear immunoreactivity for papillomavirus antigen in scattered cells in the stratum granulosum and corneum.

**Diagnosis: Bovine aural fibropapilloma**

**Comment:** While the histopathologic findings in this case are classic for a papillomavirus associated fibropapilloma, this case is particularly interesting from an epidemiologic perspective as it raises questions about the source of infection and the pathogenesis of the lesion. In humans, tattoo-associated verruca vulgaris have been described, with latency periods ranging from 2-12 months. Proposed pathogeneses include inoculation of virus through contaminated ink or tattoo instruments, contamination of the tattoo site from the artist's saliva, or irritation of pre-existing regions of subclinical or latent papillomavirus infection. Upon further investigation in the current bovine case, at least 14 of the 107 calves that were tattooed on the same day developed similar lesions confined to and covering the entire tattooed regions. For disinfection, 1:3 sodium hypochlorite to water was applied to the ear prior to tattooing and to the head gate, numbers, and tattooer between animals, and hands were disinfected; however, the ink roller was not disinfected between animals. We hypothesize that the act of tattooing served to inoculate papillomavirus into the epidermis and dermis, and that the ink or the ink roller may have been a source of contamination.

**References:**

1. Mauldin EA, Peters-Kennedy J. Integumentary System, *Papillomas and papillomavirus-induced lesions*. In: Maxie MG, ed. *Jubb, Kennedy, and Palmer's Pathology of Domestic Animals*. 6th ed. vol. 1. Philadelphia, PA: Elsevier; 2016:706-712.
2. Wanat KA, Tying S, Rady P, Kovarik CL. Human papillomavirus type 27 associated with multiple verruca within a tattoo: report of a case and review of the literature. *Int J Derm* 2014; 53: 882-884.