The case of the scaly Golden Retriever

By Genevieve D'Amours

A young Golden Retriever presents with pain on the neck and spine and mysterious, severe scaling.

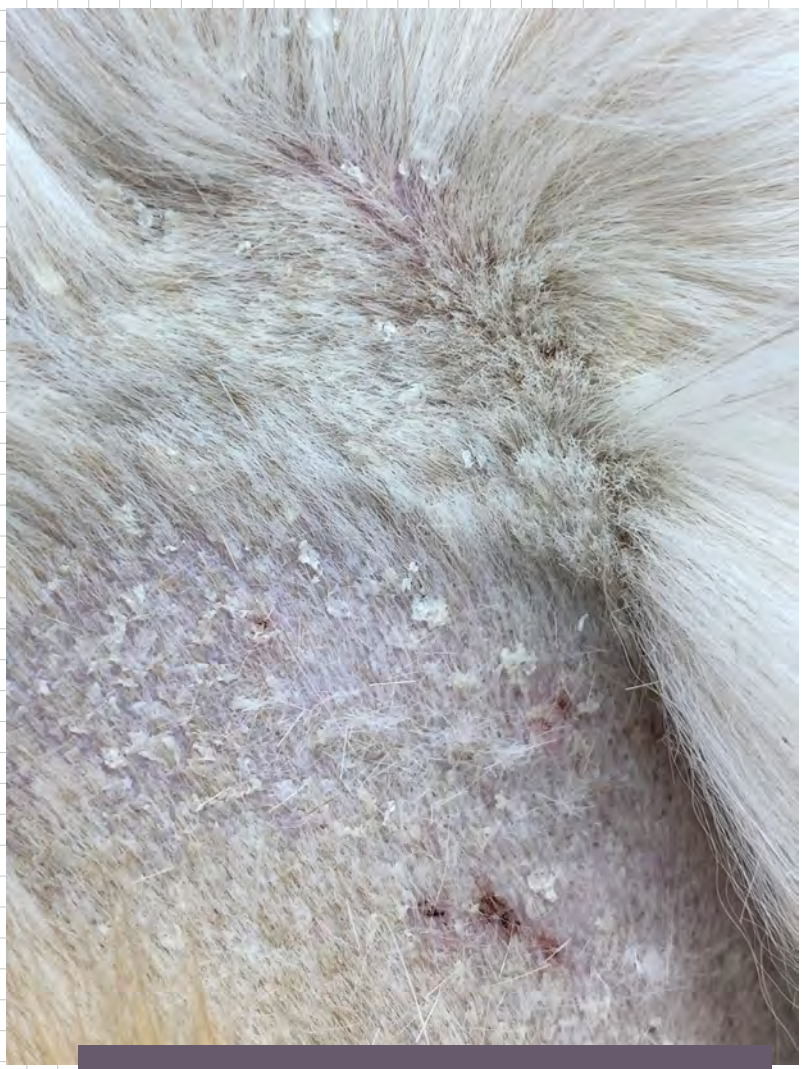

FIGURE 1: Generalised scaling. Hair was trimmed with scissors prior to biopsy. Photo courtesy of Gabe Hagard at Newstead Veterinary Services.

A one-year-old Golden Retriever presented for generalised pain, especially on the neck and spine. Unrelated to the acute presentation, the dog had had generalised skin disease since puppyhood, with severe scaling on their trunk and neck (see Figure 1). The lesions were nonpruritic, and biopsies were taken for histopathology.

On histology, there was mild to marked laminar hyperkeratosis, which was markedly disproportional to the thickness of the epidermis and occasionally extended into the follicular ostia. The keratin was deeply eosinophilic, often compact and lifted from the underlying epidermis in thick bands. There was multifocal mild epidermal hyperplasia, and scattered vacuolated cells in the stratum granulosum. Sebaceous glands were present in normal numbers.

The histological changes in the epidermis were consistent with nonepidermolytic ichthyosis.

Ichthyosis is a rare hereditary or congenital abnormality of the stratum corneum, characterised clinically by scaly skin. This can be further divided into epidermolytic and nonepidermolytic forms based on histological changes in the stratum granulosum and stratum corneum. Epidermolytic forms are due to a defect in keratin formation, whereas nonepidermolytic forms include a variety of mutations affecting lipids and structural proteins that cause similar clinical phenotypes.

There are several known genetic mutations associated with ichthyosis. In Golden Retrievers, nonepidermolytic ichthyosis is an autosomal recessive disease associated with a mutation in the PNPLA1 gene. This gene encodes a patatin-like phospholipase involved in lipid metabolism and signalling. The disease is usually associated with mild generalised scaling that can wax and wane throughout life, but will be present from birth or from a very young age.

A similar autosomal recessive inherited disease has been described in American Bulldogs and is caused by a mutation in the NIPAL4 gene, which encodes the ICHTHYIN protein. The disease is generally more severe than that seen in Golden Retrievers and often presents before weaning, with puppies having large, thick, adherent scales, giving them a wrinkled appearance.

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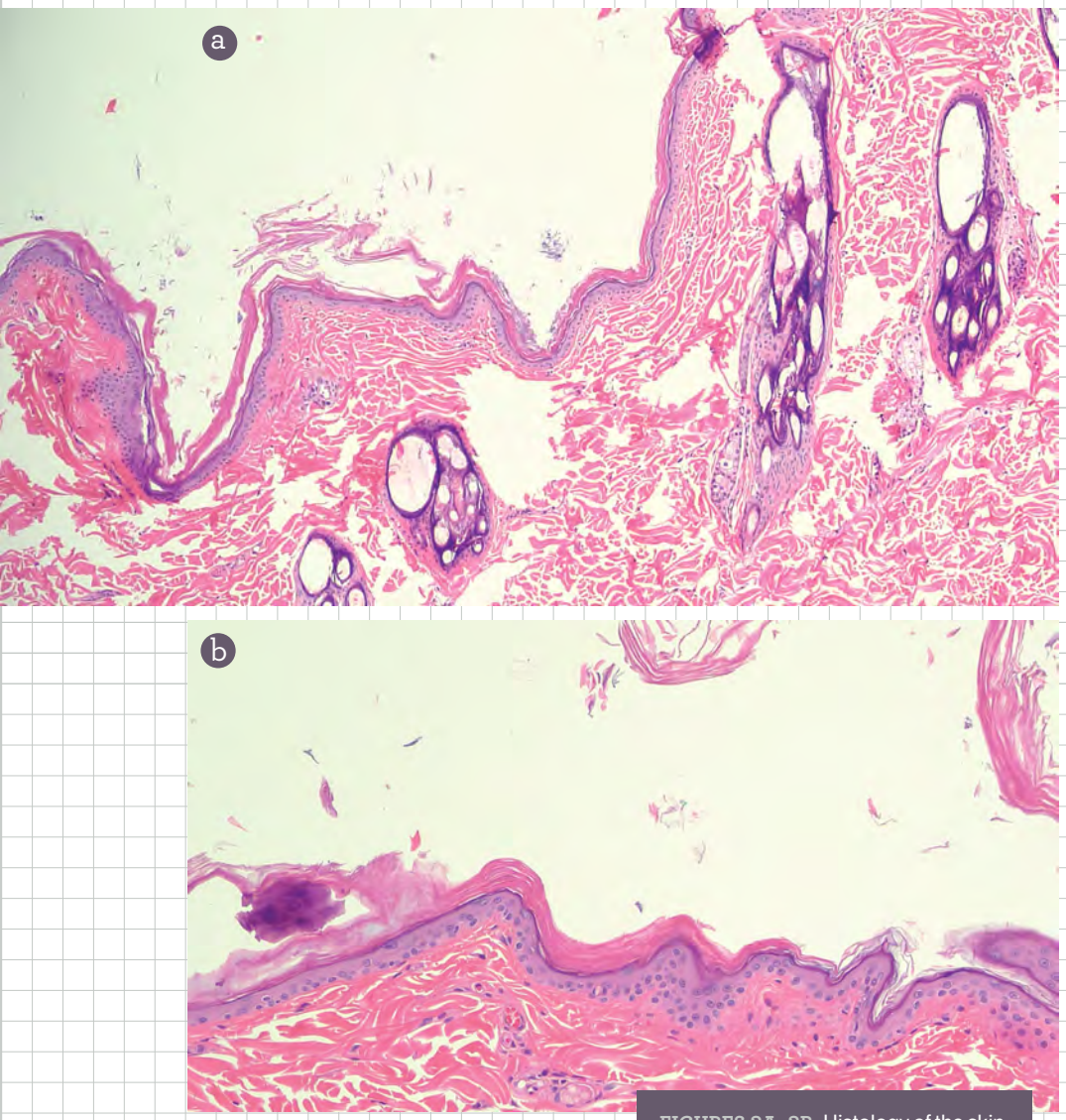

FIGURES 2A, 2B: Histology of the skin.

FURTHER READING:

- **Casal ML, Wang P, Mauldin EA, Lin G, Henthorn PS.** A defect in NIPAL4 is associated with autosomal recessive congenital ichthyosis in American Bulldogs. *PLOS One* 12(1), e0170708, 2017
- **Graziano L, Vasconi M, Cornegliani L.** Prevalence of PNPLA1 gene mutation in 48 breeding Golden Retriever dogs. *Veterinary Science* 5(2), 48, 2018
- **Mauldin EA.** Canine ichthyosis and related disorders of cornification. *Veterinary Clinics of North America: Small Animal Practice* 43(1), 89–97, 2013
- **Mauldin EA, Credille KM, Dunstan RW, Casal ML.** The clinical and morphologic features of nonepidermolytic ichthyosis in the Golden Retriever. *Veterinary Pathology* 45(2), 174–80, 2008

Epidermolytic ichthyosis has also been reported in the Norfolk Terrier as an autosomal recessive disease and is caused by a mutation in KRT10 encoding epidermal keratin. Finally, ichthyosis has been described in the Jack Russell Terrier, caused by a mutation in transglutaminase 1 (TGM1), an enzyme that mediates cross-linking of peptides in the cell envelope of keratinocytes in the stratum corneum. The disease in this breed is typically more severe than it is in Golden Retrievers and American Bulldogs.

Ichthyosis is a lifelong disease and is mostly characterised by scaling. It is usually not pruritic; however, affected animals are susceptible to secondary *Malassezia* or bacterial infections, which can be pruritic. Differential diagnoses for generalised scaling include sebaceous adenitis, hypothyroidism, epitheliotropic lymphoma and zinc-responsive dermatitis. Ectoparasites and atopy should also be considered if there is associated pruritus.

Biopsy can help establish a diagnosis and rule out other causes. In dogs intended for breeding, genetic tests for mutations in PNPLA1 and NIPAL4 are available overseas to help identify homozygous and heterozygous animals. VS

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