RJVS Research Journal of Veterinary Sciences

OPEN ACCESS

News & Comments

Characterization of Angiogenic Factor Expression in Domestic Cat

Rajagopal Shankar

The extremely cancerous neoplasm known as squamous cell carcinoma (SCC) develops from epidermal cells and causes differentiation into keratinocytes, which typically produce keratin. SCC can be categorized as oral, ocular, or cutaneous depending on where it originates (CSCC). The main causes of SCC tumour induction are prolonged exposure to sun radiation (which results in actinic keratosis), a lack of skin pigmentation, scant hair coverage, and papillomavirus infection. The increase of the angiogenic factor VEGF-A in SCC has been linked to a mutation in the p53 gene brought on by exposure to UV radiation. Islands, cords, and trabeculae of disorganized epidermal keratinocytes that invade and trespass beyond the basal layer of the epidermis into the dermis are the hallmarks of CSCC in humans and cats, according to histology.

Angiogenesis has a significant role in the development, spread, and survival of malignant tumours. Solid tumours require arterial perfusion to spread and grow; otherwise, they can only reach a diameter of 1 to 2 mm before necrosis is brought on by hypoxia at the tumour's centre. Although KDR caused a stronger phosphorylation signalling cascade to drive proliferation, survival, and increase permeability in endothelial or tumour cells, VEGF-A interacts with Flt-1 at a higher affinity. Increased levels of PLGF mRNA or protein are associated with pathological angiogenesis, tumour growth, metastasis, advanced clinical stage, recurrence rate, and poor prognosis in a variety of malignancies. To investigate the expression of mRNAs encoding two isoforms of PLGF, three isoforms of VEGF-A, and receptors for these growth factors in cat CSCC biopsies, researchers conducted the current study.

The formalin-fixed, paraffin-embedded (FFPE) blocks of CSCC samples were chosen from the tissue archives of the Virginia Tech Animal Laboratory Services (ViTALS; an accredited diagnostic institution of the Virginia Maryland College of Veterinary Medicine). Cat breed, sex, tumour site, and sample quality in terms of tumour size were all used as selection criteria. Using ViTALS standard histological procedures, control skin tissue intended for histology was immediately immersed in % formalin for 48 hours before being embedded in paraffin.

The current study tested the hypothesis that these tumour angiogenesis mediators would be enhanced in cutaneous cancer relative to normal skin by examining the mRNA and protein expression of VEGF-A, PLGF, and their receptors KDR and Flt-1 in feline CSCC and NHS controls. These results are in line with higher PLGF levels found in oral SCC as well as higher VEGF-A and KDR levels in CSCC as documented in dog studies. Overall, the IHC findings support the hypothesis that CSCC exhibits higher levels of angiogenesis-related markers. Trans- and cis-acting mechanisms enhance the synthesis of

proteins from a relatively low abundant mRNA, depending on how the tumour environment affects transcriptional or translational control.

The possibility of marginally normal tissue contributing RNA in addition to neoplastic tissue in the same sample is one of the study's limitations. More tissue-selective outcomes would result from choosing the tumour from its nontumoral perimeter on the FFPE slide. With a focus on pre-mRNA splice variants, they investigated CSCC in cats as a spontaneous illness setting to understand the dynamics of angiogenic biomarker expression. Although we did not see the anticipated differences between normal skin and CSCC in the expression of mRNAs expressing specific heparin-binding or soluble VEGF-A variants, different connections between mRNAs encoding angiogenic growth factors and those encoding their receptors did emerge.

Source: Veterinary Sciences

KEYWORDS

VEGF-A, PLGF, VEGFR1, VEGFR2, KDR, Flt-1, angiogenesis, cutaneous squamous cell carcinomas, cat, feline