Squamous Cell Carcinoma (SCC) Across Species: Preliminary Findings from a multi-institutional survey of SCC in birds

Laura Swift, MPH⁴, Ash Sundaram, MS⁴, Ashley Zehnder², DVM, ABVP(Avian), ¹UC Berkeley Extension, Berkeley, California, USA. ²Program in Epithelial Biology, Stanford University School of Medicine

Background

• First large scale multi-institutional survey to collect treatment and outcome data on avian SCC
• Results to support evidence-based clinical guidelines for the treatment of SCC in avian species and provide comparative medical understanding of SCC
• Preliminary results indicate important similarities across species

In Avian Species

• Second most common type of tumor found in Order Galliform and Order Psittaciformes
• Common lesion locations: skin, oral cavity, choana, beak, uropygial gland
• Most common type of neoplasm in cockatiel, budgerigar, African grey and rosella, Guinea fowl, and chicken
• Second most common type of skin cancer and accounts for nearly 20% of cutaneous malignancies²
• Common lesion locations: skin, head and neck, esophagus, lungs, prostate, bladder, cervix
• Cutaneous lesions more common in people with fair skin, certain genetic conditions or an impaired immune system

In Humans

• Spontaneous avian SCC is a potential model to study safety and efficacy of therapies prior to mammalian / human clinical trials.
• Rapid cancer progression in avians shortens duration to clinically significant findings.

To better assess the effectiveness of avian models:
• compare avian/human tumor genome for mutational landscape and identify altered signaling pathways affected
• comparison of known biomarkers in human SCC (ex: COX-2 expression)

Similarities between Human & Avian SCC

Common Risk Factors/Concurrent Disease: Hypovitaminosis A, chronic infection or inflammation
Similar Lesion Locations: Dermis, head and neck
Similar Treatments: Surgical excision, cryosurgery, laser surgery, radiation therapy, photodynamic therapy, chemotherapy, topical medications, debulking (common in avians with hard to resect tumors)

Differences between Human & Avian SCC

Mortality: high in avians vs. low in humans
Metastasis: • Avian: rare, tumors extremely locally invasive
• Human: tumors >2cm more likely to metastasize
Diagnostic Tools: biopsy common to both
• Avian: fine needle aspirate (FNA), radiograph
• Human: CT, MRI

SCC Studies for Potential Avian Trials

• Antiproliferative effects of citrus flavonoids on human SCC in vitro⁴
• Vitamin D receptor agonist / histone deacetylase inhibitor molecular hybrids⁵
• Antiproliferative effects of tyrosine kinase inhibitors on human SCC in vitro and in nude mice²⁶
• Differential induction of apoptosis by all-trans-retinoic acid retinamides in head and neck human SCC cell lines⁷

Assessing the Avian Model

• Spontaneous avian SCC is a potential model to study safety and efficacy of therapies prior to mammalian / human clinical trials.
• Rapid cancer progression in avians shortens duration to clinically significant findings.

To better assess the effectiveness of avian models:
• compare avian/human tumor genome for mutational landscape and identify altered signaling pathways affected
• comparison of known biomarkers in human SCC (ex: COX-2 expression)

References