Genomic-guided use of imatinib in canine squamous cell carcinoma: dose adjustment restores tolerance and maintains durable response

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Case Background

Leonidas, an 8-years-old Leonberger, was diagnosed with squamous cell carcinoma (SCC) of the medial aspect of the right nasal planum. Initial surgical excision was performed on March 14, 2025, followed by cytoreductive surgery of a local recurrence on May 7, 2025. No evidence of tumor dissemination was noted on staging evaluation. Histopathology confirmed SCC. After discussion of treatment options, the owner, a physician, declined radiation therapy and more aggressive surgery. She also declined toceranib therapy due to potential for gastrointestinal toxicity, as Leonidas had historically demonstrated a sensitive GI system.

To explore further treatment options, VetOmics' Canine Comprehensive Genomic Profiling, Canine CGP, was pursued.

Genomic-Guided Treatment Recommendations

Canine CGP identified KIT and PDGFRA copy number gains, as well as mutations in KDM5C and PTK2. Based on these findings, imatinib was prioritized as the most appropriate targeted therapy to exploit these tumor-specific vulnerabilities.

Treatment Course and Adverse Event

The patient was started on imatinib at 10 mg/kg orally once daily, a dose and schedule that is generally well-tolerated in most cases. After six weeks, the dog developed bone marrow suppression (HCT dropped to 24% from 36%, Platelets 63,000, PMN 4.11). This adverse event is extremely rare in dogs, although similar reactions have been reported in human CML patients, occasionally linked to ethnicity and predictive of treatment response. We speculate that the Leonberger breed may have increased drug sensitivity, further contributing to this reaction.

Precision Medicine In Action: Dose Adjustment and Encouraging Outcome

Imatinib was temporarily discontinued to allow hematologic recovery. Following a one-week drug holiday, the patient's blood count normalized.

Repeat genomic review confirmed that imatinib remains the optimal therapy based on Leonidas's tumor genomic profile.

After recovery, imatinib was reintroduced at a reduced dose of 3 mg/kg PO SID, consistent with published data showing clinical response at lower doses (PMID: 18564225, 36335646).

At this adjusted dose, no further hematologic or systemic toxicity was observed, and durable tumor control has been maintained without recurrence to date. This outcome is particularly encouraging, as recurrence occurred rapidly after the first incomplete surgical resection. The patient remains clinically well on the reduced-dose regimen. Both the owner and Dr. Kitchell are very pleased with the sustained response and tolerance.

Why This Matters

This case illustrates how genomics-guided therapy, when paired with individualized dosing, can optimize the balance between efficacy and safety, even for targeted agents generally regarded as well-tolerated.

Based on Leonidas's tumor genomic profile, imatinib was clearly the most appropriate therapeutic option. However, dose adjustment to 3 mg/kg proved essential to maintaining clinical benefit while avoiding hematologic toxicity.

Key take home point

More broadly, this case reinforces that precision medicine success depends on the right patient, right target, right drug, right dose, and right timing. We are only beginning to uncover the full potential, but it's exciting to see growing promising outcomes.