

## A Canine Li-Fraumeni Syndrome? Bonnibel's Story

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Bonnibel, a 9-year-old mixed breed girl, has had an unfortunate history with cancer. At just 6 years old, she developed multiple mammary tumors. In late 2024, she was diagnosed with two different cancers: hemangiosarcoma of the bone and metastatic adenocarcinoma of unknown primary. To better understand why Bonnibel is so prone to cancer and explore therapeutic options, VetOmics' *Canine CGP* was pursued.

### Genetic Predisposition to Cancer

Genomic profiling revealed that Bonnibel's two cancers had distinct mutation landscapes, yet both harbored a TP53 G354R heterozygous mutation at ~50% allele frequency (despite varying tumor content), suggesting a potential germline origin.

In humans, germline TP53 mutations are the hallmark of Li-Fraumeni Syndrome, a hereditary cancer predisposition disorder linked to an increased risk of multiple cancers (PMID: 1978757). Bonnibel's history raises the possibility of a similar syndrome in dogs. While not widely documented in veterinary medicine, germline TP53 mutations have been identified in canine osteosarcoma and others (PMID: 31341965; 38053317).

### Precision Medicine in Action

Bonnibel's case is not just about bad luck, genomics has provided a compelling explanation for her cancer susceptibility. Beyond uncovering this predisposition, *Canine CGP* also identified multiple genomics-guided therapy options. Among these, high tumor mutation burden (TMB) and defect in DNA repair pathways are key biomarker for both tumors, guiding the decision for her systemic treatment plan.

### Why This Matters

Although hereditary cancer syndromes are rarely recognized in dogs, human medicine has well-established genetic predisposition conditions, involving genes such as *TP53*, *BRCA1/2*, *NF1*, *RBI* and *fanconi anemia genes*. Back in 2013, actress Angelina Jolie's decision to undergo a preventive double mastectomy due to a *BRCA1* mutation brought global awareness to genetic cancer risk and proactive health management.

With VetOmics' comprehensive genomic profiling, we now have solid evidence that hereditary cancer syndromes also exist in dogs.

Could this knowledge inform better health management for pets and even guide breeding practices? Could we see a future where preventative measures—such as lifestyle modifications, enhanced screening, or even prophylactic surgery, are tailored to a pet's unique genetic/genomic risks?

Bonnibel's story is only the beginning.