

Managing Cancer Risk in Dogs

A Practical Guide for Breeders

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This guide is intended to help dog breeders make more informed decisions about breeding when hemangiosarcoma, mast cell tumors, lymphoma, osteosarcoma, or histiocytic sarcoma appear in a dog's pedigree. It distills the key decision points into plain language.

Key Points for Breeders

- **These cancers are almost all polygenic.** This means that an unknown number of locations in the canine genome affect the risk that an individual dog will develop one of these cancers. No DNA test exists to identify at-risk puppies at birth. Decisions must rely on pedigree history, diagnosis records, and estimated breeding values (EBVs), if available.
- **Choose replacement breeding stock from pedigree lines that are longer lived.** Because these later-onset cancers are often deadly, older dogs, say beyond 10 years, are likely to come from pedigree lines that carry fewer cancer-causing genes and more genes that contribute to a longer life. In some breeds, such as Bernese Mountain Dogs and some lines of Golden Retrievers, this can be a challenge. Using frozen semen from a less related male, drawn from breeding stock in another country, might help restore genetic diversity to the gene pool.
- **These cancers are typically late-onset.** A dog can already have produced multiple litters before a cancer diagnosis appears, so waiting for a dog's own health history to "clear" it is not a reliable strategy on its own.
- **A cancer diagnosis in one dog does not automatically disqualify its relatives.** Because these are polygenic diseases, a sibling or offspring may carry substantially less genetic risk. EBVs, which weigh the whole pedigree rather than one dog's outcome, give a more accurate picture than treating every relative the same way.
- **EBVs only get more accurate as more data comes in.** Contributing pedigree records and diagnosis information to a centralized system, such as the [International Working Dog Registry](#) (IWDR), is what makes a meaningful risk-based EBV possible for cancers that have no DNA test.
- **One exception is worth knowing about.** In Scottish Deerhounds, osteosarcoma risk is driven substantially by a single dominant-acting major gene, identified through a large, well-documented pedigree study and since supported by a smaller follow-up study. This is a much simpler inheritance pattern than the many-gene architecture behind most of the cancers in this guide, though a dog's sex also appears to affect how often the gene's risk is expressed, and other modifying genes have not been ruled out. Even here, no molecular DNA test yet exists, so pedigree-based tracking is still the practical tool available.
- **A real breeding colony has shown that selection decisions driven by EBVs actually work.** Selecting against mast cell tumor risk using pedigree-based EBVs, without any DNA test, measurably shifted a Labrador Retriever guide dog colony's selection priorities over multiple generations.

A Simple Decision Framework

1. Does this dog, or its close relatives, have EBVs available for these cancers, or at minimum documented diagnosis and pedigree history in a centralized system?
2. Do any close relatives, parents, siblings, or offspring, have a diagnosed cancer from this list?
3. Is that diagnosis being reported to a centralized system so it can inform this dog's EBV, and its relatives' EBVs, going forward?

A dog with no cancer diagnosis of its own should not be assumed low-risk on that basis alone, since these are late-onset diseases. A dog with an affected relative should not be automatically excluded from breeding, since EBVs, not any single relative's outcome, are the more reliable guide once enough pedigree data exists.

A Note on Genetic Risk

A cancer-free health history does not rule out genetic risk. It only means no diagnosis has appeared yet, and for a late-onset disease, that can simply mean not enough time has passed. This is where EBVs add the most value: they summarize risk across a pedigree rather than waiting on any single dog's outcome. An accurate EBV, however, requires enough diagnosis and pedigree data across enough related dogs; one built on sparse data is no more informative than a single dog's clean history.

Looking further ahead, DNA testing based on modern SNP arrays could eventually make individual cancer-risk prediction possible, the same technology behind gEBVs. Reaching that point will require genetic and health data from tens of thousands of dogs within a breed, collected over many years. Until that data exists, pedigree-based EBVs remain the most practical tool available.

For a plain-language summary of the peer-reviewed literature behind these recommendations, including specific heritability findings for hemangiosarcoma, mast cell tumors, lymphoma, osteosarcoma, and histiocytic sarcoma, see [*The Genetics of Canine Cancer: A Practical Summary of the Peer-Reviewed Literature*](#).