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The Impact of Breast Tumors in dogs and cats

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Abstract: Mammary tumors are common in dogs and cats, with significant species differences in biological behavior and prognosis. Despite advances in imaging, artificial intelligence, and comparative oncology, early detection and standardized treatment remain major challenges, while endocrine and metabolic factors play a key role in tumor development and progression.

Keywords: Mammary tumors; Dogs; Cats.

Introduction:

- Mammary tumors are common and clinically significant in dogs and cats.
- Dogs: variable behavior; Cats: more aggressive with poorer prognosis.
- Key prognostic factors: tumor size, grade, and metastasis.
- Development is multifactorial (age, hormones, breed, environment).
- Advances exist, but early diagnosis and standardized treatment remain challenges.

Materials and methods:

- Narrative literature review using databases like PubMed, Scopus, and Google Scholar to collect relevant studies on mammary tumors in dogs and cats.
- Selection and analysis of peer-reviewed studies to synthesize data on epidemiology, diagnosis, prognosis, and comparative oncology aspects.

Results & Discussions:

Mammary tumors show **high incidence in dogs** and **higher aggressiveness in cats**, influenced by multifactorial risk factors.

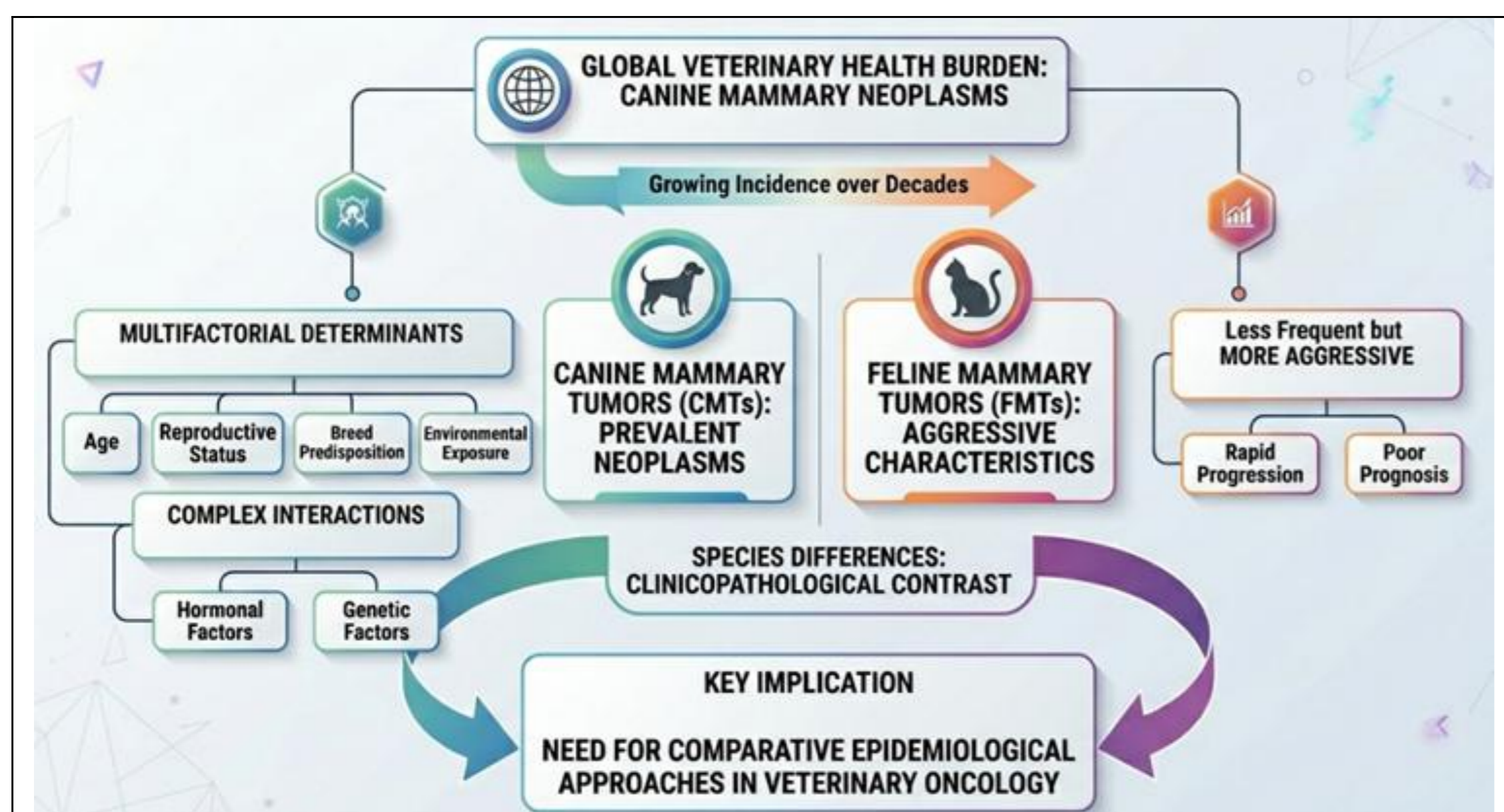


Figure 1. Multifactorial Determinants of Mammary Tumorigenesis: A Cross-Species Analysis.

Advances in diagnostics (AI, imaging) improve detection, but **early diagnosis remains challenging**.

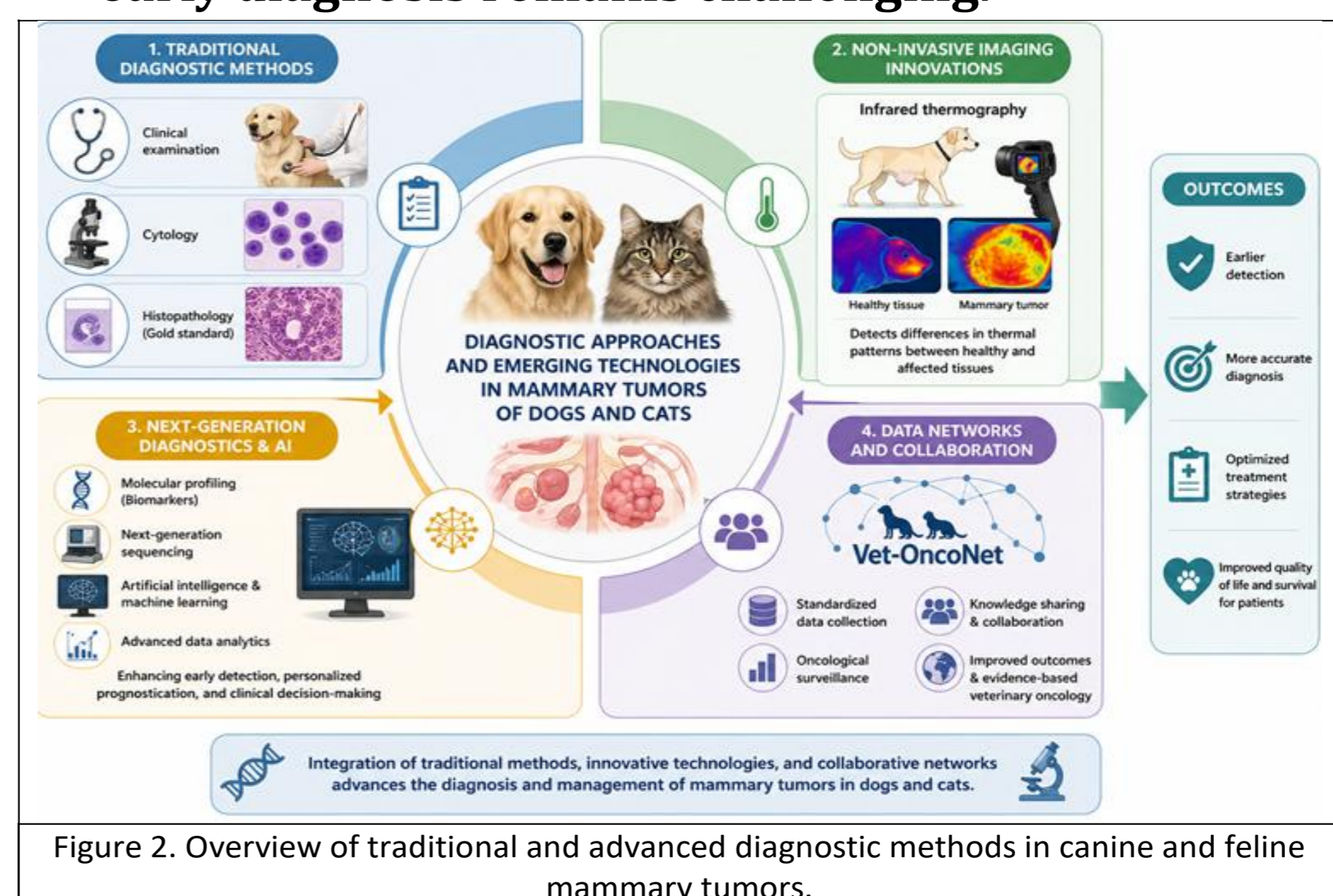


Figure 2. Overview of traditional and advanced diagnostic methods in canine and feline mammary tumors.

Tumor biology and prognosis depend on **histological type, grade, and metastasis**, with shared molecular mechanisms across species.

Prognostic factor	Dogs	Cats	Impact on prognosis
Tumor size	Frequently associated with malignancy	Strong predictor of poor outcome	Larger tumors → worse prognosis
Histological grade	Variable (benign to malignant)	Mostly high-grade carcinomas	Higher grade → aggressive behavior
Lymph node involvement	Common in advanced stages	Frequently present	Indicates metastasis
Distant metastasis	Occurs in malignant tumors	Very frequent	Strong negative prognostic factor
Hormonal status	Influenced by estrogen/progesterone	Less hormone-dependent	Affects tumor development
Age	Increased risk with age	Increased risk with age	Older animals → higher incidence
Clinical stage	Directly correlated with survival	Critical for prognosis	Advanced stage → poor outcome
Tumor type (histology)	Mixed types common	Mostly malignant epithelial tumors	Determines biological behavior

- Prognosis is mainly determined by **tumor size, stage, and spread**, with generally poorer outcomes in cats.
- Mammary tumors serve as **comparative models for human breast cancer**, supporting translational research.
- Clinical management is influenced by **veterinary decision-making and systemic limitations**.

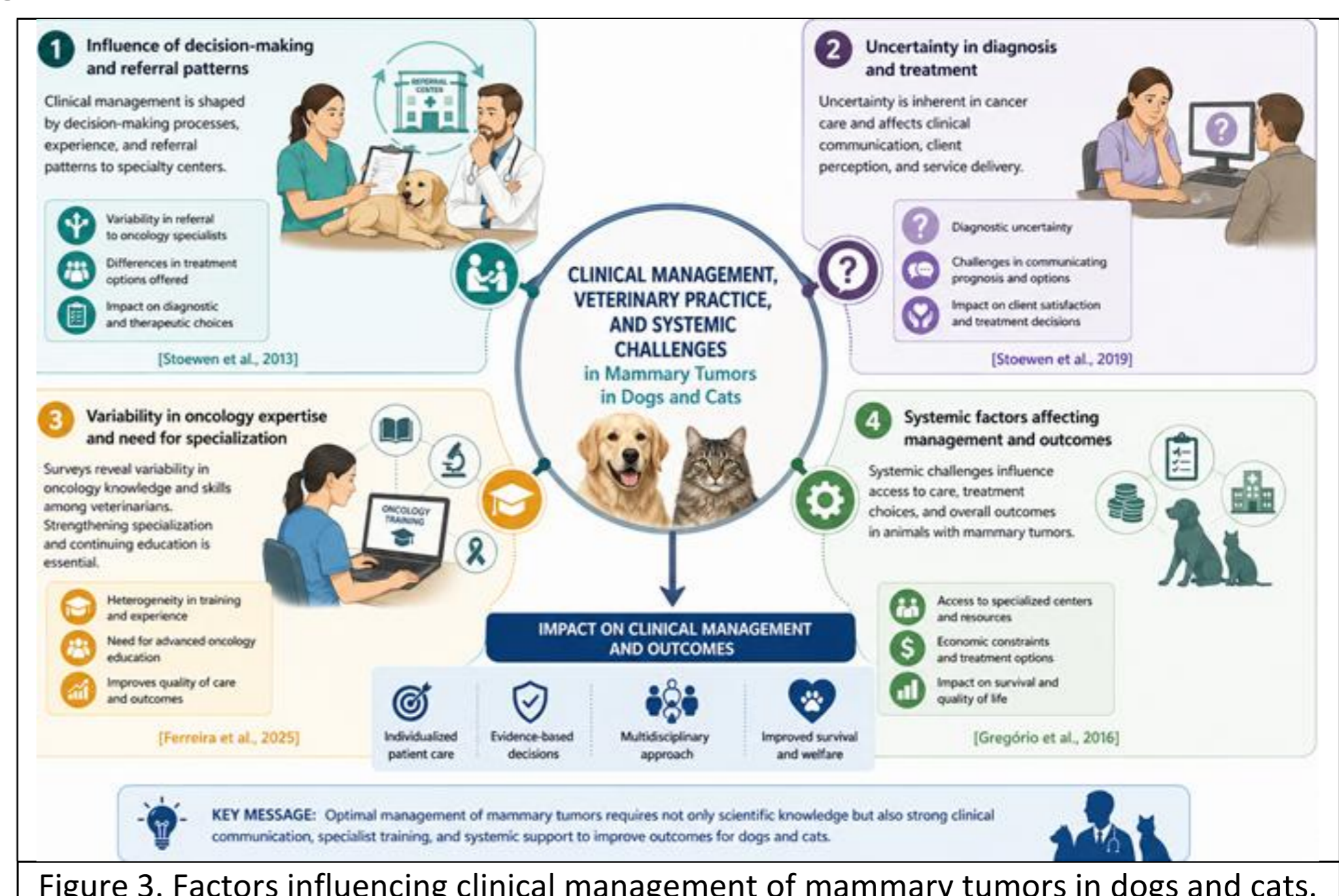


Figure 3. Factors influencing clinical management of mammary tumors in dogs and cats.

- **Endocrine and metabolic factors** contribute to tumor progression and interact with cancer biology.
- Future directions focus on **biomarkers, AI, and standardized therapies**.

Conclusion: Mammary tumors in dogs and cats vary significantly, and despite diagnostic advances, early detection and standardized treatment remain major challenges.

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