Equine Sarcoid Pathology Quick Reference Guide (PQRG)
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Introduction: PQRGs for neoplasms are designed for diagnostic pathologists so they are aware of the gross or microscopic information needed by clinicians to assign prognoses and offer therapeutic options. This PQRG is to be used for equine sarcoid and is not intended for feline sarcoid. For equine sarcoid, the parameters needed from a pathologist are the **diagnosis and mitotic count.**

Equine sarcoids, hereafter termed sarcoids in this PQRG, are the most common skin tumor in equines.[1,3,8,9] They are associated with nonproductive infection with bovine papillomavirus types 1 and 2 with currently unclear pathogenesis.[1,3,8,10] Although histopathology is considered the gold standard for diagnosis, available literature is conflicting regarding the histologic criteria used to differentiate between sarcoids and other equine spindle cell tumors.[1,8] Sarcoids are nonmetastatic but locally invasive, have a high propensity for recurrence (although studies report anywhere from 18-64% recurrence rate), and they may undergo spontaneous regression. [1,3,4,8,10] The various clinical subtypes of sarcoid were originally reported to be prognostically useful;[4] however, subsequent studies were unable to replicate this finding.[8] A 2024 publication found that the clinically reported fibroblastic subtype was statistically associated with recurrence, although there were only 4 cases of fibroblastic subtype in this study (3 of which recurred).[3] Additionally, the clinical subtypes of sarcoid have not been reliably associated with any histologic features to confirm the clinical subtype diagnosis.[3,8]

Clinicians will create treatment recommendations and assign a prognosis based on all the data gathered for the patient. Clinical data that aid the pathologist to establish the histological diagnosis include breed, age, sex/gender, location on the body, presence of additional skin lesions, and gross description of the lesion with clinical subtype and photographs if possible. Each of these may add to the certainty of the diagnosis. A full VCGP Protocol for equine sarcoid is under development.

Diagnostic report: The only data needed by a clinician from the pathologist to aid in assigning a prognosis and offer therapeutic options for sarcoid are 1) the diagnosis and 2) mitotic count (MC).

> **Diagnosis:** A histologic diagnosis of sarcoid is usually straightforward and requires at minimum an increase in density of dermal fibroblasts.[3,8] Other confirmatory histologic features include rete peg formation (often long rete pegs),

dermal fibroblasts arranged perpendicularly to the epidermal basement membrane ("picket fencing"), epidermal hyperplasia, hyperkeratosis, surface ulceration, and loss of adnexal structures.[1,3,8]

Mitotic count: A 2024 study found MC to be predictive of sarcoid recurrence: MC ≥ 20 per 2.37 sq mm was significantly associated with recurrence,[3] this study has not yet been validated. MC should be obtained according to VCGP published guidelines, i.e., the number of mitotic figures in 2.37 sq mm.[5,6]

Other histologic assessments: Additional histologic or cytological assessments by the pathologist beyond the diagnosis and MC are not needed for the clinician to make recommendations. There are no sarcoid grading systems that have been developed to predict clinical outcomes.[3,8] Metastasis, even to local lymph nodes (LN), has not been reported with sarcoids, therefore LN assessment is not currently warranted in diagnostic practice. A 2024 study indicated none of the following features correlated with recurrence: cellularity, nuclear pleomorphism, necrosis, inflammation, completeness of excision, or additional treatments beyond excision.[3] In this study, margins were not measured and authors stated it was difficult to know if the fibroblasts at a surgical margin were reactive or neoplastic in some cases.[3] These results should be validated.

Surgical margins: Margins should be assessed and reported according to VCGP margin evaluation guidelines.[2] To obtain representative samples of tumors of the skin and subcutis, we recommend evaluation of a minimum of 5 inked surgical margins. Report the narrowest deep and lateral histologic tumor free distances (HTFD) between neoplastic fibroblasts and surgical margins in whole millimeters (mm). Incomplete tumor excision (i.e., HTFD 0 mm, in which neoplastic cells abut the surgical margin) is anecdotally prognostic for recurrence,[1,4] but studies have not confirmed this.[3]

LVI: LVI should be assessed and reported according to VCGP LVI guidelines.[7] There are soft and strict criteria for LVI assessment. Data on LVI in sarcoids has not been reported.

Core vs Noncore information supplied by the pathologist to help clinicians assign prognosis.

What is critical to be provided by the pathologist- Core	***What is not critical but highly recommended to be provided by the pathologist- Noncore***	***What is not needed to be provided by the pathologist- Noncore***
• Diagnosis (i.e., equine sarcoid) • Mitotic count (MC)	• Presence of lymphovascular invasion (LVI) • Surgical margin evaluation*	• Lymph node (LN) status • Grading system • Description

*Completeness of excision was not predictive of recurrence in a 2024 study; [3] however, it is likely clinicians will request surgical margin measurement if it is not provided in the initial report.

Future Directions: Future investigations should evaluate a wide array of clinical, pathological, and molecular parameters correlated with accurate clinical outcome data to determine what, if any, further testing beyond a histologic diagnosis and mitotic count will help predict outcome and or guide clinician options. Mitotic count should be validated as a prognostic indicator of sarcoid recurrence. Future studies should determine if histological features can be correlated to clinical subtypes and if those subtypes are predictive of outcomes, and if lymphovascular invasion is predictive of outcomes. Advances in diagnostic modalities may provide additional diagnostic parameters in the future, and we may learn that some histologic findings or other diagnostic markers might correlate with specific outcomes. When such data emerges, please contact the communication author(s) listed above, and this PQRG will be updated.

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(Full protocol pending)