GRANULOSA CELL TUMOURS

Granulosa cell tumours (GCT or sex cord-stromal tumours) are the most common ovarian tumour in horses and can occur in mares of any age. They may be composed of granulosa cells alone or contain theca cells (granulosa-theca cell tumours). They are almost always unilateral, functional and benign.

CLINICAL SIGNS

The hormonal pattern is inconsistent and determines the clinical signs observed. These may include:

Oestrus cycle: Persistent, irregular or absence of oestrus

Masculinisation: stallion-like behaviour including mounting, aggressiveness, squealing, striking, and in chronic cases, increased muscle deposition, cresty neck and an enlarged clitoris.

RECTAL EXAMINATION

One ovary is normally enlarged with no ovulation fossa being palpable. GCTs are slow growing tumours but have been reported up to 40cm in diameter. The contralateral ovary is usually small, firm and inactive. If there is asymmetry in ovary size yet the smaller ovary is cycling, then a granulosa cell tumour is less likely and the enlarged ovary is more likely to have a haematoma or teratoma.

ULTRASONOGRAPHIC EXAMINATION

Granulosa cell tumours typically have a multicystic honeycomb appearance with some areas of solid tissue. A minority will have a dense homogenous appearance or will appear as a solid ovarian mass, with a single anechoic fluid-filled cyst. Haematomas or regions of necrosis within the tumour are common. The variable ultrasonographic appearance of GCTs hampers differentiation from other possible diagnoses including haematoma, cystadenoma, lymphoma and germ cell tumours.

Since clinical signs, rectal examination findings and ultrasonographic appearance are not consistent in all GCT cases they do not predict the presence of a GCT reliably. Therefore, measurement of serum hormone concentrations are recommended for diagnosis.

ANTI-MÜLLERIAN HORMONE CONCENTRATION

Serum levels of anti-Müllerian hormone (AMH) have been shown recently to be a reliable means of identifying the presence of granulosa cell tumours (GCT). In mares, AMH is produced by granulosa cells and in healthy mares serum AMH concentrations are similar throughout the oestrus cycle and pregnancy. The proliferation of granulosa cells which occurs with GCTs is associated with a marked increase in serum AMH concentration.

In a recent investigation, the diagnostic accuracy of AMH, inhibin and testosterone for the diagnosis of GCT was compared in 44 mares in which GCTs were confirmed with histopathology. Overall, the sensitivity of AMH for detection of known GCTs was 98%, compared to sensitivities of 80% for inhibin, 48% for testosterone and 84% for the combination of inhibin and testosterone (Ball *et al*. 2013). Median serum AMH in mares with histologically confirmed GCTs (n = 44) was 66.0 ng/ml (quartiles, 27.1–184.5 ng/ml). Median serum AMH in reproductively normal, non-pregnant mares (n = 94) was 0.30 ng/ml (quartiles, 0.01–0.50 ng/ml), and in pregnant mares (n = 39) the median serum AMH concentrations were 0.22 ng/ml (quartiles, 0.04–0.45 ng/ml) (Ball *et al*. 2013).

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In addition to increasing the accuracy of diagnosis of GCTs, AMH is not increased in pregnant mares, in contrast to testosterone and inhibin. Furthermore, AMH offers practical advantages, as inhibin measurement is only available commercially in the United States, resulting in a greater delay between sampling and the reporting of results and increased expense.

We recommend AMH as the test of choice for any mares suspected of having a granulosa (theca) cell tumour.

	AMH (ng/mL)	Inhibin (ng/mL)	Testosterone (nmol/L)	Progesterone (nmol/L)	
				oestrus	dioestrus
Healthy mare	<4	0.1 - 1.7	<0.5	>3	>12
GCT	>4	>0.5	>1.4	<3	

Ball, B.A., Almeida, J. & Conley, A.J. (2013) Determination of Serum Anti-Müllerian Hormone Concentrations for the Diagnosis of Granulosa-Cell Tumors in Mares. Equine Veterinary Journal 45: 199-203.