

THE NECESSITY OF GENDER-SPECIFIC REFERENCE RANGES

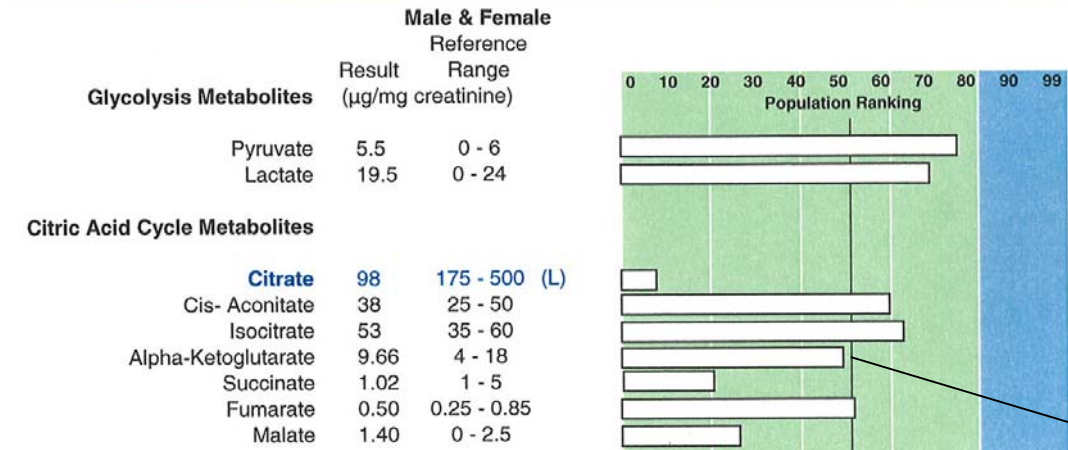
- ♂ ♀ Organic acids are reported relative to creatinine (μg organic acid per mg creatinine)
- ♂ ♀ The creatinine excretion rate is 25% higher for males than for females
- ♂ ♀ Males and females show distinct physiological and biochemical differences
- ♂ ♀ For a given organic acid, the actual difference between the genders can be slight (as for kynurenate) or dramatic (alpha-ketoglutarate)

Organic Acid	Alpha-Ketoglutarate	Kynurenate
Male Average Result	6.1 $\mu\text{g}/\text{mg}$ creatinine	1.8 $\mu\text{g}/\text{mg}$
Female Average Result	14.7 (more than 2x that of males)	1.7 $\mu\text{g}/\text{mg}$
Male Reference Range	4.0 – 8.5 $\mu\text{g}/\text{mg}$	0 – 2.2 $\mu\text{g}/\text{mg}$
Female Reference Range	9.5 – 19.0 $\mu\text{g}/\text{mg}$	0 – 2.4 $\mu\text{g}/\text{mg}$

- ♂ ♀ The most clinically useful way to report organic acid values is with separate reference ranges for men and women, to avoid false-negative and false-positive values due to gender bias

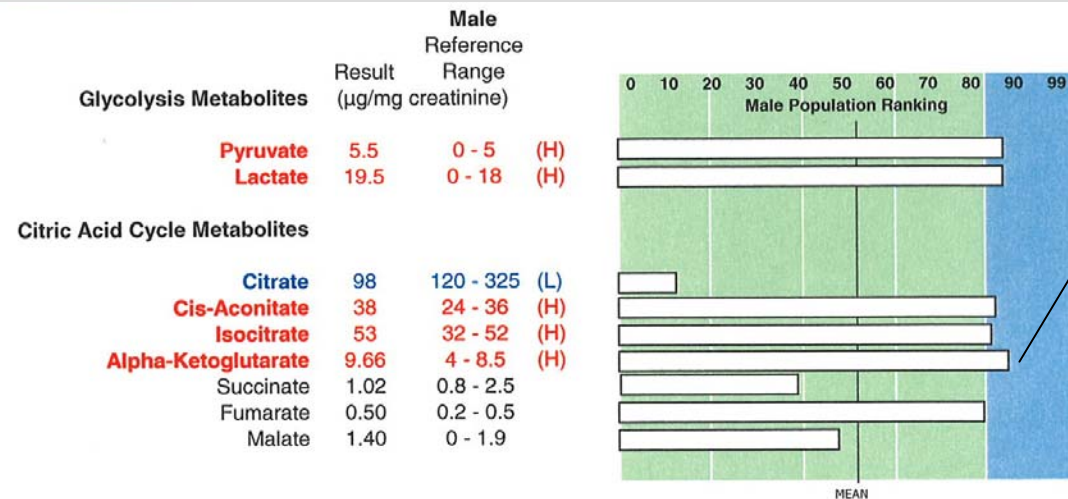


Urinary Metabolic Profile



John Doe reported against a nonspecific, adult reference range

The two sets of results are identical. The reference ranges differ by the inclusion of females in the reference range above and their exclusion below.



Due to the difference between male and female results, α -Ketoglutarate appearing to be 'average' is actually elevated, showing the potential for 'false-negative' results without gender-specific ranges

John Doe reported against a male-specific reference range