PROJECT REVIEW

"Origin production of 19-norandrosterone in human urine samples and doping analysis"

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In extremely rare circumstances the presence of 19-norandrosterone (19-NA) in human urine can be explained by the "instability" or "activity" of the urine specimens. This is most likely due to the sample transportation and storage in the laboratory and is based on the 19- demethylation of abundant endogenous steroids in the urine samples.

Tests for the assessment of the activity of the urine samples have been established. The hypothesis is that 19-NA will be produced by 19-demethylation of androsterone, the main androgen metabolite present in the urine. Briefly, an aliquot of sample to be tested for activity will be incubated in the presence of deuterated androsterone. The formation of deuterated 19-NA will be the proof of urine activity.

From the data collected until now, it appears that the instability of these urine samples is due to enzymatic activity expressed (from exogenous origin) in the sample. It seems unlikely that the 19-demethylation would be the result of a pure, unassisted chemical reaction. If this were the case, this phenomenon would be reproducible at any time, and is not. The growth of microorganisms in the urine samples is not unlikely. It is reasonable to link this enzymatic activity to the presence of a microorganism growing in the urine. The expression of aromatase is restricted to the gonads and brain in many vertebrates, from aquatic and avian species to mammals. The removal of the methyl group in the 19 position seems not linked to an aromatization process since no microorganism expresses such an enzyme. An important demethylase enzyme present in some microorganisms is the 14-demethylase (CYP51A1). The activity of this enzyme is crucial to the life of these microorganisms since it is the responsible for the formation of ergosterol from lanosterol. The hypothesis is that CYP51 uses androsterone as "substrate" consequently producing 19-NA.