

Kelly B¹, Madsen M¹, Sharpe K², Nair V¹, Eichner D¹

A Population Study of Urine Glycerol Concentrations in Elite Athletes Residing in North America

Sports Medicine Research and Testing Laboratory, Salt Lake City, United States of America¹; Department of Mathematics and Statistics, University of Melbourne, Melbourne, Australia²

Abstract

Glycerol is an endogenous substance that is on the World Anti-Doping Agency's list of prohibited substances due to its plasma volume expansion properties. The WADA has set the threshold for urine glycerol, including measurement uncertainty, at 1.3 mg/mL. Glycerol in circulation largely comes from metabolism of triglycerides in order to meet energy requirements and when the renal threshold is eclipsed, glycerol is excreted into urine. In part due to ethnic differences in postprandial triglyceride concentrations, we investigated urine glycerol concentrations in a population of elite athletes competing in North America and compared the results to those of athletes competing in Europe. 959 urine samples from elite athletes competing in North America collected for anti-doping purposes were analyzed for urine glycerol concentrations by a GC-MS method. Samples were divided into groups according to: Timing (in- or out-of-competition), Class (strength, game, or endurance sports) and Gender. 333 (34.7%) samples had undetectable amounts of glycerol (<1 µg/mL). 861 (89.8%) of the samples had glycerol concentrations ≤20 µg/mL. The highest glycerol concentration observed was 652 µg/mL. Analysis of the data finds the effects of each category to be statistically significant. The largest estimate of the 99.9th percentile, from the in-competition, female, strength athlete samples, was 1813 µg/mL with a 95% confidence range from 774 to 4251 µg/mL. This suggests a conservative threshold of 4.3 mg/mL, which would result in a reasonable detection window for urine samples collected in-competition for all genders and sport classes.

This work is published as:

Kelly, B. N., Madsen, M., Sharpe, K., Nair, V. and Eichner, D. (2013), A population study of urine glycerol concentrations in elite athletes competing in North America. *Drug Test Analysis*. **5**(11-12):890-5