

PROJECT REVIEW

“Influence of renal flow rate on urinary concentration of compounds of interest to anti-doping agencies”

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Changes in the rate of urine formation will affect the concentration of doping agents in the urine, but may not do so in a uniform manner. This raises the possibility that athletes may manipulate urine flow rates to evade detection of prohibited substances. It also offers a potential basis for appeal by an athlete who has failed a test. A tested athlete may be acutely dehydrated after training or competition, resulting in an extremely high total solute concentration in the urine sample obtained. If athletes are unable to produce a sample, and are allowed water or other drinks to stimulate urine flow the solute concentration of the urine sample obtained may then be extremely low due to an acute increase in urine flow rate. This is likely to be followed by a refractory period during which lipid-soluble metabolites will be excreted in lower than normal amounts as these compounds will be released from lipid depots at a relatively constant rate. Any sudden change in urine flow rate is likely to disturb this equilibrium and result in a temporary mis-match between concentrations in the tissues and the urine. It is therefore important to quantify the effects of changes in urine flow rate on the excretion patterns of prohibited substances so that allowance may be made for these effects. Urine composition may be affected by acute changes in the rate of urine formation, due to differences in the size, polarity, lipid solubility and other physio-chemical properties of components excreted. Changes in the measured concentration and/or time-course of excretion of diagnostic markers for prohibited substances will be of interest to anti-doping. A fundamental understanding of the effect of acute changes in hydration status will be particularly important in establishing acceptable parameters for metabolite excretion profiles with the application of the athlete passport.