



## DRUG TESTING INFORMATION SHEET NICOTINE / COTININE

**Classification:** Stimulant

**Background:** Nicotine is a drug to which virtually every member of a tobacco using society is exposed. Although cotinine (the metabolite of nicotine) is often detected in the urine of nonsmokers, the level of urinary cotinine can still be used to differentiate smokers from nonsmokers who are exposed to second-hand tobacco smoke.

**Legal Use:** Although use of tobacco is legal in the US, its sale to minors is prohibited.

**Modes of Use:** Tobacco is normally smoked or chewed but it can also be absorbed through the skin.

**Appearance:** leafy plant

**Metabolism and Detection Time in Urine:** In the body nicotine is rapidly converted to cotinine which is subsequently eliminated in the urine. Only a small fraction of the parent nicotine is eliminated in the urine and its detection time following use is short compared to cotinine. The presence of cotinine is accepted evidence of nicotine use and can be detected in the urine for as long as 2-5 days after use.

**Bodily Effects:** Desirable effects of nicotine include stimulation and a sense of well being. Prolonged use can lead to physical dependency.

**Cutoff Level:** The cotinine result is reported with respect to the urine creatinine level (creatinine is a natural body elimination byproduct) to correct for the urine concentration.

Cotinine cutoff level: 500 ng of cotinine per mg of creatinine (500 ng/mg)

**Interpretation of Results:** A urine cotinine level greater than 500 ng/mg indicates recent nicotine use. Studies have shown that although nicotine can be absorbed from second-hand smoke, second-hand smoke is not sufficient to cause a cotinine level greater than 500 ng/mg. Conversely, levels between 100 -500 ng indicate infrequent smoking or intense exposure to second-hand smoke. Finally, a level less than 100 indicates very little exposure to nicotine.

**References:**

1. R.C. Baselt and R.H. Carvey, *Disposition of Toxic Drugs and Chemicals in Man*, fourth ed. (1995) Chemical Toxicology Institute, Foster City CA, p. 543 – 547.
2. Cotinine Enzyme Immunoassay, Diagnostic Reagents, INC, (1996), Sunnyvale CA
3. M.J. Jarvis, Hugh Tunstall-Pedoe, C. Feyerabend, C. Vesey, Y. Saloojee, Comparison of tests used to distinguish smokers from nonsmokers, *American Journal of Public Health*, (1987), 77, p. 1435-1438

**Review:**

- A group of nonsmokers had urine cotinine levels between 0–64 ng/mg. After staying in a smoky room for 80 minutes their levels were between 13-200 ng/mg. Daily smokers had urine cotinine levels between 1000-20,000 ng/mg. (1)
- The manufacturer of testing reagents recommends the use of a 500 ng/mg cutoff to indicate chronic smokers. (2)
- The authors of a study of 211 people attending a cardiovascular clinic reported that a 50 ng/mg cutoff could discriminate smokers from nonsmokers. (3)