

Patient Information

Serum

Caffeine

Neonates: 12 – 36 mg/L

Adults:

Normal: < 2.0 mg/L

High: \geq 2.0 to < 5.0 mg/L

Very High: \geq 5.0 mg/L

Paraxanthine

Adults:

Normal: < 1.2 mg/L

High: \geq 1.2 to < 2.1 mg/L

Very High: \geq 2.1 mg/L

Urine

Adults:

Caffeine/creatinine ratio

Normal: < 0.5 mg/mmol

High: \geq 0.5 to < 1.75 mg/mmol

Very High: \geq 1.75 mg/mmol

Paraxanthine/creatinine ratio

Normal: < 1.5 mg/mmol

High: \geq 1.5 to < 3.05 mg/mmol

Very High: \geq 3.05 mg/mmol

References

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Caffeine and Paraxanthine in Serum and Urine

Clinical Biochemistry



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Introduction

Caffeine is consumed by more than 90% of adults daily and is found in coffee, tea, chocolate and energy drinks. It is also combined with analgesics and produced in a tablet form for fatigue relief.

Caffeine and its main metabolite paraxanthine are both central nervous system stimulants which, among other effects, can increase blood pressure and accentuate heart beats. Caffeine also has psychoactive properties leading to reduced fatigue and increased alertness.

Excessive consumption of caffeine and subsequent withdrawal can lead to non-specific side-effects such as anxiety, depression, palpitations, migraine and insomnia.

Clinical Studies

In clinical studies we have demonstrated that there are a significant proportion of individuals of all ages with 'high' and 'very high' caffeine levels (*Figure 1*). These individuals will often be consuming excessive amounts of caffeine and subsequently experiencing the adverse side-effects of dependence and withdrawal.

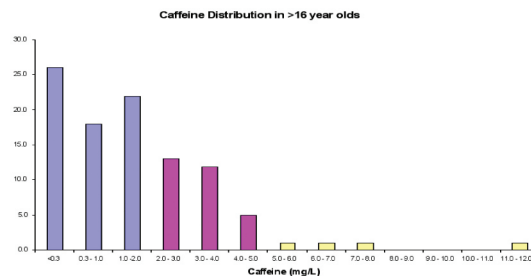


Figure 1

Key: - 'Normal' caffeine = ■ < 2.0 mg/L caffeine & < 1.2 mg/L paraxanthine
'High' caffeine = ■ ≥ 2.0 but < 5.0 mg/L caffeine & ≥ 1.2 but < 2.1 mg/L paraxanthine
'Very high' caffeine = ■ ≥ 5.0 mg/L caffeine & ≥ 2.1 mg/L paraxanthine

Clinical Use of Caffeine Measurement

Neonates: Due to its stimulant effects, caffeine therapy is used in neonates to treat apnoea of prematurity. Monitoring of caffeine levels during treatment is of use in those infants who show signs of toxicity or who are not responding to a standard dose.

Adults: Caffeine can play a role in a number of clinical presentations such as headache, insomnia and palpitations, and the measurement of caffeine in older children or adults could help identify those patients whose symptoms are caused by an excessive caffeine intake.

City Hospital Caffeine Service

Assay

Our assay measures caffeine and its major metabolite paraxanthine by HPLC. Caffeine and paraxanthine can be measured in both urine and serum, with between batch CV's of <4.5 % for caffeine and < 9 % for paraxanthine. undetectable levels (deficient).⁴

Sample Requirements

Either serum in a gel separator tube or plasma from a lithium heparin tube; minimum volume 500 µL.

Urine must be supplied in a plain white-topped universal; minimum volume 1 mL.

Serum samples need to be collected 1 – 2 hours post dose in neonates receiving caffeine therapy.

Serum samples are stable for 7 days when stored between 2-8 °C and urine samples are stable for 7 days at room temperature.

Units

Caffeine and paraxanthine creatinine ratios provide a more representative measure of urine caffeine and paraxanthine than results expressed in mass units. Urine results are therefore reported in mg/mmol of creatinine. Serum/plasma results are reported in mg/L.

