

Péronnet F, Mignault D et al, 2011 - Pharmacokinetic analysis of absorption, distribution and disappearance of ingested water labeled with D2O in humans



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This study describes the rate of absorption of water in the body water pool and the volume and rate of renewal of this pool. The experiment was conducted on 36 healthy male subjects (18-35 yo, 76.9 kg, BMI = 23.3 kg/m²) drinking ad libitum, with 2 L/day of natural mineral water in their beverages. Following ingestion of natural mineral water with deuterium oxide (D₂O) as tracer, the deuterium to hydrogen ratio (D/H) was measured in blood over the following hour and in urine over the following 9 days.

Pharmacokinetic analysis of D/H show that water appeared in plasma and blood cells within 5 min following ingestion and was entirely distributed in the body water pool within ~75-120 min. The volume of the body water pool was 46.6 L (60.7 % body mass) and its turnover (or water clearance, i.e., the volume added in the pool from water in food and drinks and metabolic water, and removed from the pool through urine, feces, sweat, perspiration, and respiration, was 4.58 L/day. The mean residence time of water in the body water pool was 10.3 days indicating that half of the pool (i.e., the half-life) was replaced in 7.2 days.

Water ingested under the form of natural mineral waters, with a low mineral content, appears in plasma and blood cells in less than 5 min, and is distributed in the entire body water pool in less than 2 hours. In the young healthy male subjects studied who remained well hydrated by drinking 2 L of natural mineral water/day, the entire body water pool was completely renewed in ~50 days.

Péronnet F, Mignault D, du Souich P, Vergne S, Le Bellego L, Jimenez L, Rabasa-Lhoret R. Pharmacokinetic analysis of absorption, distribution and disappearance of ingested water labeled with D₂O in humans. European Journal of Applied Physiology, Published Ahead-of-print, October 2011.