# Appendix H

Endogenous Production Derivation

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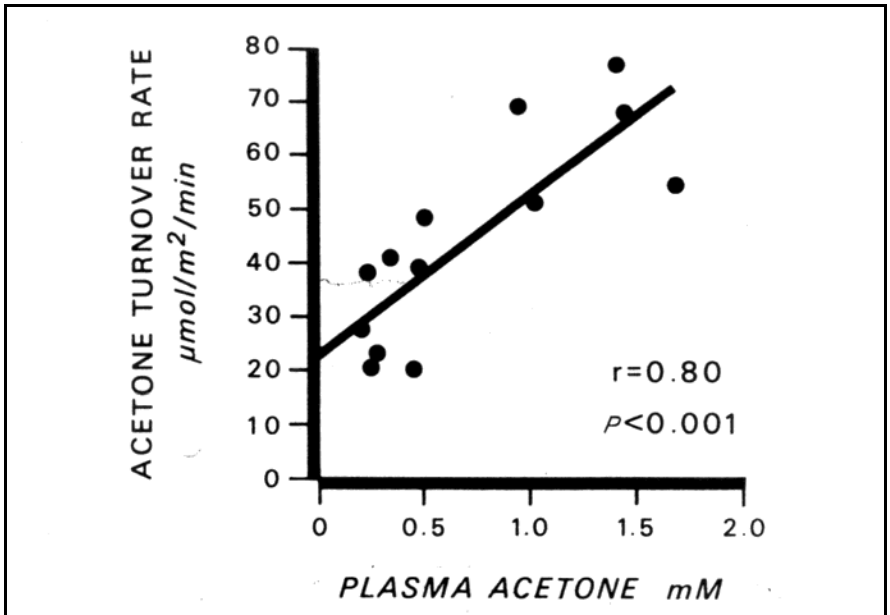
There is a direct relationship between plasma acetone turnover and acetone concentration (when less than 5 mM) as shown in the Reichard et al (1979) study and Owen et al (1982) study. Thus, for normal healthy adults the range of acetone production was derived from the relationship of blood acetone levels and acetone "turnover rates" as reported by Reichard and Owen. The reported blood acetone values presented in the Patty's chapter ranges from 0.43 mg/L to 28.6 mg/L. This range corresponds to a plasma acetone level of 0.007 mM to 0.48 mM (10 mg/L = 0.17 mM). The following equation was used to calculate a range of daily endogenous production:

$$Endogenous \cdot dose(mg/kg/day) = \frac{TO \times SA \times MW \times 60\,\text{min}/hr \times 24hr/day}{BW \times 1000\mu g/mg}$$

where: TO = Acetone Turnover rate (endogenous dose) (μmol/lmin-$m^2$);
SA = surface area (1.73 $m^2$);
MW = molecular weight of acetone (58.08 μg/μmol); and
BW = body weight (70 kg).

The endogenous doses (turnover rates) were estimated from Figure 3 of Reichard *et al*. (1979), as shown below.




Relationship between plasma acetone concentration and turnover rate. A significant correlation between concentration and turnover rate ($r = 0.80$, $P < 0.001$) was obtained.

The low end of the range of blood acetone concentrations (0.007 mM) falls outside of the range of the Reichard et al data and an exact value of the endogenous dose that corresponds to that value could not be ascertained because Reichard et al did not publish the regression equation. Although Figure 3 shows that a blood acetone level of zero has a y-intercept of approximately 20 µmol/lmin-$m^2$, lack of the regression equation made selection of a turnover rate at the low end of the normal human range highly uncertain. Therefore, based upon AMEC's professional judgment, 10 µmol/$m^2$/min was chosen as a plausible endogenous dose associated with this plasma level. The maximum acetone blood concentration of 0.48 mM corresponds to a turnover rate of approximately 35 µmol/$m^2$/min. Based on these two values and using the equation above, the range of adult daily endogenous acetone production was 20 to 72 mg/kg-d.