

The relationship between energy intake and gastric emptying time in cystic fibrosis

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Cystic fibrosis (CF) is the most common genetically inherited disease in Caucasians. It is a terminal disease with death usually resulting from severe lung disease and malnutrition. Poor appetite is a well recognised feature of CF. Delayed mouth to caecum transit times have been reported. Malnourished young people with Crohn's disease have been shown to have delayed gastric emptying. The possibility of delayed gastric emptying times contributing to reduced energy intakes in CF has been examined.

The study is a cross-sectional measurement of energy intakes, clinical status, faecal fat excretion and gastric emptying times in the John Hunter Hospital CF clinic population and normal controls. Nineteen subjects with CF, mean age 12.6 years (11 females and eight males) and 11 control subjects were studied. Energy intake was assessed using a 4-day weighed food record. Clinical status in CF was assessed using the Shwachman score and faecal fat excretion determined from a 3-day stool collection analysed by the method of van der Kamer. Gastric emptying was assessed using a standard test meal of pancakes labelled with 99 Tcm-macroalbumin aggregates. The half emptying time of solids from the stomach was recorded.

Mean energy intake for the subjects with CF was 115% RDI versus 90% RDI for the controls. This difference was significant, 95% CI (5.2, 43.9), $P = 0.01$. The correlation of gastric emptying time with energy intake was significant for the subjects with CF ($r = -0.50$, $P < 0.05$). Those who had faster gastric emptying times also had higher relative energy intakes. Unexpectedly, the median gastric emptying time for the subjects with CF was significantly shorter than the controls, 95% CI for the difference (-52.0, -12.0), $P = 0.006$. Statistically significant positive correlations were also observed between %RDI for energy and the weight of the test meal consumed for both the subjects with CF ($r = 0.49$, $P < 0.05$) and the controls ($r = 0.60$, $P < 0.05$).

It appears that fast gastric emptying and/or the ability to consume a lot of food in one sitting is associated with higher relative energy intakes in CF. Older 'survivors' were more likely to have adequate energy intakes. Assessment of gastric emptying time may be a useful screening tool for individuals with CF who have suboptimal energy intakes. If fast gastric emptying times confer a survival advantage in CF or conversely, slow emptying a survival disadvantage, through impaired nutritional status secondary to inadequate energy then detecting individuals with CF and slower gastric emptying may become an important focus in the future.

1. Grill BB, Lange R, Markowitz R et al. Delayed gastric emptying in children with Crohn's disease *J Clin Gastro* 1985; 7:216-26.
2. Ramsey BW, Farrell PM, Pencharz P. Nutritional assessment and management in cystic fibrosis: a consensus report. *Am J Clin Nutr* 1992; 55:108-16.