# LETTERS TO THE EDITOR

## Radionuclide imaging of gastric emptying

EDITOR, – I would like to comment on the paper by MacLaren *et al*[1] reporting the use of radionuclide imaging to determine gastric emptying during exercise. In their study they could not detect any difference in the rates of emptying of a 5% glucose solution and an isoosmotic maltodextrin solution that appears to contain ~20% carbohydrate. There is a large body of evidence, accumulated over many years, that shows that carbohydrate concentration has a greater effect on the gastric emptying rate than osmolality within this concentration range.[2] The findings of this study therefore require examination.

It is known that single field scans, without correction for tissue attenuation, result in significant errors of measurement,[3] and may well be the reason for the extremely variable emptying patterns shown in figs 2 and 3 of MacLaren's paper. The use of AUC values to compare emptying rates gives no indication of the shape of the emptying curves and reduces the sensitivity of the technique. I am curious to know what units are used in reporting the AUC values.

Without a measure of the sensitivity of this modification of the scintigraphic technique, or an indication of the power of the study, the value of this paper is debatable. I would suggest that the main conclusion of this study is not that the method was repeatable, but that it is not sensitive enough to detect differences in gastric emptying rates between 5% and 20% carbohydrate solutions.

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1 MacLaren D, Miles A, O'Neill I, Crichley M, Grime S, Stockdale H. Use of radionuclide imaging to determine gastric emptying of carbohydrate solutions during exercise. *Br J Sports Med* 1996;**30**:20–3
2 Vist GE, Maughan RJ. The effect of osmolality and carbohydrate content on the rate of gastric emptying of liquids in man. *J Physiol (Lond)* 1995;**482**:523–31.
3 Collins PJ, Horowitz M, Cook DJ, Harding PE, Shearman DJC. Gastric emptying in normal subjects–a reproducible technique using a single scintillation camera and computer system. *Gut* 1983;**24**:1117–25.

### The authors reply:

In response to Mr Leiper's letter, we offer the following explanations:

(1) We concur with the statement that there is a large body of evidence showing that the energy content of ingested fluid appears to be a primary determinant of gastric emptying, but that is not what we found in this study. The majority of studies on gastric emptying during exercise have focused on the intubation technique—this is the first study to examine gastric emptying directly using scintigraphic techniques while the subject is actually exercising.

(2) It is true that posterior to anterior movement of food from the fundus to the body of the stomach can, when imaging the subject using a single headed gamma camera (we presume that is what Mr Leiper refers to as "single field scan"), lead to errors in the early assessment of gastric emptying. Dual headed cameras and geometric mean image analysis would help to resolve the problem of tissue attenuation. If Mr Leiper feels that without a dual headed camera and associated depth corrections, gastric emptying studies cannot correctly be performed, then he should be informed that the majority of nuclear medicine departments in the country that are involved in gastric emptying studies do not possess dual headed cameras. Yet these same departments produce clinically acceptable information which is of value to referring clinicians, and helps in the diagnosis and management of gastric disorders.

(3) We are aware of the potential errors in the quantification of gastric emptying studies using a single headed system, and it was for this reason that each subject acted as his own control. We made the assumption that any anatomical movement of the ingested material and any bowel overlap in the region of interest that may occur would be consistent for each individual. This is indeed what we found, for each individual the pattern of emptying on each of the four occasions was remarkably consistent and so repeatable. Any variations that occurred were due to interindividual differences not to intraindividual differences. Examination of figs 2 and 3 clearly reflect these findings. No subjects "dumped" the ingested material, but subjects could be classified as "slow emptiers" or "fast emptiers".

(4) The statement that the area under the curve (AUC) does not carry any information about the shape of the emptying patterns is true, but that is why we published figs 2 and 3. The AUC is an acceptable method of quantification in areas where conventional single exponential, double exponential, or power exponential curve fits are not acceptable. We admit that the sensitivity of AUC decreases as the emptying time increases. Since each subject's curves were normalised to their own maximum image count (which incidently was the same frame on each of the subjects' four studies), and we never proposed to compare one subject with another, the question of units is irrelevant; however, the units we used were per cent retention time.

We do have to state quite vehemently that variations in gastric emptying found between individuals but not within individuals surely must reflect the fact that the scintigraphic technique we employed is sensitive enough or we would have obtained similar results throughout. The fact that our findings are not consistent with studies using the intubation technique needs elucidating.

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## Systematic review of physical activity promotion strategies

EDITOR, – Your review article on systematic review of physical activity promotion strategies[1] reviews randomised controlled trials of physical activity promotion in apparently healthy, free living adults from the USA. From this it states that these findings do not support the promotion of physical activity in the United Kingdom by general practitioner exercise prescription schemes.

It is established that the primary care physician is influential in promoting physical activity to patients.[2–4] My own experiences confirm this. In the 10 exercise prescription scemes operating in East Sussex, initial attendance rates are over 90%. The importance of physical activity is firmly established in the scientific literature. Unfortunately, this is of little value to the general practitioner unless he has a practical means to help bring about a permanent change in lifestyle, incorporating regular and appropriate physical activity. Referring patients for exercise is a strategy to engage sedentary, at risk patients in regular controlled exercise in a safe environment. All general practitioners in the scheme undergo training, supported by a fully referenced manual. The centres are served by staff trained by the first university accredited course on GP referral schemes at the University of Brighton which reassures the GPs of the expected standard of care. The staff aim to educate patients concerning the benefits of activity and risks of continued inactivity, with the ultimate aim of empowering patients to control their own health and exercise more safely in the manner of their choosing. This may well not take place in the leisure centre—only approximately 20% continue their exercise within the centre on completion of the programme. Walking is one of the most commonly employed modes of exercise, contrary to the article's statement.

Raising the level of physical activity in the population is desirable and it would be foolish to surmise that one strategy alone will achieve this. Physician based counselling and referral for supervised activity is only a small part in that jig-saw. There appears to be a lack of understanding of the role of GP referral schemes. But throwing away one part of the jig-saw may ruin the whole picture. Regrettably Hillsdon and Thorogood[1] appear eager to discredit a system unique to the United Kingdom on the basis of American trials, with healthy subjects and only telephone follow up in many cases. The majority of home based programmes described had no postintervention follow up and it is therefore flawed to conclude that these were more likely to result in long term change in physical activity behaviour. While further research (and funding) in this area is required to substantiate long term behavioural change, it is important not to discourage those striving to motivate an at risk section of the population.

While appreciating that this is a review article, I have to confess that I was disappointed to see this paper accepted for publication in its current form. It bears so much resemblance to their previous review[5] of controlled trials of physical activity that the introduction, discussion and "future research" merely display the value of the word processor, and it adds little to the published literature on this subject. Nine of the 12 papers were already discussed in the previous review.

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1 Hillsdon M, Thorogood M. A systematic review of physical activity promotion strategies. *Br J Sports Med* 1996;**30**:84–89
2 Lewis BS, Lynch WD. The effect of physician advice on exercise behaviour. *Prev Med* 1993;**22**: 110–21.
3 Logsdon DN, Lazaro CM, Meier RV. The feasibility of behavioural risk reduction in primary care. *Am J Prev Med* 1989;5:249–56.