Diuretics in the elderly: how safe?

Around one fifth of people over 65 take diuretics.¹ Not surprisingly, therefore, diuretics are the commonest cause of adverse drug reactions in old age.² One of the most serious side effects is hyponatraemia, which occurs in about one fifth of old people taking diuretics. In severe cases it causes a range of problems that includes weakness, confusion, postural giddiness, postural hypotension, falls, transient hemiparesis, and fits.³ Old people also have a diminished renal reserve so that in them diuretics are more likely to precipitate a prerenal uraemia than in younger people.⁴

The effect of diuretics on potassium balance is more contentious. Around one in 20 elderly patients taking diuretics have hypokalaemia,⁵ but the effect of diuretics on intracellular potassium concentrations is less dramatic.⁵ Hypokalaemia may increase the risk of cardiac arrhythmias, but in patients with uncomplicated hypertension the risk is minimal.⁶ The problem is more critical for patients taking cardiac glycosides because hypokalaemia greatly accentuates the cardiotoxicity of these agents.⁷ Claims that a low dietary intake of potassium in the elderly gives rise to muscle weakness have not been substantiated.⁸

Diuretics also have some less immediate metabolic effects. These include hyperuricaemia, which in elderly women and less often in men gives rise to a low grade tophaceous gout.⁹ Serum cholesterol concentrations may also rise, but the effect is transient—and there is no evidence that it increases the risk of cardiovascular disease.¹⁰ The effect of diuretics on carbohydrate metabolism is more serious, particularly in old age as they may give rise to overt diabetes mellitus with serious long term complications.¹¹

Curious and less common side effects include an increased risk of acute pancreatitis or cholecystitis.¹²⁻¹³ Large doses of loop diuretics occasionally cause deafness,¹⁴ but a more practical problem in old people with limited mobility or hypertonic bladders is that diuretics may precipitate incontinence.¹⁵

Various steps may be taken to reduce the risk of toxicity. One is to use diuretics with extreme caution if there is any evidence of renal impairment. All diuretics can cause uraemia and hyponatraemia, but combinations of a diuretic and a potassium sparing agent are particularly likely to do in the elderly.¹⁶ Another step is to review serum electrolyte concentrations from time to time. When the patient is stable it is reasonable to measure the blood urea and electrolyte concentrations at the beginning and then to reassess them after one month and two months.¹⁷ Further changes are

unusual after this unless the condition of the patient changes or the dose of diuretic is changed. The need for continued treatment should also be kept under review: thiazides may often be substituted for loop diuretics, and in many cases it is possible to discontinue diuretics altogether.¹⁸

The debate on preventing potassium depletion has yet to be resolved. In old age a daily dose of at least 24 mmol of potassium is required to prevent or correct depletion.¹⁹ An alternative is to give potassium sparing agents: if given combined with diuretics they are easier to take and at least as effective as potassium supplements.²⁰ Against this must be weighed their tendency to cause hyponatraemia and uraemia in patients with poor renal function. Giving potassium supplements or sparing agents does not eliminate the need to check serum electrolyte concentrations. Some patients go on to develop hyperkalaemia, a condition far more likely to cause cardiac arrhythmia and sudden death than potassium depletion.²¹⁻²³

Diuretics are valuable in many of the disorders that afflict the elderly, but they are more likely in the elderly to cause side effects. Prerequisites for using them are an accurate diagnosis, careful monitoring for efficacy and side effects, and regular review of the need for continued treatment.

W J MacLENNAN

Professor of Geriatric Medicine,
City Hospital,
Edinburgh EH10 5SB

- 1 Castleden CM, George CF. Prescriptions for the elderly. In: O'Malley K, ed. *Clinical pharmacology and drug treatment in the elderly*. Edinburgh: Churchill Livingstone, 1984:71-98.
- 2 Williamson J, Chopin JM. Adverse reactions to prescribed drugs in the elderly: a multicentre investigation. *Age Ageing* 1980;9:73-80.
- 3 Sunderam SG, Mankikar GD. Hyponatraemia in the elderly. *Age Ageing* 1983;12:77-80.
- 4 MacLachlan MSF. The ageing kidney. *Lancet* 1978;ii:143-5.
- 5 Kassirer JP, Harrington JT. Diuretics and potassium metabolism: a reassessment of need, effectiveness and safety of potassium therapy. *Kidney Int* 1977;11:505-15.
- 6 Papademitriou V. Diuretics, hypokalaemia and cardiac arrhythmias: a critical analysis. *Am Heart J* 1986;111:1217-23.
- 7 Steiners E. Diuretics, digitalis and arrhythmias. *Acta Med Scand [Suppl]* 1981;647:75-8.
- 8 Burr ML, St Leger AS, Westlake CA, Davies HEF. Dietary potassium deficiency in the elderly: a controlled trial. *Age Ageing* 1975;5:148-51.
- 9 MacFarlane DG, Dieppe PA. Diuretic induced gout in elderly women. *Br J Rheumatol* 1985;24:155-7.
- 10 Freis ED. The cardiovascular risks of thiazide diuretics. *Clin Pharmacol Ther* 1986;39:239-44.
- 11 Helderman JH, Elahi D, Anderson DK, et al. Prevention of the glucose intolerance of thiazide diuretics by maintenance of body potassium. *Diabetes* 1983;32:106-11.
- 12 Eckhauser ML, Dokler MA, Imbembo AL. Diuretic-associated pancreatitis: a collective review and illustrative cases. *Am J Gastroenterol* 1987;82:865-70.
- 13 Van der Linden W, Ritter B, Edlund G. Acute cholecystitis and thiazide. *Br Med J* 1984;289:654-5.
- 14 Koegel L. Ototoxicity: a contemporary review of aminoglycosides, loop diuretics, acetylsalicylic acid, quinine, erythromycin and cisplatin. *Am J Otol* 1985;6:190-9.
- 15 MacLennan WJ. Use and abuse of diuretics. In: Evans JG, Caird FI, eds. *Advanced geriatric medicine*—4. London: Pitman, 1984:127-33.

- 16 Borland C, Amadi A, Murphy P, Shallcross T. Biochemical and clinical correlates of diuretic therapy in the elderly. *Age Ageing* 1986;15:257-63.
- 17 Ramsay LE, Ramsay MH. Rational potassium prescribing. *Practitioner* 1977;219:529-36.
- 18 Burr ML, King S, Davies HEF, Pathy MSJ. The effects of discontinuing long-term diuretic therapy in the elderly. *Age Ageing* 1977;6:38-45.
- 19 Lye M. Potassium supplements in elderly patients with cardiac failure. *Practitioner* 1983;224:1314-5.
- 20 Papademitriou V, Burris J, Kukich S, Freis ED. Effectiveness of potassium chloride or triamterene in thiazide hypokalaemia. *Arch Intern Med* 1985;145:1986-90.
- 21 Lawson DH. Adverse reactions to potassium chloride. *Q J Med* 1974;43:433-40.
- 22 Bender AD, Carter CL, Hanson KB. Use of a diuretic combination, triamterene and hydrochlorothiazide in elderly patients. *J Am Geriatr Soc* 1967;15:166-73.
- 23 Greenblatt DJ, Koch-Weser J. Adverse reactions to spironolactone. *JAMA* 1973;225:40-3.

Do we still need to measure faecal fat?

Measuring faecal fat has been the gold standard for detecting fat malabsorption, although its limitations are widely recognised.¹ The test is subject to errors of collection and day to day variation in fat excretion. In addition, it is unpleasant for the patients and staff, and some patients may have difficulty fulfilling the need for a minimal daily fat intake of 50 g.² Now that we have other chemical tests for malabsorption we must ask two questions: are there now practical and reliable alternatives to measuring faecal fat, and when are these tests likely to be helpful in clinical practice?

Many alternatives to measuring faecal fat have been proposed—for example, faecal microscopy and absorption tests using triolein labelled with iodine-131 and vitamin A and butterfat—but discrimination between controls and patients is poor.^{1,3} The paper by Newcomer and others⁴ stimulated interest in using carbon-14 breath tests in investigating malabsorption, and the ¹⁴C-triolein test is an attractive alternative to faecal fat estimation, detecting both absorptive failure and pancreatic disease.⁴ It has a high predictive accuracy, is acceptable to patients and staff, and can be completed in a working day in outpatients. We have used ¹⁴C-triolein in a gluten free mouse containing 19.3 g fat.⁵ In an initial study we showed complete discrimination between controls and patients with steatorrhoea, and in a prospective investigation we found a sensitivity of 85% and a specificity of 93% (100% when two obese people were excluded). The test can replace faecal fat estimation as an index of malabsorption, although its place in clinical practice remains to be determined as there are other investigations that provide more specific information.

As well as testing for malabsorption, measurement of faecal fat assesses the function of the exocrine pancreas. But specific tests are now available⁶ so that faecal fat is no longer required for this purpose. The fluorescein dilaurate test necessitates urine collections on two consecutive days, making it inconvenient as an outpatient procedure, although measuring urinary fluorescein is technically simple.⁷ The *N*-benzoyl-L-tyrosyl-*p*-aminobenzoic acid test with the addition of a ¹⁴C-*p*-aminobenzoic acid marker is a valuable screening test in patients with suspected pancreatic insufficiency,⁸ but the main problem has been the non-specificity of the chemical assay for *p*-aminobenzoic acid. Recent modifications use *p*-aminosalicylic acid as a pharmacokinetic marker with high performance liquid chromatography for simultaneously measuring *p*-aminobenzoic acid and *p*-aminosalicylic acid.^{9,10} Excretion indices are then derived and are close to those obtained using ¹⁴C-*p*-aminobenzoic acid; and a non-isotopic marker now enables the test to be used in children.

There are thus now reliable alternatives to measuring faecal fat to detect malabsorption, but under what circumstances are they likely to be helpful? Medical textbooks list the many conditions in which malabsorption may occur, but showing steatorrhoea does not usually aid the diagnosis or management. For example, there may be varying degrees of steatorrhoea after small bowel resection or in Crohn's disease, but measurement neither contributes to the diagnosis nor helps in treatment. Some have advocated using ¹⁴C-triolein absorption as a screening test in patients with unexplained bowel disturbances despite a normal result not excluding gastrointestinal disease.¹¹ We believe that neither faecal fat measurements nor a ¹⁴C-triolein test should be used for screening because exact diagnoses need to be made in patients with potentially treatable conditions, and the best chance of achieving this is by using more appropriate investigations.

The investigation of patients presenting with bowel disturbance begins with the history and physical examination and may move on to sigmoidoscopy with rectal biopsy; blood tests, looking particularly at the haemoglobin concentration, mean corpuscular volume, erythrocyte sedimentation rate, and serum albumin concentration; stool examination; and radiological examination. Patients with infective diarrhoea, ulcerative colitis, Crohn's disease, or other colonic disease and many with the irritable bowel syndrome will be confidently diagnosed. Some of those who cannot be diagnosed with these tests may have pointers to coeliac disease or pancreatic insufficiency and need further investigations.

Coeliac disease, which affects at least one in 2000 of the general population, is increasingly diagnosed because of greater awareness of two factors: firstly, the many ways in which it may present; and, secondly, the importance of abnormalities in haematological and biochemical tests such as mild anaemia, raised mean corpuscular volume, and decreased concentrations of folate in red cells and serum. Although faecal fat estimations were used in investigating coeliac disease, this is now unnecessary as steatorrhoea is found in only a minority of patients.^{12,13} Though interest has recently focused on tests of intestinal permeability and antigliadin antibodies in diagnosing coeliac disease,^{14,15} the diagnosis can still be made reliably only by biopsy of the small intestine. Coeliac disease is treatable, and when it is suspected most gastroenterologists would now proceed directly to a biopsy of the small bowel.¹⁶

Now that we have reliable oral tests for exocrine pancreatic function, the measurement of faecal fat is unnecessary when investigating pancreatic insufficiency or monitoring replacement treatment. Other investigations, particularly abdominal ultrasonography and endoscopic retrograde cholangiopancreatography may be used alone or in conjunction with these tests to improve further diagnostic accuracy in pancreatic problems.^{8,17}

In the Derby hospitals, with a catchment population of 450 000, no faecal fat estimations have been carried out in the past three years—and nothing suggests that this policy should change. We should not regret the passing of measurements of faecal fat but use the newer tests when biochemical investigations for malabsorption are required.

G K T HOLMES
Consultant Physician

P G HILL
Top Grade Biochemist

Departments of Gastroenterology
and Chemical Pathology,
Derbyshire Royal Infirmary, Derby DE1 2QY