

# Patient cases

Tube feeding in surgical and gastro-intestinal patients.  
What Fresubin® can do for your patients.





## Tube feeding in surgical and gastrointestinal patients

Managing the risk of malnutrition is important when dealing with surgical patients and those with gastrointestinal diseases. Perioperative nutrition should be considered to maintain a good nutritional status – not least to be able to avoid postoperative complications but also to trigger positive effects on the general well-being of the patient.<sup>1</sup>



Malnutrition plays a decisive role as an independent risk factor regarding postoperative complications. Gastrointestinal diseases, like Crohn's disease, also present nutritional risk and inversely nutrition can play a major role in the management of such diseases. Enteral nutrition can help to maintain and improve the nutritional status, which in addition has positive effects on the patients' quality of life.<sup>2,3</sup>

**The following four example cases illustrate how different patients undergoing surgery and/or treatment for gastrointestinal diseases may benefit from tube feeding.**



# Case 1

## Short-term supplemental feeding following emergency bowel surgery

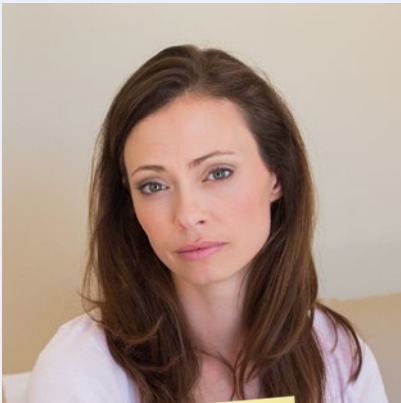
### Clinical summary



#### Presentation/clinical history

**Ms M, 38 years, teacher who was admitted 48 hours ago as an emergency due to a perforated bowel (previous history of chronic constipation)**

- Hemi-colectomy completed with re-anastomosis 24 hours ago, oral intake not yet established following surgery.
- Past medical history: cow's milk protein allergy (CMPA), constipation
- Medication: lactulose, bisacodyl, macrogol, paracetamol, calcium/vitamin D supplement
- Biochemistry: Na 140 mmol/l, K 4.2 mmol/l, Ur 5.9 mmol/l, Cr 74 µmol/l, Ca 2.08 mmol/l, PO<sub>4</sub> 1.07 mmol/l, Mg 0.73 mmol/l



#### Weight history

Normal weight	56.5 kg (BMI: 21.0 kg/m <sup>2</sup> )
Current weight	53.6 kg (BMI: 19.9 kg/m <sup>2</sup> )

- Weight loss of **5.1 %** in recent 4–6 weeks prior to surgery, not significant but as BMI low, at nutritional risk

*Short-term postoperative tube feeding by nasogastric tube may aid wound healing and prevent deterioration in nutritional status.<sup>4</sup>*

### Nutritional assessment



#### Estimated nutritional requirements

- Energy: 2010 kcal<sup>5,6</sup>  
(25 kcal x 53.6 kg + 1.0 stress factor due to non-complicated surgery and 1.5 due to low physical activity level)
- Protein: 53.6 g (1 g/kg)<sup>5</sup>
- Fluid: 2004 ml (using the 100/50/15 formula)<sup>7</sup>



#### Dietetic assessment

- Attended ward to review patient. Ms M is sitting up in bed, looks lethargic and appears low in mood.
- Bowels not opened post surgery.
- **Tried ONS but managing minimal amounts** (< 50 ml consumed/tolerated at one time despite maximum encouragement).
- Biochemistry indicated normal hydration (on 8-hourly IV fluids – 1500 ml).
- Small weight loss of 5% over past few weeks and due to low BMI, Ms M at risk of malnutrition.
- **Not meeting nutritional requirements orally therefore enteral tube feeding indicated.**
- Not at high risk of re-feeding as eating normally prior to admission.



#### Aim

- **Maintain nutritional status during recovery from surgery and optimise oral intake.**

### Tube feeding with Fresubin



#### Nutrition therapy

**Type of feeding tube: nasogastric tube (placement confirmed via aspirate) – 8Fr Freka**

- Feeding to commence via nasogastric tube to meet nutritional requirements.
- Cow's milk protein-free, nutritionally complete feed required due to long-standing cow's milk protein allergy.
- Fibre-containing feed is indicated to help maintain gut physiology.<sup>8-11</sup>
- Fish oil in the recommended daily intake for adults for cardiovascular protection.<sup>12-14</sup>

*Fresubin Soya Fibre provides a nutritionally complete solution to patients with cow's milk protein allergy.*

#### Day



#### Feeding regime

- 1 500 ml Fresubin Soya Fibre at 25 ml/hr x 16 hr (400 ml) approx. 7 a.m.–11 p.m. with 100 ml water flushes pre- and post-feed.
- 2 1000 ml Fresubin Soya Fibre at 50 ml/hr x 16 hr (800 ml) approx. 7 a.m.–11 p.m. with 100 ml water flushes pre- and post-feed.
- 3 1000 ml Fresubin Soya Fibre at 75 ml/hr x 13.5 hr approx. 7 a.m.–8.30 p.m. with 100 ml water flushes pre- and post-feed.  
Providing 1000 kcal, 38 g protein, 20 g fibre and 1030 ml fluid.

#### Monitoring/follow-up

- 2 Feed tolerated well during the day, currently running at 25 ml/hr as per protocol. Request IV fluids to be reduced to 12-hourly (1000 ml). Bowels not opened as yet but only had 1 day of feed – still titrating. Oral intake improved slightly, approx. 300 kcal and 10 g protein on cow's milk-free diet. Continue with regime as planned and increase on Fresubin Soya Fibre to 50 ml/hr x 16 hr with 100 ml flushed pre- and post-feed.
- 4 **Feed complete at day 3 of regime and tolerating 1000 ml of Fresubin Soya Fibre. Oral intake improved again – 750 kcal and 18 g protein. Total intake 1750 kcal and 56 g protein.** Weight ↑0.5 kg to 54.1 kg therefore meeting nutritional requirements. Bowels now opened 2 x since surgery – no problems reported, urine output good. Biochemistry checked, no problems. Patient seems well hydrated and not overloaded, IV fluids can be discontinued. Increase to 1000 ml Fresubin Soya Fibre at 100 ml/hr x 10 hr.
- 7 Oral intake not improved significantly – nausea reported therefore commence on anti-emetics to optimise oral intake. Bowels moving well, no new issues. Biochemistry remains within reference ranges. 1000 ml Fresubin Soya Fibre at 100 ml/hr x 10 hr. Continue with feeding as per current regime.
- 9 **Nausea improved and oral intake increasing.** Managing at least 1/2 main courses – approx. 1000 kcal and 35 g protein. Bowels moving well 1–2 x daily at present. Reduce feed to 500 ml Fresubin Soya Fibre in the evening (6 p.m.–11 p.m.) at 100 ml/hr with 50 ml water flushes pre- and post-feed. **Commence Fresubin ONS 1–2 x per day to maximise oral intake.** Review in 2–3 days, if weight stable and oral intake increased again, nasogastric feeding tube could be removed.
- 12 Weight 54.4 kg (↑0.3 kg but overall stable) – oral intake remains stable, 1/2 main course but also tolerating 2 x Fresubin ONS daily to meet nutritional requirements of 1500 kcal and 57 g protein. Bowels moving well. **Nasogastric tube can be removed – weight however to be monitored.**
- 15 Weight 54.5 kg – stable with BMI of 20.3 kg/m<sup>2</sup>. Ms M continues to have regular bowel movements and oral intake continues to improve. For discharge home today.

*Ms M met her nutritional requirements within 3 days of surgery despite having a cow's milk protein allergy.*

### Therapeutic outcome



#### 2 months post discharge

- **Ms M is back to normal routine and back at work. Weight remains stable.**
- **Bowels moving well post-surgery with no subsequent complications. She now no longer requires laxatives.**
- Supplemental feeding with Fresubin Soya Fibre was able to help meet fibre needs and maintain normal bowel function, particularly with recent bowel surgery and previous history of chronic constipation.<sup>8-11</sup>
- Fresubin Soya Fibre provides the recommended dose of vitamin D in RDD to prevent a deficiency and help to reduce the risk of fractures and falls.<sup>15,16</sup>

Case 2

Gastrostomy tube feeding in cystic fibrosis following lung transplantation

Clinical summary



Presentation/clinical history

Mr N, 19 years, student with cystic fibrosis admitted for a lung transplant 36 hours ago

- On transplant list for 7 months - virtually no oral intake due to shortness of breath. 15Fr Freka PEG in situ-feeding at home for 18 months.
- Previously maintaining weight with oral intake and Fresubin.
- Multiple hospital admissions over the past two years with respiratory exacerbatio.
- Oral intake poor following surgery and tube feeding to recommence to meet nutritional requirements.
- Past medical history: cystic fibrosis, previous PEG in childhood
- Medication: pancreatic enzymes, NaCl capsules, regular antibiotic therapy, steroid inhaler, O<sub>2</sub> therapy, saline nebulisers
- Biochemistry: Na 129 mmol/l, K 4.2 mmol/l, Ur 2.4 mmol/l, Cr 57 µmol/l, PO<sub>4</sub> 0.96 mmol/l, HbA1c 7.2 mmol/l



Early tube feeding helps meet nutritional requirements and reduce malnutrition risk in patients with poor oral intake following transplant surgery.



Weight history

Normal weight	57-62 kg (BMI: 18.6-20.2 kg/m <sup>2</sup> )
Current weight	64.7 kg (BMI: 21.1 kg/m <sup>2</sup> )

- Normal weight ranges depending on medical condition, however weight increased due to impending transplant. Weight stable for past 3-6 months

Nutritional assessment



Estimated nutritional requirements

- Energy: 2329-4658 kcal<sup>2,5,6</sup>  
(25 kcal x 64.7 kg + 1.2 stress factor and 1.2 physical activity factor - requirements for cystic fibrosis patients are individual and can be up to 200% of that of the healthy population)<sup>2</sup>
- Protein: 77.6-97 g (1.2-1.5 g/kg)<sup>2,3</sup>
- Fluid: 2171 ml (using the 100/50/15 formula)<sup>7</sup>



Dietetic assessment

- Day 4 post-op - breathing independently with overnight BIPAP and O<sub>2</sub> therapy, looks very lethargic and short of breath.
- Current feeding regime: 1000 ml Fresubin Original at 50 ml/hr x 24 hr - to change from 24 hr feeding now on ward.
- Currently on 8-hourly IV fluids (1500 ml) - catheter draining good, volumes 1950 ml.
- Loose stools reported (4 times daily) possibly secondary to pancreatic insufficiency - pancreatic enzymes via feeding tube to be given orally as enteric coated.
- Weight 64.7 kg - stable over past 3-6 months therefore not a re-feeding risk.
- Biochemistry indicated slight overhydration. Chronic low Na due to cystic fibrosis.
- Oral fluid better than food intake - mostly managing water (approx. 500 ml daily), also enjoys ice pops.
- Recommence PEG-feeding as oral intake not likely to meet increased nutritional requirements in the short to medium term.



Aim

- Maintain nutritional status during surgery and aid rehabilitation (likely to be in hospital for 4-6 weeks).

Tube feeding with Fresubin



Nutrition therapy

- Energy-dense, high-protein feed needed to meet increased demands following lung transplantation.
- High vitamin D is required due to frequent vitamin D deficiency in cystic fibrosis patients with pancreatic insufficiency.<sup>2</sup>
- Reduce feeding rate with more concentrated feed - titrate slowly to ensure tolerance following surgery and due to pancreatic insufficiency.
- Reduce IV fluids to 12-hourly, can be discontinued once on full feed volume.
- Commence high protein fortified menu options.

Day



Feeding regime

- 1000 ml Fresubin 2 kcal HP Fibre at 50 ml/hr x 16 hr approx. 7 a.m.-11 p.m. with 100 ml water flushes pre- and post-feed.
- 1000 ml Fresubin 2 kcal HP Fibre at 75 ml/hr x 13.5 hr approx. 7 a.m.-11 p.m. with 100 ml water flushes pre- and post-feed.

Water flushes of 100 ml pre- and post-medication also required (approx. 4 times daily). Providing 2000 kcal, 100 g protein and 1710 ml fluid - monitor oral fluid intake and IV fluids.

Monitoring/follow-up

- 2 Feed tolerated very well at 50 ml/hr. Oral intake remains poor due mainly to shortness of breath and pain. Continues on oxygen therapy and analgesia. Fluid intake continues to improve (approx. 700 ml). Ur and Cr normalising, Na remains low - continues on NaCl. Bowels moved twice - remains loose but reduced volume. Urine output excellent via catheter. Increase feeding rate to 1000 ml Fresubin 2 kcal HP Fibre at 75 ml/hr x 13.5 hr.
- 4 Tolerating feed well at 75 ml/hr for 13.5 hr with 100 ml water flushes overnight. IV fluid to be discontinued. Lung function good, no signs of any transplant rejection. Bowels moving 2-3 x daily - loose, continues on pancreatic enzymes. Urine output good, catheter removed. Oral intake improving (approx. 450 kcal and 20 g protein). Weight 63.1 kg. Total intake 1950 kcal and 95 g protein. Increase feeding rate to 100 ml/hr x 10 hr on 1000 ml Fresubin 2 kcal HP Fibre. Review in 2-3 days.
- 7 Recovering well and mobile on ward with assistance. Oral intake improved - 750 kcal and 25 g protein. Biochemistry within reference ranges with exception of Na: 133 mmol/l (improving). Continue with feed on 1000 ml Fresubin 2 kcal HP Fibre at 100 ml/hr x 10 hr and monitor weight.
- 10 Oral intake improving - approx. 1250 kcal and 40 g protein. Weight 63.6 kg (10.5 kg). Bowels moving 1-2 x daily - soft/loose. Aim to keep weight stable. Reduce feed to 500 ml Fresubin 2 kcal HP Fibre in the evening (6 p.m.-11 p.m.) at 100 ml/hr with 100 ml water flushes pre- and post-feed. Commence Fresubin ONS 1-2 x per day to maximise oral intake. Review in 2-3 days, if oral intake stable - continue with regime until rehabilitation complete.
- 14 Rehabbing well, lung function continues to improve. Oral intake improved again, approx. 1200 kcal and 45 g protein - eating 1-2 courses at meal times plus 1 x Fresubin ONS daily. Urine output good, 1-2 soft/loose bowel movements daily (normal for him). Feed via PEG continues on Fresubin 2 kcal HP Fibre at 100 ml/hr x 5 hr from approx. 7 p.m.-11 p.m. Total intake approx. 2200 kcal and 95 g protein. Weight 63.7 kg - still meeting nutritional requirements. Continue with supplemental gastrostomy feeding on Fresubin 2 kcal HP Fibre and encouragement of fortified foods.

Enteral tube feeding in cystic fibrosis patients, like Mr N, may help to improve weight gain, nutritional status and lung function, and may improve quality of life.<sup>12</sup>

Therapeutic outcome



2 months later

- Outpatient, lung transplant has been a success. Rehabilitated well and due to go back to his studies in the next few weeks.
- Oral intake continues to improve and weight stable at 63.9 kg. Supplemental feeding via PEG continues - Fresubin 2 kcal HP Fibre 500 ml in evening at 100 ml/hr x 5 hr.
- MCT fats contained in Fresubin 2 kcal HP Fibre may help reduce steatorrhea secondary to pancreatic insufficiency.<sup>18</sup>
- Fresubin 2 kcal HP Fibre contains 15 g fibre in 1000 ml which may normalise bowel function, help to reduce abdominal pain and prevent distal intestinal obstruction syndrome in combination with pancreatic enzyme therapy.<sup>8-10,19</sup>



Fresubin 2 kcal HP Fibre is an energy-dense, high-protein feed that meets increased demands following lung transplantation.



# Case 3

## Cardiac surgery and enteral tube feeding

### Clinical summary



#### Presentation/clinical history

**Mrs P, 65 years, retired nurse admitted to accident and emergency department 5 days ago following a myocardial infarction and subsequent cardiac surgery**

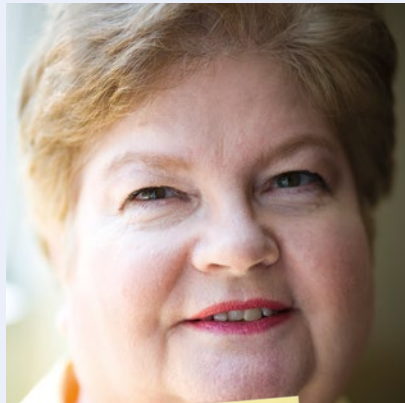
- A quadruple coronary artery bypass graft was completed.
- Not progressing to oral diet following surgery and referred to dietetics for short-term nasogastric tube feeding due to risk of malnutrition.
- Past medical history: angina, hypertension, high cholesterol
- Medication: statin, acetylsalicylic acid, glyceryl trinitrate spray
- Biochemistry: Na 143 mmol/l, K 4.1 mmol/l, Ur 5.8 mmol/l, Cr 71 µmol/l, Ca 1.97 mmol/l, PO<sub>4</sub> 0.99 mmol/l, Mg 0.79 mmol/l



#### Weight history

Normal weight/admission weight **98 kg (BMI: 36.0 kg/m<sup>2</sup>)**

- No weight loss reported or identified



Short-term tube feeding following cardiac surgery may reduce risk of malnutrition in patients with poor oral intake.<sup>9</sup>

### Nutritional assessment



#### Estimated nutritional requirements

- Energy: 1960 kcal<sup>6</sup>  
(20 kcal x 98 kg - no stress or activity factor due to obesity)<sup>7</sup>
- Protein: 98-147 g (1.0-1.5 g/kg)<sup>5,20</sup>  
75 % actual body weight requirements due to obesity = 73.5-110 g<sup>21</sup>
- Fluid: 2670 ml (using the 100/50/15 formula)<sup>7</sup>



#### Dietetic assessment

- Attended coronary care unit to review Mrs P. Looks very lethargic.
- Oral intake minimal < 250 kcal and 10 g protein, not meeting nutritional requirements despite maximum encouragement of oral diet and Fresubin ONS.
- Complaining of nausea - medical staff have prescribed anti-emetic.
- Biochemistry normal and not undernourished therefore not at re-feeding risk.
- Bowels now moved in 2-3 days. Catheter in situ - fluid balance good and draining good volumes approx. 2200 ml (with 3000 ml fluid input via IV fluids - 4-hourly).



#### Aim

- Maintain nutritional status throughout recovery and prevent catabolism.

### Tube feeding with Fresubin



#### Nutrition therapy

- An 8Fr Freka nasogastric tube inserted - placement confirmed via x-ray as unable to obtain aspirate.
- A nutritionally complete feed is required to meet Mrs P's requirements, without fluid overloading as likely to be consuming minimal micronutrients via oral diet.
- Fibre-containing feed is beneficial as may help to maintain gut function as Mrs P appears constipated.<sup>8,10</sup>
- Due to obesity, hypertension and high cholesterol, fish oil may provide some cardio protection benefits.<sup>12</sup>
- Reduce IV fluid to 8-hourly (1500 ml).

#### Day



#### Feeding regime

1

500 ml Fresubin HP Energy Fibre at 25 ml/hr x 16 hr (400 ml) approx. 7 a.m.-11 p.m. with 100 ml water flushes pre- and post-feed.

2

1000 ml Fresubin HP Energy Fibre at 50 ml/hr x 16 hr (800 ml) approx. 7 a.m.-11 p.m. with 100 ml water flushes pre- and post-feed.

3

1000 ml Fresubin HP Energy Fibre at 75 ml/hr x 13.5 hr approx. 7 a.m.-8.30 p.m. with 100 ml water flushes pre- and post-feed.

Providing 1500 kcal, 75 g protein and 990 ml fluid (reduce IV fluids as oral intake increases).

#### Monitoring/follow-up

2

Mrs P tolerated feed at 25 ml/hr well - feed currently on break. Oral intake remains as previous assessment despite anti-emetics. Biochemistry remains within reference ranges. Continue feeding regime as planned, increase to Fresubin HP Energy Fibre at 50 ml/hr x 16 hr.

3

Tolerating feed well at 50 ml/hr for 16 hr with 100 ml water flushes. Continues on IV antibiotics. Bowels moved - soft. Urine output good via catheter. Oral intake slightly improved approx. 450 kcal and 25 g protein. Total intake estimated at 1950 kcal and 100 g protein. No new weight - requested. Increase rate of feed to 75 ml/hr x 13.5 hr on 1000 ml Fresubin HP Energy Fibre. Review in 2 days, if oral intake continues to increase and weight stable - reduce feed.

5

Mrs P is improving and mobile on ward. Nausea has improved and oral intake also increased significantly. Oral intake approx. 1000 kcal, 50 g protein and 1500 ml fluid with 1-2 Fresubin ONS. Feeding continues to be well tolerated on 1000 ml Fresubin HP Energy Fibre. Weighed today 97.1 kg - small decrease of 0.9 kg but not significant, therefore exceeding nutritional requirements with supplemental tube feeding. Reduce feed to 500 ml Fresubin HP Energy Fibre at 75 ml/hr x 6.5 hr in the evening (approx. 4.30 p.m.-11p.m.) and monitor weight.

7

IV fluids discontinued. Oral intake continues to improve; Mrs P is managing 2 courses at meal times. Intake approx. 1250 kcal and 55 g protein. Bowels moving well, no problems. Catheter removed and beginning to be mobile on ward with assistance. Continue with feed on 500 ml Fresubin HP Energy Fibre in the evening. Increase rate to 100 ml/hr x 5 hrs (approx. 6 p.m.-11 p.m.). Encouraged to take 2 x Fresubin ONS to maximise oral intake and allow nasogastric tube to be removed. Review in 2-3 days - if oral intake increased again, feed can be stopped and nasogastric feeding tube to be removed.

9

Oral intake improved again, approx. 2000 kcal and 80 g protein - eating 2-3 courses at meal times plus 2 x Fresubin ONS daily and family is encouraging extra snacks at visiting. Weight today 96.8 kg, overall patient meeting nutritional requirements for weight stability. Stop feed and remove feeding tube. Continue with regular meals and snacks and 2 x Fresubin ONS daily to aim for weight maintenance.

The fish oil in Fresubin HP Energy Fibre may provide some cardio protection benefits particularly important for patients with pre-existing disease.<sup>12</sup>

Short-term supplemental nasogastric tube feeding with Fresubin HP Energy Fibre was able to optimise Mrs P's nutritional status during her recovery from hospital and help facilitate her rehabilitation by providing energy and protein to meet her needs.

### Therapeutic outcome



#### 1 month post discharge

- Mrs P is back to her normal self. She is actively trying to live a healthier lifestyle and has intentionally lost 2 kg since discharge from hospital - weight approx. 95 kg, BMI 34.9 kg/m<sup>2</sup> and is keen to continue this in the long term.
- Fresubin HP Energy Fibre contains 15 g fibre per 1000 ml which may have helped to maintain Mrs P's gut function.<sup>8,10,11</sup>
- Supplementing with fish oil may provide some cardio vascular protection.<sup>12</sup>



# Case 4

## Exclusive enteral nutrition in Crohn's disease

### Clinical summary



#### Presentation/clinical history

**Mr R, 43 years, banker with Crohn's disease who has been admitted to the acute assessment unit for surgical assessment**

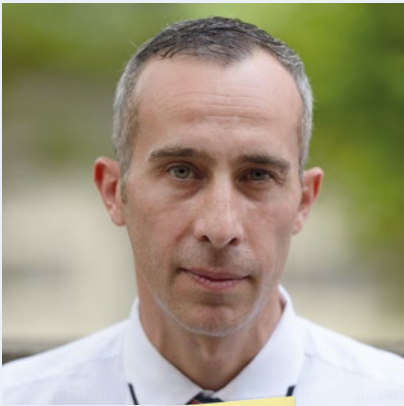
- Following advice from surgeon and clinical nurse specialist, Mr R should commence an exclusive enteral nutrition trial to help induce remission, as if symptoms don't improve - likely to be candidate for further surgery. Mr R has had many courses of IV steroids over the past year therefore not feasible.
- Nasogastric feeding tube to be sited if required.
- Past medical history: Crohn's disease (8 years), inflammatory colon stricture (18 months ago), osteoporosis
- Medication: sulphasalazine, prednisolone, calcium/vitamin D supplement, mesalamine enema, ferrous sulphate, vitamin B<sub>12</sub>
- Biochemistry: Na 151 mmol/l, K 3.9 mmol/l, Ur 7.6 mmol/l, Cr 83 µmol, Ca 2.05 mmol/l, PO<sub>4</sub> 0.73 mmol/l, Mg 0.86 mmol/l, CRP 174 mg/l, Albumin 29 g/l



#### Weight history

Normal weight (prior to diagnosis)	90 kg (BMI: 27.5 kg/m <sup>2</sup> )
Recent stable weight (3 months ago)	75.5 kg (BMI: 23.0 kg/m <sup>2</sup> )
Current weight	66.4 kg (BMI: 20.2 kg/m <sup>2</sup> )

- Weight loss **12.1 %** in past 3 months; total weight loss **26.2 %** over 8 years



Exclusive enteral nutrition can induce remission in patients with Crohn's disease.<sup>22,23</sup>

### Nutritional assessment



#### Estimated nutritional requirements

- Energy: 2490 kcal<sup>5,6</sup> (25 kcal x 66.4 kg + 1.5 physical activity factor; no stress factor)
- Protein: 79.7 g (1.2 g/kg)<sup>5</sup>
- Fluid: 2196 ml (using the 100/50/15 formula)<sup>7</sup>



#### Dietetic assessment

- Discussed treatment plan in-depth and discussed options for exclusive enteral nutrition, i.e. oral vs. tube feeding.
- Very keen to trial exclusive enteral nutrition due to demanding work schedule. Agreed to admission for 3 days to establish feeding and allow training on equipment.
- Aware of complete avoidance of all foods and importance of compliance to regime.
- Current weight 66.4 kg, weight loss of 12.1 % reported in past 3 months - depleted.
- Biochemistry shows significantly increased inflammatory markers and shows dehydration.
- Bowels moving up to 20 x daily at present, urine output poor due to increased losses.
- Oral intake very good - managing 1-2 courses at meal times and 2-3 Fresubin ONS daily, however due to significant bowel movements, unable to maintain nutritional status.
- Not at high risk of re-feeding syndrome.



#### Aim

- Improve nutritional status throughout active disease and help induce remission.

### Tube feeding with Fresubin



#### Nutrition therapy

**Type of tube feeding: nasogastric tube (placement confirmed via aspirate) - 8Fr Freka**

- Commence exclusive enteral feeding via nasogastric feeding tube for 3-6 weeks. Stop all oral intake except still water, weak black tea/coffee.<sup>23</sup>
- Overnight feeding to commence as to allow Mr R to continue to work during the day and also to reduce complications.<sup>1</sup>
- A nutritionally complete polymeric feed is indicated due to the high prevalence of nutritional inadequacies found in patients with inflammatory bowel disease.<sup>1,23,24</sup>
- A fibre free feed is indicated due to high bowel output and previous history of stricture.<sup>17</sup>

Fresubin Energy is a nutritionally complete polymeric feed and is indicated due to the high prevalence of nutritional inadequacies found in patients with inflammatory bowel disease.<sup>1,23,24</sup>

#### Day



#### Feeding regime



- Day 1: 500 ml Fresubin Energy at 50 ml/hr x 10 hr with 100 ml water flushes pre- and post-feed.
- Day 2: 1000 ml Fresubin Energy at 75 ml/hr x 10 hr with 100 ml (750 ml) water flushes pre- and post-feed.
- Day 3: 1000 ml Fresubin Energy at 100 ml/hr x 10 hr with 100 ml water flushes pre- and post-feed.
- Day 4: 1500 ml Fresubin Energy at 125 ml/hr x 10 hr with 100 ml (1250 ml) water flushes pre- and post-feed.
- Day 5: 1500 ml Fresubin Energy at 150 ml/hr x 10 hr with 100 ml water flushes pre- and post-feed.

Total providing 2250 kcal, 84 g protein and 1370 ml fluid. Permitted drinks: still water, weak black tea/coffee (aim for approx. 800 ml).

#### Week



#### Monitoring/follow-up



Feed titrated to full volume over 4 days, no problems with tolerance. Training on Applix® feeding pump completed - managing well at home. Running on 1500 ml Fresubin Energy at 125 ml/hr x 10 hr. Bowel movements improved in consistency and reduced to 10 x daily. Hydration status normalising, CRP remains high, albumin remains low (slight improvement). Weight stable therefore meeting nutritional requirements. Continue with feeding regime and review weekly.



Back at work and reports hunger despite consuming 700-900 ml water/weak black coffee. Tolerating feed well on 1500 ml Fresubin Energy at 125 ml/hr x 10 hr. Bowels reduced significantly to 4-6 x daily. Urine output good. Weight relatively stable at 66.1 kg therefore meeting nutritional requirements. Advised to consume 2 x Fresubin ONS in addition to enteral feed to aid with hunger. If weight increasing significantly, reduce overnight feed and review weekly.



Hunger improved but struggling with no solid food during day. Due to significant improvement in bowel habit, encouraged to continue with exclusive enteral nutrition. Bowels now moving only 2-3 x daily and consistency back to normal for him. Inflammatory markers almost back to normal. Weight 66.6 kg (10.5 kg in 1 week). Feed tolerated on 1500 ml Fresubin Energy with 1-2 Fresubin ONS daily.



Bowels still moving only 2-3 x daily. Continues to tolerate feeding regime on 1500 ml Fresubin Energy 125 ml/hr x 10 hr and 1-2 Fresubin ONS with still water and weak black coffee. Weight 67.2 kg (10.4 kg) therefore slightly exceeding nutritional requirements. Review inflammatory markers in 1 week, for possible food reintroduction programme.



Inflammatory markers within reference ranges. Able to recommence oral diet. Weight 67.5 kg (10.3 kg) therefore meeting nutritional requirements. As there have been no problems with appetite and oral diet to commence advised, feeding can be stopped however informed to consume minimum 3 x Fresubin ONS in the first week to prevent any weight loss.

Exclusive enteral nutrition using Fresubin Energy was able to induce remission in Mr R, meeting his full nutritional requirements and helping to prevent micronutrient deficiencies during dietetic management of his active disease.

### Therapeutic outcome

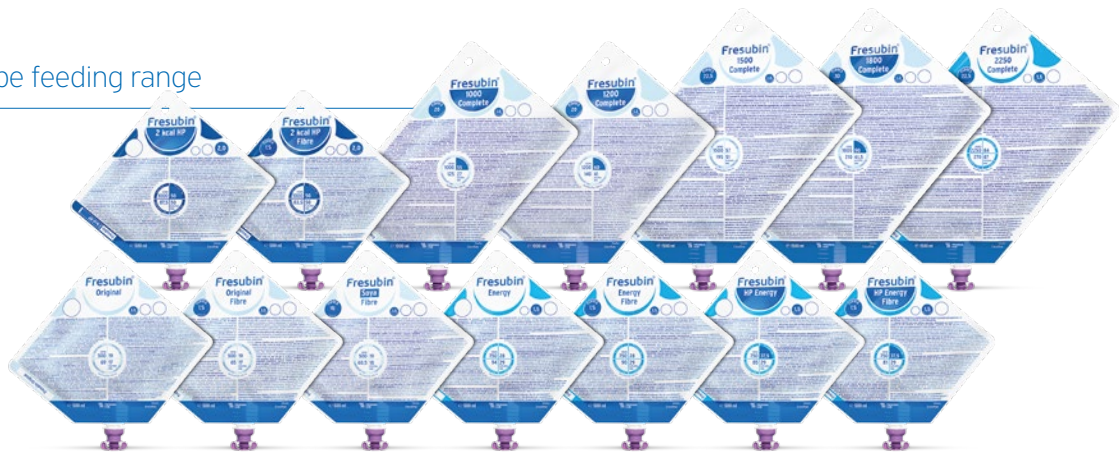


#### Week 12

- Mr R is now in full remission of his Crohn's disease and has completed a food reintroduction programme (elimination diet) and back to 3 meals daily. Bowels moving 2 x daily as normal for him. Surgery no longer required. Weight increased slightly to 68.2 kg with a BMI of 20.8 kg/m<sup>2</sup> - aim for small weight gain.
- Nasogastric tube removed and supplementary enteral nutrition using Fresubin ONS continues following remission as surgical recurrence may be lower when continued in the longer term.<sup>25</sup>
- Due to Mr R's osteoporosis the 20 µg of vitamin D per RDD contained in 1500 ml of Fresubin Energy may help improve muscle mass and muscle function and reduce risk of fractures and falls.<sup>26-28</sup>
- Fresubin Energy contains fish oil in the recommended daily intake for adults which may provide some cardiovascular protection.<sup>12</sup>



## Fresubin tube feeding range



## The Fresubin tube feeding range at a glance



### With fish oil

- In the recommended daily intake for adults for cardiovascular protection<sup>22-24</sup>
- Included in all Fresubin standard tube feeds



### High-quality protein

- Quality of protein mixture in line with WHO and FAO recommendations<sup>29</sup>
- Non-dairy protein blends also available – for patients with intolerances, allergies, individual preferences



### Vitamin D

- With all micronutrients for complete nutrition including the recommended 20 µg vitamin D per RDD in all Fresubin standard tube feeds per RDD – in line with the latest nutrition recommendations<sup>30</sup>
- Prevents a vitamin D deficiency<sup>31,32</sup>
- Reduces the risk of fractures and falls by improving muscle strength and muscle function<sup>33,34</sup>



### Fibre blend

- Fibre-enriched versions of all Fresubin standard tube feeds
- Blend of soluble/insoluble and fermentable/infermentable fibres to maintain gut physiology<sup>35,36</sup>



### Broad tube feed range

- Broad range of products to meet the individual needs of patients with a wide range of physical conditions
- 27 state-of-the-art products designed to help you provide your patients with a best-fit enteral nutrition solution

## References

- Lochs H, Dejong C, Hammarqvist F, Hébuterne X, Leon-Sanz M, Schütz T, et al. ESPEN Guidelines on Enteral Nutrition: Gastroenterology. Clin Nutr. 2006;25(2):260-274.
- Turck D, Braegger CP, Colombo C, Declercq D, Morton A, Pancheva R, et al. ESPEN-ESPGHAN-ECFS guidelines on nutrition care for infants, children, and adults with cystic fibrosis. Clin Nutr. 2016;35(3):557-577.
- Braga M, Ljungqvist O, Soeters P, Fearon K, Weimann A, Bozzetti F. ESPEN Guidelines on Parenteral Nutrition: surgery. Clin Nutr. 2009;28(4):378-386.
- Weimann A, Braga M, Carli F, Higashiguchi T, Hübner M, Klek S, et al. ESPEN guideline: Clinical nutrition in surgery. Clin Nutr. 2017;36(3):623-650.
- ASoCN. Recommendations for enteral and parenteral nutrition in adults. 2 ed Vienna: AKE – Österr. Arbeitsgemeinschaft für Klinische Ernährung; 2008.
- World Health Organization, Food and Agriculture Organization of the United Nations, United Nations University. Human energy requirements: Report of a Joint FAO/WHO/UNU Expert Consultation 2004.
- Chidester JC, Spangler AA. Fluid intake in the institutionalized elderly. J Am Diet Assoc. 1997;97(1):23-28.
- McAtear CA, Arrowsmith H, McWhirter J. Current perspectives on enteral nutrition in adults. A report by the British Association for Parenteral and Enteral Nutrition. Maidenhead: BAPEN, 1999.
- Stroud M, Duncan H, Nightingale J. Guidelines for enteral feeding in adult hospital patients. Gut. 2003;52 Suppl 7:vii-12.
- Shankardass K, Chuchmach S, Chelswick K, Stefanovich C, Spurr S, Brooks J, et al. Bowel function of long-term tube-fed patients consuming formulae with and without dietary fiber. JPEN J Parenter Enteral Nutr. 1990;14(5):508-512.
- Lochs H, Allison SP, Meier R, Pirlich M, Kondrup J, Schneider S, et al. Introductory to the ESPEN Guidelines on Enteral Nutrition: terminology, definitions and general topics. Clin Nutr. 2006;25(2):180-186.
- Lee JH, O'Keefe JH, Lavie CJ, Marchiolli R, Harris WS. Omega-3 fatty acids for cardioprotection. Mayo Clin Proc. 2008;83(3):324-332.
- Kris-Etherton PM, Grieger JA, Etherton TD. Dietary reference intakes for DHA and EPA. Prostaglandins Leukot Essent Fatty Acids. 2009;81(2-3):99-104.
- International Society for the Study of Fatty Acids and Lipids (ISSFAL): Recommendations for Dietary Intake of Polyunsaturated Fatty Acids in Healthy Adults, Report June 2004.
- Bischoff-Ferrari HA, Willett WC, Orav EJ, Lips P, Meunier PJ, Lyons RA, et al. A pooled analysis of vitamin D dose requirements for fracture prevention. N Engl J Med. 2012;367(1):40-49.
- Hilger J, Friedel A, Herr R, Rausch T, Roos F, Wahl DA, et al. A systematic review of vitamin D status in populations worldwide. Br J Nutr. 2014;111(1):23-45.
- Morton A, Wolfe S. Enteral tube feeding for cystic fibrosis. Cochrane Database Syst Rev. 2015;(4):CD001198.
- Gracey M, Burke V, Anderson CM. Medium chain triglycerides in paediatric practice. Arch Dis Child. 1970;45(242):445-452.
- UK Dietitians' CF Interest Group. Nutrition: A guide for adults with cystic fibrosis Factsheet – September 2010. <https://www.cysticfibrosis.org.uk/life-with-cystic-fibrosis/publications/factsheets>.
- Deutz NE, Bauer JM, Barazzoni R, Biolo G, Boirie Y, Bosy-Westphal A, et al. Protein intake and exercise for optimal muscle function with aging: recommendations from the ESPEN Expert Group. Clin Nutr. 2014;33(6):929-936.
- Elia M. Artificial nutrition support. Med Int. 1990;82:3392-3396.
- Triantafyllidis JK, Vagianos C, Papalois AE. The role of enteral nutrition in patients with inflammatory bowel disease: current aspects. Biomed Res Int. 2015;197167.
- Lee J, Allen R, Ashley S, Becker S, Cummins P, Gbadamosi A, et al. British Dietetic Association evidence-based guidelines for the dietary management of Crohn's disease in adults. J Hum Nutr Diet. 2014;27(3):207-218.
- Vagianos K, Bector S, McConnell J, Bernstein CN. Nutrition assessment of patients with inflammatory bowel disease. JPEN J Parenter Enteral Nutr. 2007;31(4):311-319.
- Yamamoto T, Shiraki M, Nakahigashi M, Umegae S, Matsumoto K. Enteral nutrition to suppress postoperative Crohn's disease recurrence: a five-year prospective cohort study. Int J Colorectal Dis. 2013;28(3):335-340.
- Bischoff-Ferrari HA, Dawson-Hughes B, Staehelin HB, Orav JE, Stuck AE, Theiler R, et al. Fall prevention with supplemental and active forms of vitamin D: a meta-analysis of randomised controlled trials. BMJ. 2009;339:b3692.
- Bellido T, Boland R. Effects of 1,25-dihydroxy-vitamin D3 on phosphate accumulation by myoblasts. Horm Metab Res. 1991;23(3):113-116.
- Stein MS, Wark JD, Scherer SC, Walton SL, Chick P, Di Carantonio M, et al. Falls related to vitamin D and parathyroid hormone in an Australian nursing home and hostel. J Am Geriatr Soc. 1999;47(10):1195-1201.
- World Health Organization, Food and Agriculture Organization of the United Nations, United Nations University. Protein and amino acid requirements in human nutrition. Report of a joint FAO/WHO/UNU expert consultation (WHO Technical Report Series 935), 2007.
- Volkert D, Berner YN, Berry E, Cederholm T, Coti Bertrand P, Milne A, et al. ESPEN Guidelines on Enteral Nutrition: Geriatrics. Clin Nutr. 2006;25(2):330-360.
- Bass DJ, Forman LP, Abrams SE, Hsueh AM. The effect of dietary fiber in tube-fed elderly patients. J Gerontol Nurs. 1996;22(10):37-44.



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Fresenius Kabi Deutschland GmbH  
61346 Bad Homburg  
Germany  
Phone: +49 (0) 61 72 / 686-0  
Enteral.nutrition@fresenius-kabi.com  
[www.fresenius-kabi.com](http://www.fresenius-kabi.com)