



From Test to Treatment: Nutrition Bloods in Practice

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Why we check bloods, and why diet comes first

Why check bloods?

- Prescribed is not the same as delivered or absorbed
- Bioavailability varies by form, source and nutrient interactions
- Growth can look reassuring while micronutrients drift
- Bloods often change before clinical signs appear

Diet and feed history first

- A result shows what is happening, not why
- The history decides whether to test and what to request
- Over-testing costs: distress, difficult samples, chasing false abnormalities
- Check the regimen still fits age, weight and requirements

Thresholds, products and IV versus enteral pathways vary by site. Check local policy before applying today's examples.

How often should we test? What guidelines say

Setting	What exists
Parenteral nutrition	ESPGHAN/ESPEN/ESPR 2018: biochemical monitoring set out, continuing after weaning in short bowel
Neurodisability	ESPGHAN 2017: anthropometry at least 6-monthly, micronutrients checked annually
Specific conditions	Schedules sit in each condition's own guideline, e.g. cystic fibrosis, ketogenic diet
Tube feeding and restricted diets	No agreed interval. Risk-based, using local protocols (e.g. baseline, 6 months, then annually)

For most of our patients, how often to test is a clinical judgement, so the reasoning matters as much as the numbers.

The framework: Test, Interpret, Act, Review

1 TEST

Know why you are testing

- What is the trigger: routine, symptom or risk factor?
- Right tests for this patient's risk

2 INTERPRET

Read it in context

- Age-appropriate reference ranges
- Diet picture and confounders
- Isolated result, or a pattern?

3 ACT

Build the plan

- Diet or feed change
- Supplement as per local policy
- Escalate and communicate

4 REVIEW

Close the loop

- When to recheck
- What triggers an earlier recheck
- Document the reasoning

Inflammation changes the result: check CRP with every panel

Falls with inflammation

Zinc, plasma selenium

Iron and transferrin saturation

Vitamins A, C and D

Albumin

Risk: treating a deficiency that is not there

Rises with inflammation

Ferritin

Copper and caeruloplasmin

Risk: missing a true deficiency behind a normal result

Albumin is an inflammatory marker, not a nutrition marker.

If CRP is raised, recheck once it has settled before committing to treatment.

Choosing the right test

Selenium

- Plasma: recent intake. Falls as CRP rises
- Red cell: the previous 3 to 4 months. Not affected by acute inflammation
- Recent transfusion invalidates red cell results

Vitamin E

- Ask for the vitamin E to cholesterol ratio
- High lipids raise the raw level, so deficiency is missed
- Low lipids lower it, so deficiency is over-called
- The ratio holds up in inflammation

Iron

- Read Hb, MCV, ferritin, CRP and transferrin saturation together
- Ferritin rises with inflammation; saturation falls
- If CRP is raised, repeat once it has settled

Case 1: 14-year-old with a restricted diet

- Autism, with a long-standing limited diet: toast, potato shapes, yoghurt
- Four months of sore legs, falling mobility, weight loss and hair loss
- Local dietetic referral declined: did not meet criteria
- Nil diet or fluids for more than 10 days; emergency gastrostomy
- 6% weight loss in 10 days, weight and height on the 75th to 91st centile

Marker	Result	Marker	Result
Vitamin A (0.9-2.5)	0.3	Vitamin B6 (250-680)	537
Vitamin D (>50)	<14 S	Vitamin C (15-90)	<1
Vitamin E:cholesterol (3.5-9.5)	4.4	Ferritin	S
Vitamin K (0.2-2.2)	0.7	Copper (11-25)	20.6
Vitamin B12	S	Zinc (10-18)	11.5
Folate	S	Red cell selenium (3-9)	5
Thiamine (B1) (275-675)	433	CRP	Normal
Vitamin B2 (1.0-3.4)	2.1	Albumin	Normal

Case 1: interpret, act, review

Interpret

- CRP and albumin normal, so low results mean true deficiency
- Several deficiencies from a diet eaten in good volumes
- Neurological and eye signs: think B12, thiamine, vitamin A, copper, vitamin E

Act

- Thiamine cover while feeds were built up under refeeding guidance
- High-dose vitamin A after ophthalmology review
- B12 and vitamin D by intramuscular injection
- Iron infusion, folate and vitamin C

Review: vitamin D was low again three months after replacement. Recheck, and do not assume one course has worked.

Case 2: 18-month-old with short bowel and gastric losses

- Ex-preterm (31 weeks); gastroschisis and small bowel atresia
- Less than 45 cm of small bowel; PN until 10 months
- Stricture surgery at 16 months
- Jejunal feeds at full requirements; gastrostomy on drainage
- Gastric losses variable; growth sub-optimal

Test	Result	Reference range
Sodium	134	132–144
Potassium	2.8 low	3.3–4.7
Chloride	95 low	98–111
Urea	5.3	2.4–6.5
Magnesium	0.88	0.5–1.0
Phosphate	1.6	1.0–2.1
Spot urinary sodium	<20 low	>20

Case 2: interpret, act, review

Interpret

- Serum sodium looks fine, but urinary sodium under 20 shows total-body sodium depletion
- Low potassium with low chloride fits gastric losses and aldosterone-driven renal potassium loss
- Sodium depletion alone can hold back growth

Act

- Medical review for potassium 2.8, and replace potassium
- Replace sodium: sodium chloride in feeds or oral rehydration solution
- Swap plain water for a sodium-containing fluid
- Measure, reduce and replace gastric losses as per local policy

Review: U&Es and urinary sodium within 72 hours, then space out as losses settle. Titrate sodium to urinary sodium and growth.

Case 3: the feed meets every RNI, so why test?

Long-term home tube feeding after intestinal failure. Bloods every 6 months.

Nutrient	Range	Apr 25	Oct 25	Apr 26	Oct 26
Copper	10-22	13.3	5	4.5	12.2
Zinc	10.7-18.0	9.4	9.1	7.6	7.4
Vitamin E:cholesterol	2.9-5.7	2.3	4.5	2.7	5.0
CRP	<5	<5	<5	<5	<5

A trend across four results tells you more than any single one.

Copper and zinc together

- Zinc blocks copper absorption, so never give zinc alone when copper is also low
- Replace both, as separate doses
- Lowest effective zinc dose, for a defined course
- Plasma zinc under 6 µmol/L with normal CRP and albumin: treat. Marginal results: case by case

Case 3: interpret, act, review

Interpret

- CRP under 5 throughout, so these results are real
- Copper fell to deficiency, then recovered on supplementation
- Zinc low on every check, and falling
- The cause persists: jejunal feeding and a short gut

Act

- Copper: continue the current dose. Do not stop now it is normal
- Zinc: lowest BNFC dose for weight, once daily for 3 months
- Give zinc and copper at opposite ends of the day
- Doses, timing and recheck date to GP and family

Review at 3 months: copper, caeruloplasmin, zinc, albumin, CRP and FBC together. Step zinc down once in range; if copper falls, reduce zinc.

Summary: put all the jigsaw pieces together

- 1 Diet and feed history first: it decides whether to test and what to request
- 2 Check CRP with every micronutrient panel
- 3 Pick the right test and read the pattern, not a single number
- 4 Find the source of the loss before choosing what to replace
- 5 Agree who owns the result, the plan and the recheck

Questions

References

- Romano C et al. ESPGHAN guidelines for the evaluation and treatment of gastrointestinal and nutritional complications in children with neurological impairment. J Pediatr Gastroenterol Nutr 2017;65:242–264
- ESPGHAN/ESPEN/ESPR/CSPEN guidelines on pediatric parenteral nutrition. Clin Nutr 2018;37
- BNF for Children: iron (oral). Should always check the current monograph for dosing
- Local trace element laboratory advice on plasma zinc interpretation