

Bone Health

As we get older our bones become thinner and weaker. Thinning of the bones can occur at an earlier age for people with cystic fibrosis (CF).

What is bone mineral density (BMD)?

Bone mineral density (BMD) is a measure of the level of minerals the bones contain. This shows how strong the bones are. BMD is usually measured by a Dual Energy X-ray Absorptiometry (DEXA) scan. The low radiation dose used in the DEXA scan is less than that needed for a chest x-ray.

The scan is taken at the following sites on the body for approximately two or three minutes:

- Lumbar spine (below the chest and above the pelvis)
- Top of the leg (hip)
- Wrist
- Whole body

It is important to note that the BMD score may not accurately predict the fracture risk in people with CF. A DEXA scan should be performed from about ten years of age and repeated every one to three years. Check with your doctors when the next one is due.

What are bone mineral density “Z” and “T” scores?

- The Z-score compares a measured BMD value to the average value obtained from a healthy population of the same sex and age as the patient. Z-scores are usually the most appropriate method in people with CF.
- The T-score compares the measured BMD value to the average value obtained from a healthy young adult population.
- BMD is considered very low in people with CF when the Z-score in the spine or hip is lower than -2.

What causes low bone mineral density in CF?

CF-related low BMD probably has many causes:

- Severe lung disease and recurrent lung infections
- Poor nutrition: low body weight, low levels of minerals (calcium) and vitamins (vitamin D and K)
- Certain medications e.g. steroids
- Delayed puberty
- CF related diabetes

There may be a direct link between low BMD and the abnormal protein produced by the CF gene.

How can low BMD be prevented and treated?

- Regular DEXA scans to screen for low BMD.
- Optimise lung function and prevent lung infections.
- Optimise nutrition through high energy diet, oral supplements and nasogastric or gastrostomy tube feeds.
- Vitamin D or calcium levels should be checked yearly and low levels corrected with extra dietary supplements.
- Frequent contact with a specialist CF dietitian to gain advice on how best to boost nutrition for bone health.
- There is not yet sufficient evidence to recommend universal vitamin K supplementation for bone health in CF. However, supplementation should be considered in certain clinical situations. Always check with your doctor.
- Weight bearing physical activity is encouraged. A specialist CF physiotherapist can develop an exercise program where appropriate. This will depend on an individual's abilities and needs.
- Minimise steroid treatment as advised by your doctors.
- Avoid smoking and alcohol which can have damaging effects on bone health.

Calcium

Calcium intake in individuals with CF should meet the Recommended Daily Intakes (RDI) for the general population. It should be increased to 1500mg/day for those with low BMD.

Category	RDI (mg/day)
Girls (14yrs -18 yrs)	1300
Women (19yrs -50yrs)	1000
Pregnant Women (19yrs -50yrs)	1000
Breastfeeding mothers (19yrs - 50yrs)	1000
Boys (14yrs - 18yrs)	1300
Men (19yrs -70yrs)	1000
<i>Men & Women with CF with low BMD</i>	1500

Sources of Calcium include:

Calcium	Approx. calcium content in mg per 100g/100ml
Calcium fortified milk (e.g. Lite Start, Shape, Pura Tone)	120
Yoghurt	100
Tinned salmon with bones or sardines	277-382
Cheese (cheddar)	721
Calcium fortified soy milk	190
Custard	145
Ice-cream	127
Almonds	248
Tofu	683

Meat (beef)	20
Eggs	25mg/egg
Baked beans	31
Oranges	38mg/orange
Bread, whole wheat	138 (approx. 40mg/slice)
Cottage cheese	61
Broccoli	40
Spinach	99 (approx. 3 cups)
Dried apricot	55 (approx. 4mg/apricot)

Vitamin D

Vitamin D is an essential ingredient for maintaining a healthy body. It helps maintain muscle and bone strength and allows your body to absorb calcium. The major source of vitamin D in Australia is exposure to sunlight. While small amounts are derived from dietary sources such as oily fish (e.g. Salmon), eggs and fortified foods such as margarine and some milks.

Vitamin D levels are screened through a blood test annually. To prevent deficiency, the minimum recommended Vitamin D level is 75nmol/l. All patients with vitamin D deficiency and insufficiency should be prescribed vitamin D supplements. Generally, a supplement of 1000 to 5000 IU/day of vitamin D is used in adults. Check with your CF treating team, what your individual needs would be.

Are there any specific drug treatments?

Bisphosphonates (e.g. Aledronate, Residronate) are a family of drugs that reduce bone breakdown and may directly stimulate the cells that produce new bone.

Oral Bisphosphonates are best absorbed in the absence of food and should be taken on an empty stomach. This may be difficult for people with CF related diabetes or for those who feed overnight. Calcium supplements impair the absorption of bisphosphonates and the two should not be taken together.

For more information, contact your Dietitian or CF Centre.

Useful Resources

- Exercise Factsheet
https://www.cysticfibrosis.org.au/media/wysiwyg/CF-Australia/Fact_Sheets/CF_Aust_Fact_Sheet_Excercise.pdf

Cystic Fibrosis WA

The Niche
11 Aberdare Rd
Nedlands WA 6009

Postal Address
PO Box 959
Nedlands 6909

T: +61 8 6457 7333
F: +61 8 6457 7344
E: admin@cfwa.org.au

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