

Vitamin supplementation in Cystic fibrosis

Vitamin D supplementation

The CF trust has recently produced new guidelines for vitamin D supplementation and bone health in children with CF (see CF Trust website for more details).

Metabolism

Vitamin D3 (colecalfiferol) is either absorbed in the diet or produced in the skin by photoconversion of 7-dehydrocholesterol. D3 It is converted by the liver to 25(OH)D3, which is the major form of vitamin D circulating in the blood. 25(OH)D3 is converted into 1,25(OH)D3 and 24,25(OH)D3 in the kidney. These two forms are active and serve to increase intestinal absorption of calcium.

Vitamin D2 (ergocalciferol) is not naturally produced by vertebrates, but is obtained in the diet, and is often given as a Vitamin D supplement.

Recommended first line vitamin D supplementation is with Dalivit, Abidec or Vitamin A+D capsules. These are Vitamin D2 supplements. Vitamin D3 supplements can also be given. Preparations available on the UHW formulary include Adcal D3 dissolve, Calcichew D3 caplets, Fultium 800 IU capsules (recently licensed in UK), ZymaD (10,000 IU / ml (licensed in France) and Dekristol 20,000 IU capsules (licensed in Germany).

Recommended supplementation

Recommended daily doses of ergocalciferol (D2) or colecalfiferol (D3) for routine use in pancreatic insufficient children:

Age	Dose / day
Birth – 1 year	400 IU
1-12 years	400-800 IU
>12 years	800-2000IU

1 microgram of vitamin D is equivalent to 40 IU

Suitable Vitamin preparations for uncomplicated therapy

Preparation	Vitamin D (IU)	Vitamin A (IU)
Abidec (0.6 mls)	400	1333 CONTAINS PEANUT OIL
Dalivit (0.6 mls)	400	5000
A+D capsule	400	4000
Multivitamins BPC	300	2500

Vitamin D alone & combined Vitamin D / Calcium supplements for more complicated cases

Preparation	Vitamin D (IU)	Calcium
Adcal D3 Dissolve	400	15 mmol
Calcichew D3 caplets	400	12.5 mmol
Fultium D3	800	CONTAINS PEANUT OIL
ZymaD (10 ml bottle)	10,000 / ml	
Dekristol D3 capsules	20,000 / capsule	CONTAINS PEANUT OIL

Management of low vitamin D levels

Recommended *total* levels of 25(OH)D are **30- 60µg/l** (75-150nmol/L).

We measure Vitamin D levels and PTH levels at annual review, together with calcium, phosphate and alkaline phosphatase. Vitamin D results are usually given for both 25(OH)D2 and 25(OH)D3. There is strong circadian variation to PTH levels and a relationship to eating. Early morning levels taken after a small breakfast will be higher than afternoon levels taken after a large lunch.

FOR CHILDREN WHO CAN SWALLOW TABLETS (use Dekristol capsules)

If total serum 25(OH)D is above 30 µg/l and PTH is normal

- No action

If PTH is high:

- Serum 25(OH)D level 20-30 µg/l; give 40,000iu colecalciferol D3 once weekly for 4 weeks
- Serum 25(OH)D level <20 µg/l; give 40,000iu colecalciferol D3 once weekly for 6 weeks
- Repeat 25OHD and PTH after 3 months

If PTH is normal:

- Serum 25(OH)D level 20-30 µg/l; give one dose 40,000iu colecalciferol D3
- Serum 25(OH)D level <20 µg/l; give 40,000iu colecalciferol D3 once weekly for 2 weeks
- Serum 25(OH)D level <10 nmol/L; give 40,000iu colecalciferol D3 once weekly for 4 weeks
- Repeat 25(OH)D and PTH after 6 months

FOR CHILDREN WHO CANNOT SWALLOW TABLETS (use ZymaD liquid)

If total serum 25(OH)D is above 30 µg/l and PTH is normal

- No action

If PTH is high:

- Serum 25(OH)D level 20-30 µg/l; give 20,000iu colecalciferol D3 once weekly for 4 weeks
- Serum 25(OH)D level <20 µg/l; give 20,000iu colecalciferol D3 once weekly for 6 weeks
- Repeat 25OHD and PTH after 3 months

If PTH is normal:

- Serum 25(OH)D level 20-30 µg/l; give one dose 20,000iu colecalciferol D3
- Serum 25(OH)D level <20 µg/l; give 20,000iu colecalciferol D3 once weekly for 2 weeks
- Serum 25(OH)D level <10 nmol/L; give 20,000iu colecalciferol D3 once weekly for 4 weeks
- Repeat 25(OH)D and PTH after 6 months

THEREAFTER:

- Check compliance. Remind the family that all fat soluble vitamins should be given with fat containing food and Creon.
- Increase dose of vitamin D up to a maximum of 2000iu per day as required
- Dietician should make an assessment of calcium intake
- Take care with combined preparations such as Abidec, Dalavit and Vit A+ D capsules such that vitamin A levels don't exceed the upper limit of normal. Maximum recommended daily doses of vitamin A are not established but 10,000 IU has been suggested. High Vitamin A doses are teratogenic and teenage girls of reproductive age should definitely not be on a vitamin A dose > 10,000 IU / day.

