The use of DEKA in Cystic Fibrosis

An Adult Centre’s Perspective

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Service Lead for Dietetics and Speech and Language Therapy
CF Vitamins at Royal Papworth

2010
Aquadek given to patients

2016
Aquadek discontinued

February 2017
Patients given single vitamins

November 2017
Patients started DEKA
Vitamin Practice at Royal Papworth

- Aquadek given to majority of patients from 2010
- 2 x Aquadek softgels standard prescription

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>AquADEKs (1 softgel)</th>
<th>AquADEKs Chewable (1 tablet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A</td>
<td>18167iu</td>
<td>9083.5iu</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>150iu</td>
<td>50iu</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>1200iu</td>
<td>800iu</td>
</tr>
<tr>
<td>Vitamin K</td>
<td>1mg</td>
<td>500 mcg</td>
</tr>
</tbody>
</table>
Aquadek Discontinued

Switched patient to single vitamin preparations February 2017

Large task – standard prescription

Switched to:
- 2 x A+D caps
- 1600iu colec calciferol
- 200iu of vitamin E
- 10mg of K?
The vitamin K debate

- K1 Phytomenadione recommended
- Menadiol can cause anaemia
- Cost of vitamin K supplementation
- Supply of vitamin K supplementation
- What dose is right?
Vitamin K dose

- Recommendation for all PI patients to have Vitamin K
  - 1-10mg per day (Bone Mineralisation Guidelines 2011)
  - 5-10mg per day (CF nutrition guidelines 2016)
  - No specific dose. 1mg per day enough to restore levels (Cochrane 2017)
  - 1-10mg per day (European Nutrition guidelines 2016)
  - 1-10mg per day (Australia and New Zealand nutrition guidelines 2017)
What dose of vitamin K?

- UK CF guidelines discuss 1-5 mg dosing from 1 study (Drury 2008).
- 14 patients with PI [8-18 yrs].
- Study outcome was that both 1mg and 5mg of vitamin K1 given over 1 month improved vitamin K status (carboxylated osteocalcin levels)
- Suboptimal range was put down to longer periods of supplementation being needed.
- Reference range for 5-10mg has been taken from the European bone mineralization guidelines 2007, which were replaced by the 2011 version prior to the publication of the guideline in 2016
• Beker et al. 1997 18 patients age 18-35years 5mg K1 per week for 4 weeks. Supplementation affected PIVKAII but some patients remained in deficient range. Only equates to 1.7mg dose per day

• Mossler et al. 2003 weekly dose 10-20mg beneficial to PIVKAII levels. Equates to 1.4-2.8mg per day

• Cochrane review – confirms evidence not robust enough to state what daily dose should be
Vitamin K

- **Daily dosing is best**
- **K1 preferred, but not always available**
- **No robust consensus on what dose should be**
- **Cost**

**Reliability of levels to monitor dose**
CF specific multivitamin.

<table>
<thead>
<tr>
<th></th>
<th>DEKA essential capsule (1 x capsule)</th>
<th>DEKA plus softgel (1 x softgel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A</td>
<td>2000 IU (75% as β-carotene)</td>
<td>18167 IU (92% as β-carotene)</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>150 IU</td>
<td>150 IU</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>2000 IU</td>
<td>3000 IU</td>
</tr>
<tr>
<td>Vitamin K</td>
<td>1mg</td>
<td>1mg</td>
</tr>
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</table>
Issues with single vitamins

- Drop in compliance
- Increased use of colecalciferol including high strength courses
- Issues with A+D vs BPC
- Issues with strength of vitamin E
- Having to supply vitamin E to some (blacklisted)
- Having to supply phytomenadione
- No supply at all in some areas
- Time pressure of individual regimens and fielding calls from GPS
Patient perspective on single vitamins

"I have to take 7 tablets when I had 2?"

"It doesn't really bother me. The single ones are small. Having less is better though"

"I'm only going to take them if something is low"

"I can't get hold of vitamin E or K at my GP"

"Can't I just buy my own?"

"Two of those...and I've only been given one yellow one, and some little black ones and I think a white one? I don't really know"

"I don't mind the little ones, it's easier getting them from my GP than from you"

"I reckon I take them about 2 days a week. [is that worse than when you had aquadek?] oh yeah, I took them like 6 days week"

"I miss Aquadek. They made my breath smell awful, but 2 tablets is better than this"
First adopted at Royal Papworth in November 2017

At this point not prescribable in community

Cost agreed to be met by CF MDT

Approval at Trust DTC

Deka
Total cohort of 330 patients in 2017

- Similar to Aquadek but higher vitamin D level
- November 2017 – Poor CF dietetic staffing
- Have to supply in house – how much to give?
- DEKA essential vs DEKA softgel plus?

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>1 x DEKAs essential capsule</th>
<th>1 x DEKAs Plus soft gel</th>
<th>1 x DEKAs Plus chewable</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>2000 IU</td>
<td>3000 IU</td>
<td>2000 IU</td>
</tr>
<tr>
<td>E</td>
<td>150 IU</td>
<td>150 IU</td>
<td>100 IU</td>
</tr>
<tr>
<td>K</td>
<td>1 mg</td>
<td>1 mg</td>
<td>1 mg</td>
</tr>
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<td>A</td>
<td>2000 IU (75% as β-carotene)</td>
<td>18167 IU (92% as β-carotene)</td>
<td>18167 IU (92% as β-carotene)</td>
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</table>
Doses of vitamins in DEKA

- Enlisted the help of our consultants and pharmacist
- Set a standard prescription for all those people on our standard single vitamin prescription
- Put a cap on vitamin D levels for safety
- Repeated vitamin D after 6 months

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>1 x DEKAs essential and 1 DEKA softgel plus</th>
<th>Aquadek 2 x softgels</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>5000 iu</td>
<td>2400 iu</td>
</tr>
<tr>
<td>E</td>
<td>300 iu</td>
<td>300 iu</td>
</tr>
<tr>
<td>K</td>
<td>2 mg</td>
<td>2 mg</td>
</tr>
<tr>
<td>A</td>
<td>20167 iu</td>
<td>36334 iu</td>
</tr>
</tbody>
</table>
Doctors guidance for prescribing DEKA at Royal Papworth

*Standard prescription for DEKAs:*

- 1 x DEKA essential capsule (2 x pots 60 capsules)
- 1 x DEKA plus softgel (2 x pots of 60 softgels)
- If the patient’s previous vitamin D level is above 100nmol/l – please speak to the Dietitian prior to prescribing.
- All calcichew, cholecalciferol, A+D caps, phytomenadione and vitamin E should be discontinued and replaced with the above.
- Vitamin D levels should be checked after 6 months of treatment on DEKAs due to the increase in vitamin D.
DEKAs at Royal Papworth

- 144 patients
- 1 x DEKA essential and 1 x DEKA softgel plus
- Nov 2017 and May 2018
- Fat soluble vitamin levels A, E and D were recorded at baseline and at 1 year post commencement of treatment.

**Exclusion criteria**
- PI but not taking PERT -2
- RIP -3
- Transplant -0
- Pregnancy -1
- No follow up vitamin levels -21

- Total excluded 27 patients
• Analysis was limited to 117 patients who had complete data.
• Mean results were compared using a Student Paired T Test

<table>
<thead>
<tr>
<th></th>
<th>N = 117</th>
<th>Vitamin A (SD)</th>
<th>Vitamin E (SD)</th>
<th>Vitamin E / chol ratio (SD)</th>
<th>Vitamin D3 (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td></td>
<td>1.48 (0.55)</td>
<td>23.1 (8.6)</td>
<td>6.4 (1.9)</td>
<td>67.5 (28.4)</td>
</tr>
<tr>
<td><strong>1 year</strong></td>
<td></td>
<td>1.54 (0.50)</td>
<td>26.7 (9.3)</td>
<td>8.2 (8.4)</td>
<td>85.5 (27.6)</td>
</tr>
<tr>
<td></td>
<td>p=0.20</td>
<td>p=0.00</td>
<td>p= 0.02</td>
<td>p=0.00</td>
<td></td>
</tr>
</tbody>
</table>
We found that all vitamin levels improved to some degree
Increased compliance

Vitamin D highest increase as expected
Increased compliance
Higher strength of vitamin D overall

DEKAs at Royal Papworth
Case study 1

- Female 49 years
- Compliance known to be good.

Vitamin levels at baseline (July 2017)
- Vit A 1.5
- Vit E/chol 6.3
- Vit D 137

DEKA
- Concerns over vitamin D level and starting DEKA.
- Started on 1 x DEKA softgel plus November 2017
Case Study 1

1 x DEKA Softgel Plus
Providing: 1500iu Vitamin A, 3000iu Vitamin D, 150iu Vitamin E

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>July 2017 (baseline)</th>
<th>July 2018</th>
<th>July 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>E</td>
<td>6.3</td>
<td>7</td>
<td>6.8</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>137</td>
<td>109</td>
<td>103</td>
<td></td>
</tr>
</tbody>
</table>
Case study 2

• Vitamin levels at baseline
  • Vit A 1.0
  • Vit E/chol 2.3
  • Vit D 23.5

  – Vitamin D range 9-38 in the preceding 3 years.
  
  – Issues with compliance lifelong
  – Very poor vitamin D levels even when on Aquadek

  – Single regimen 2 x A+D caps, vitamin E 200iu, calcichew D3 x2, vitamin K 10mg od

  – Multiple courses of high strength colecaltiferol (never completed)

  – Started 2 x DEKA softgel plus November 2017
Case Study 2

• Levels after 10 months
  – Vit A 2.0
  – Vit E/chol 3
  – Vit D 63.5
  – (reports 80% compliance with DEKA)

• Vitamin D repeated February 2019
  – Vit D 17.3
  – Missed 3 months of vitamins due to trip to Japan
Case Study 2

- Multiple high strength courses of vitamin D failed as taken weekly

- Changed to 2 x DEKA softgel plus and 1600iu of colecalciferol daily.
  - Vitamin D June 2019 42.3

- September 2019
  - Vitamin A 2.1
  - Vitamin E 3.6
  - Vitamin D 68.2
Case Study 3

Male

- 34 years
- Pancreatic Insufficient.

Previously stable on

- 2 x Aquadek gel per day

Changed to

- A+D caps x 2
- Vitamin E 200iu
- 1600iu colecalciferol

Started DEKA November 2017

- 1 x DEKA essential and 1 x DEKA softgel plus
### Case Study 3

<table>
<thead>
<tr>
<th></th>
<th>June 2016 (Aquadek)</th>
<th>June 2017 (pre DEKA)</th>
<th>June 2018</th>
<th>Feb 2019</th>
<th>June 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.3</td>
<td>1.4</td>
<td>2.2</td>
<td>1.8</td>
<td>1.6</td>
</tr>
<tr>
<td>E</td>
<td>6.3</td>
<td>5.5</td>
<td>6.9</td>
<td>6.8</td>
<td>6.7</td>
</tr>
<tr>
<td>D</td>
<td>89</td>
<td>69.8</td>
<td>144</td>
<td>123</td>
<td>139</td>
</tr>
</tbody>
</table>

1 x DEKA Essential and 1 x DEKA Softgel Plus
Majority of the clinic (87%) take DEKA
- 1 x essential and 1 x softgel plus (301)
- 2 x deka softgel (41)
- 2 x deka chewable (2)
- 2 x deka essential (4)
- 1 x deka softgel plus (22)

Cohort of patients who have lower requirements and therefore are still on single vitamins (12)

Cohort of patients who have opted to stay on single vitamins (22)

Where are we now?
DEKA experience

- Well tolerated by patients
- Improvement in vitamin levels and compliance for some
- Has helped some of our lowest vitamin D levels to not need additional colecalciferol
- Need more data on vitamin K levels
- Not suitable for all (if needing low doses of A or E in particular)
- Can still be challenging to prescribe in some areas
- Needs ongoing monitoring to ensure the right regimen for your patients
- Can save time, pill burden, cost and complex regimens
DEKA NOW HAS PRESCRIBING STATUS IN COMMUNITY

STANDARD LETTER TO AID PRESCRIPTIONS AT GP

DEKA NOW APPROVED WITHIN LOCAL STP FOR COMMUNITY PRESCRIPTIONS

WORKED WITH CUH PAEDS TO HAVE DEKA PRE-TRANSITION TO ADULT CARE

The Future