ESPEN Congress Prague 2007

Nutrition in Chronic Renal failure

Nutrition support in dialyzed patients

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Introduction

• Malnutrition is a frequent comorbidity in maintenance hemodialysis patients and its association with mortality is clear

• Therefore,
  • Recommendations for nutrition in dialysis have been elaborated by NKF, ESPEN and EDTA
  • Nutritional therapies have been given in attempt to counteract the deleterious effects of malnutrition
  • New approaches are being investigated to improve the efficiency of nutritional support
# Nutrition in hemodialysis

## Recommended macronutrient intakes

<table>
<thead>
<tr>
<th></th>
<th>ESPEN (1)</th>
<th>NKF (2)</th>
<th>EDTA (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protein</strong></td>
<td>1.2 - 1.4</td>
<td>1.2</td>
<td>1.1</td>
</tr>
<tr>
<td>g/kg/day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Energy</strong></td>
<td>35</td>
<td>&lt; 60 y: 35</td>
<td>30-35</td>
</tr>
<tr>
<td>kcal/kg/day</td>
<td></td>
<td>&gt; 60 y: 30</td>
<td></td>
</tr>
</tbody>
</table>

1 - Clin Nutr, 2000  
2 - Am J Kidney Dis, 2000  
3 - Nephrol Dial Transplant, in press
## Recommended micronutrient intakes

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Intake (mg/µg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyridoxin</td>
<td>10-15</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>30-60</td>
</tr>
<tr>
<td>Folic Acid</td>
<td>1</td>
</tr>
<tr>
<td>1-25 (OH)₂ D₃</td>
<td>according to plasma Ca²⁺ &amp; PTH</td>
</tr>
<tr>
<td>Zinc</td>
<td>15</td>
</tr>
<tr>
<td>Selenium</td>
<td>50-70</td>
</tr>
</tbody>
</table>

ESPEN consensus on nutritional treatment of patients with renal insufficiency

## Recommendations: follow-up

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Interval(^1,2)</th>
<th>Risk threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietary interview (3 d)</td>
<td>6 - 12 mo</td>
<td></td>
</tr>
<tr>
<td>BW</td>
<td>every HD</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>1 mo</td>
<td></td>
</tr>
<tr>
<td>nPNA</td>
<td>1 mo</td>
<td>1 g/kg/d</td>
</tr>
<tr>
<td>Creatinin pre-HD</td>
<td>1 mo</td>
<td></td>
</tr>
<tr>
<td>Albumin</td>
<td>1-3 mo</td>
<td>35 g/kg/d</td>
</tr>
<tr>
<td>Transthyretin (prealbumin)</td>
<td>1-3 mo</td>
<td>300 mg/kg/d</td>
</tr>
</tbody>
</table>

\(^1\)-ESPEN consensus on nutritional treatment of patients with renal insufficiency Clin Nutr 2000
How to reach the nutritional objectives?

- Dietary counselling
- Oral supplements
- Intradialytic parenteral nutrition
- Enteral nutrition

- Grade of malnutrition
- Spontaneous alimentation
- Patient compliance
Dietary follow-up

RCT. Six-month follow-up
Effect of dietician counselling on serum albumin changes

Independent from serum CRP

Leon JB et al. J Ren Nutr 2001
Daily supply: 500 kcal/kg/d
5 - 10 kcal/kg/d (CHO & fat)
0.4 - 0.6 g protein/kg/d

Oral supplements can only reach the nutritional objectives when spontaneous intakes are ≥ 20 kcal & 0.8 g protein/kg/d
Nondiabetic adult MHD patients with BMI <20 and serum albumin <4.0 g/dL:

- Control group: appropriate monitoring, dietary counselling

- Supplement group: post-HD oral nutrition, 500 kcal & 15 g protein for 1 month

Sharma M, J Renal Nutr 2003
Nutritional supply:
- 800-1200 kcal/HD (CHO & fat)
- 30-60 g AA/HD

60-kg patient:
- 5-8 kcal/kg/jour
- 0.2-0.4 g AA/kg/d

IDPN can only reach the nutritional objectives if spontaneous intakes are $\geq 20$ kcal & 0.8 g protein/kg/d
Overall population of Health care system:
IDPN, n=1679 Controls, n=22517

Main objective: to evaluate, in a intention-to-treat study, the effects of a one-year IDPN on nutritional status, morbidity and mortality in malnourished MHD patients.

Secondary objective: to define the parameters predicting the response to nutritional therapy.
French Intradialytic Nutrition Evaluation Study (Fines)

Malnourished MHD patients

186 patients

Oral suppl during one year, n=93

Oral suppl + IDPN during one year, n=93

• Follow-up: two years (treatment period + one year)
• Visits at day 0 and month 3, 6, 12, 18 and 24


FineS
Nutritional status

Serum albumin, g/L

Serum prealbumin, mg/L

Control group
IDPN group
Patients Survival

Mean cumulative survival: 77% at 1 yr, 58% at 2 yr
Death: Control: n = 36, IDPN: n = 40

Logrank $p = 0.33$

Mean cumulative survival: 77% at 1 yr, 58% at 2 yr
Death: Control: n = 36, IDPN: n = 40

Logrank $p = 0.33$
Independent determinants of mortality
Multivariate Cox regression

Comorbidity (+1)
Albumin d0 (+1 g/L)
Creatinine d0 (+10 µmol/L)
Δ Prealbumin d0-m3 (> 30 mg/L)
Do inflammed patients respond to nutritional support?

Serum albumin, g/L

Serum prealbumin, mg/L

Baseline CRP < 10 mg/L, n=88
Baseline CRP ≥ 10 mg/L, n=86
Enteral nutrition

• Polymeric EN, administered via naso-gastric tube or gastrostomy

• Necessary during severe undernutrition, particularly when spontaneous intakes are < 20 kcal/kg/day (1):
  - IDPN cannot reach recommended supplies
  - daily nutritional support is needed
  - enteral nutrition should be preferred to parenteral nutrition

• Poorly investigated

Parenteral Nutrition in Adult Renal Failure-ESPEN guidelines

Dietary intakes and nutritional status evaluation

Moderate undernutrition
Spontaneous intakes
≤ 30 kcal/kg/day
≤ 1.1 g protein /kg/day

Dietary counselling

Oral supplements

Severe undernutrition
BMI < 20
Body weight loss > 10% within 6 mo
Albumin < 35 g/l
Transthyretin < 300 mg/l

Spontaneous intakes
> 20 kcal/kg/d

Lack of compliance

IDPN

Spontaneous intakes
< 20 kcal/kg/d
or
Stress conditions

Enteral Nutrition
if EN is not possible:
Central venous PN

No Improvement

No Improvement
How to improve the efficacy of nutritional support?

- Protein supply with anabolic effects
- Exercise
- Anabolizing agents: male hormone, GH
- Daily dialysis
- Association
  - Nutritional supply
  - exercise
  - anabolizing agents
Exercise augments the acute anabolic effects of IDPN in hemodialysis patients

Pupim L. AJP 2004
Anabolic effects of nandrolone decanoate in dialysis patients: a randomized controlled trial

Johansen KL et al. JAMA 1999;281:1275-1281

Figure 2. Changes in Weight and Body Composition

Body composition was measured by dual-energy x-ray absorptiometry. Changes from the baseline values are expressed as mean ± SEM. Asterisks indicate statistical significance compared with baseline values by paired t-test (P<.05); dagger, statistical significance compared with the placebo group by unpaired t test (P<.01).
139 adult patients on maintenance HD
- serum albumin < 40 g/L
- randomly assigned to 6 months of treatment with placebo or 20, 35, or 50 g/kg/d hGH

Results:
- Increase in BMI, LBM, transferrin, HDL-C
- No significant change in serum albumin
- Improvement of QOL

Feldt-Rasmussen et al
JASN 2007
Daily dialysis: Spontaneous nutrient intakes

Galland et al, Kidney Int 2001

Protein (g/kg/day) | Energy (kcal/kg/day)

- Standard HD
- daily HD (6 mo)
- daily HD (12 mo)
Conclusions (1)

• Dietary counselling, oral supplements and IDPN can improve nutritional status, independent of serum CRP

• Fines Study showed that the increase in serum transthyretin > 30 mg/L within 3 months of nutritional support is associated with a two-fold increase in the two-year survival
Conclusions (2)

• IDPN should only be prescribed in patients non-compliant to oral supplementation

• In patients who do not respond to nutritional support new approaches are:
  • exercise, anabolizing agents (male hormone, GH)
  • daily dialysis

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