Intradialytic Parenteral Nutrition in End-Stage Renal Disease

Enrico Fiaccadori

enrico.fiaccadori@unipr.it

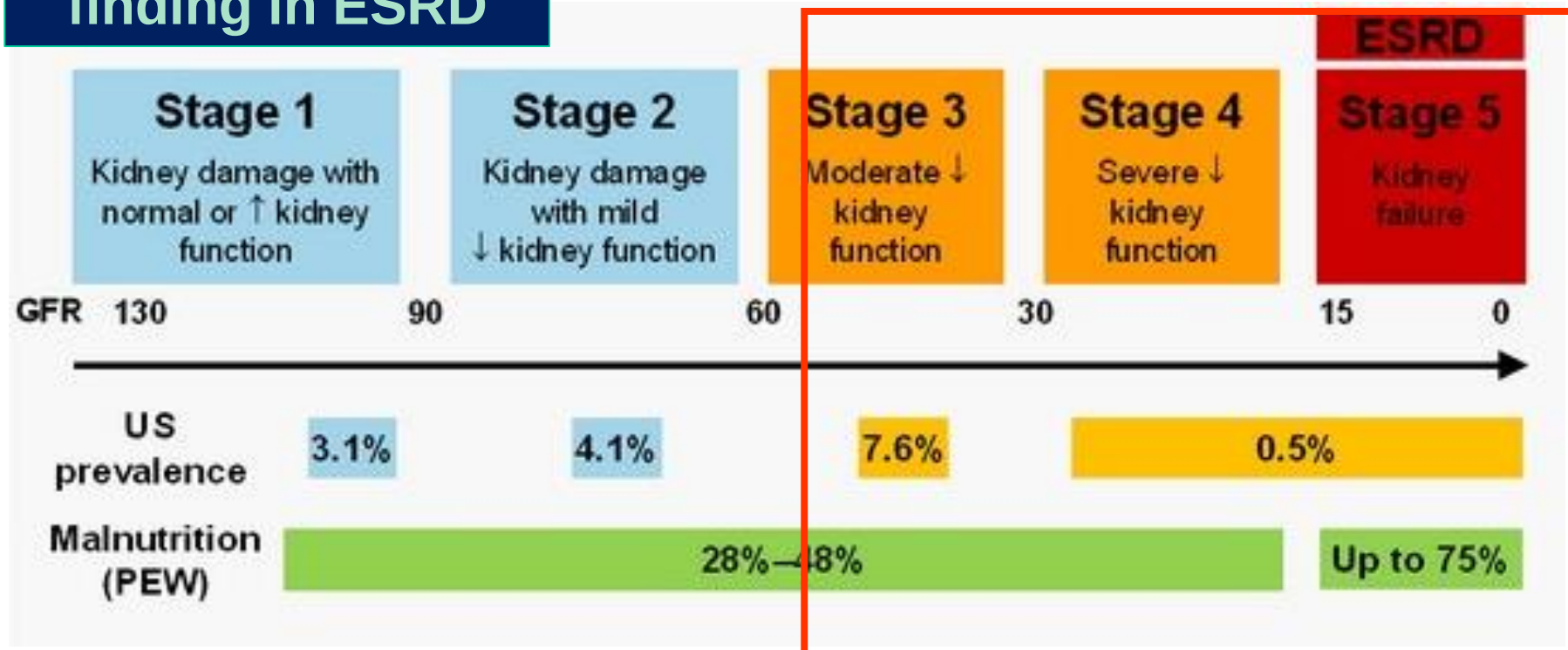
Acute and Chronic Renal Failure Unit
Clinical and Experimental Medicine Dept.
Parma University Medical School

Agenda

- Why nutritional support in End-Stage Renal Disease (ESRD) on hemodialysis (HD)
- Choice of nutritional support in ESRD on HD
- Oral Nutritional Supplementation (ONS) and Intradialytic Parenteral Nutrition (IDPN)
- The role of ONS and IDPN in ESRD on HD

Epidemiology of Protein-Energy Wasting (PEW) in CKD/ESRD

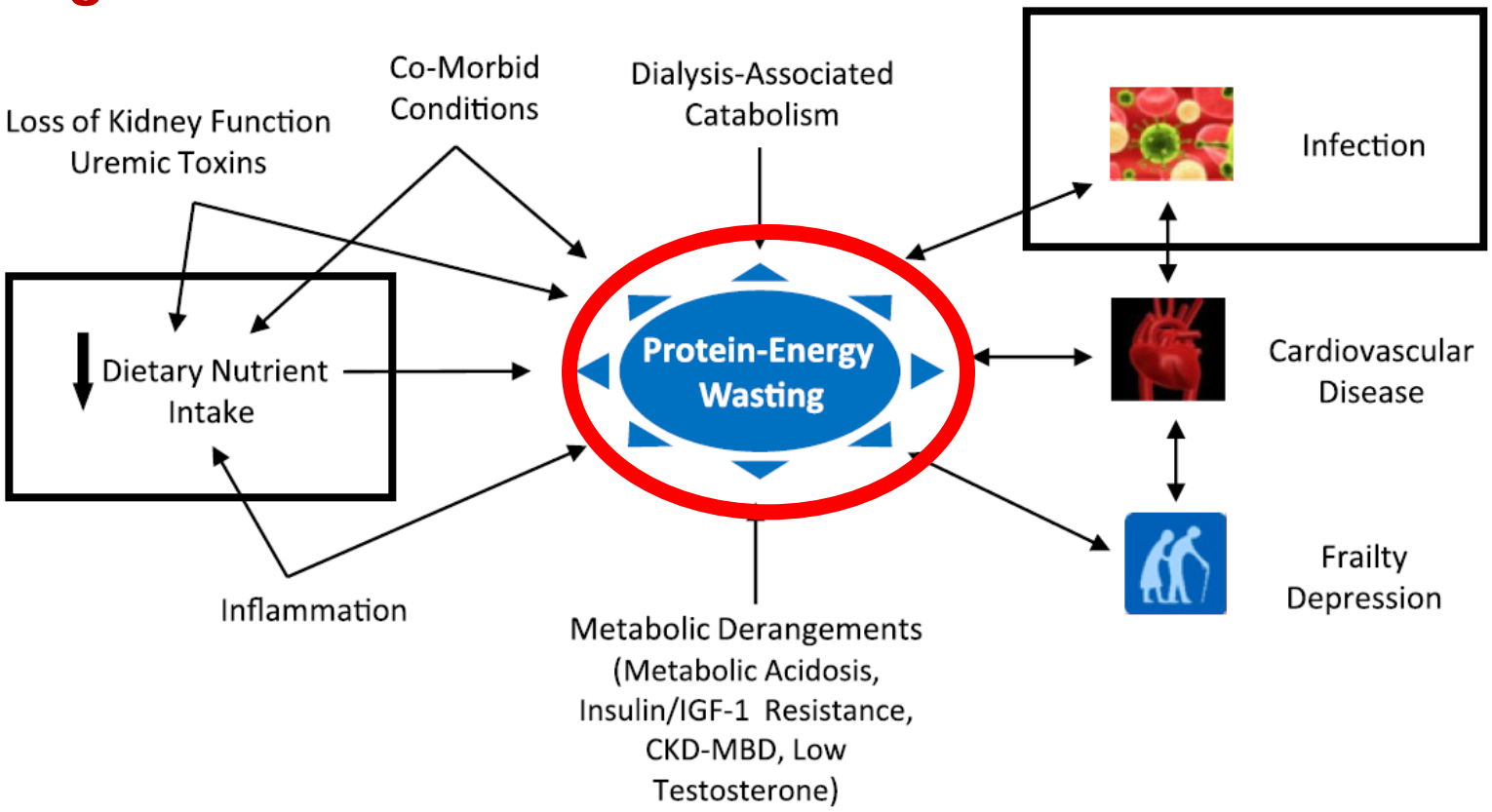
PEW is a frequent finding in ESRD



PEW prevalence increases from stages 3 to 5

USRDS 2009 Annual Data Report
Fouque D et al., Kidney Int 2008; 73:391-398
Kovesdy C et al. Am J Clin Nutr 2009; 29;3-14
Kovesdy CP et al. Am J Clin Nutr 2013; 97: 1163-1177

Pathogenesis of PEW in CKD/ESRD



PEW is the result of multiple mechanisms inherent to CKD/ESRD, including loss of appetite and reduced dietary intake, systemic inflammation, comorbidities, hormonal derangements, dialysis procedure, and uremic toxicity

Journal of Renal Nutrition, Vol 23, No 2 (March), 2013: pp 77-90

Inflammation and wasting in CKD/ESRD

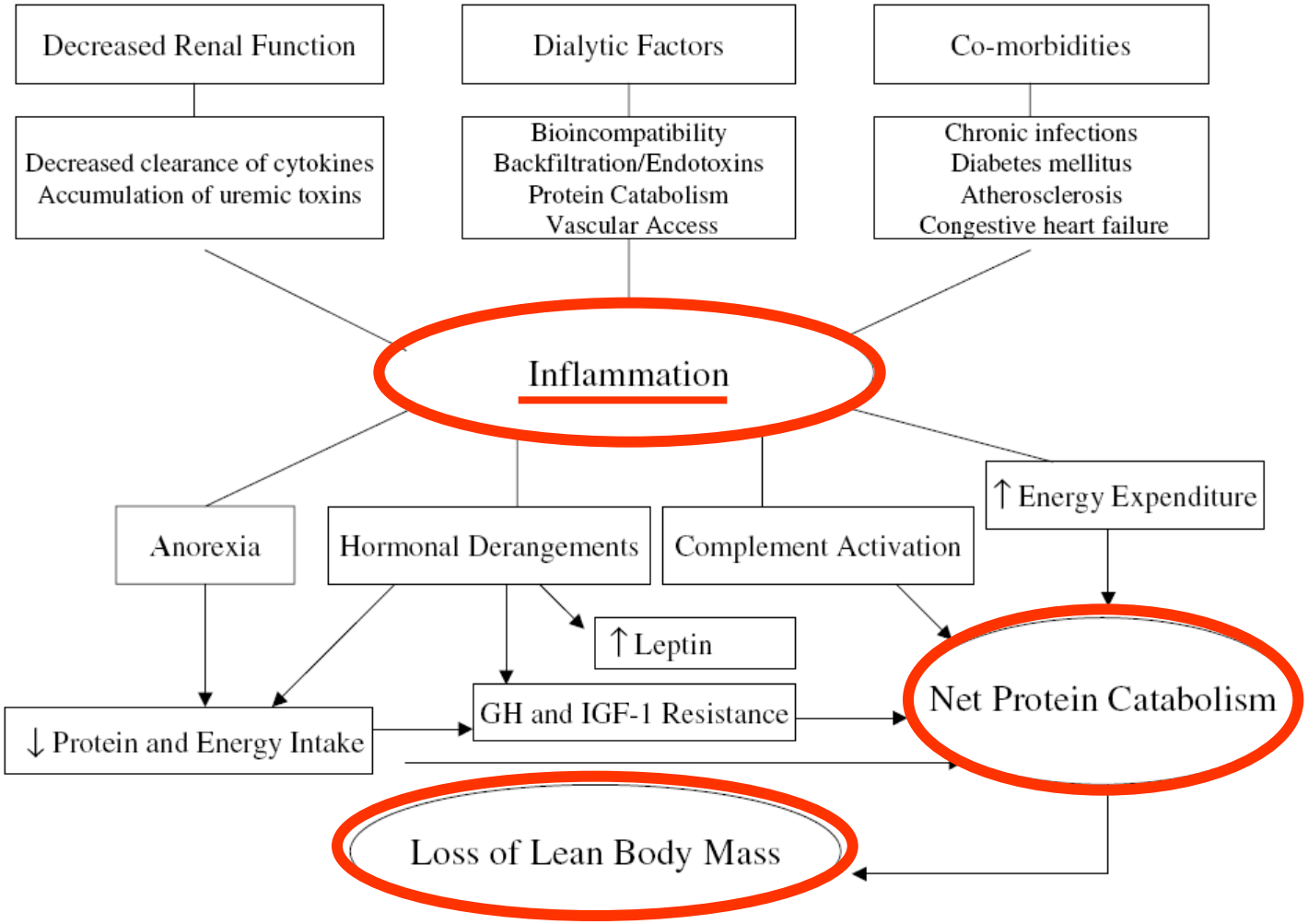
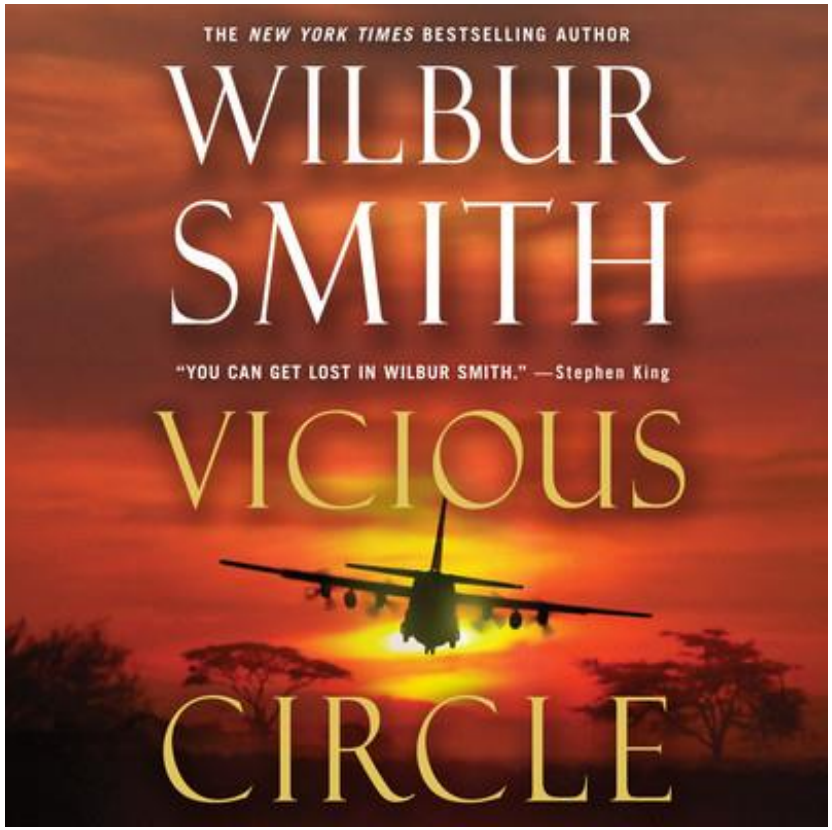


FIG. 1. Proposed interrelationship between inflammation and "uremic malnutrition."

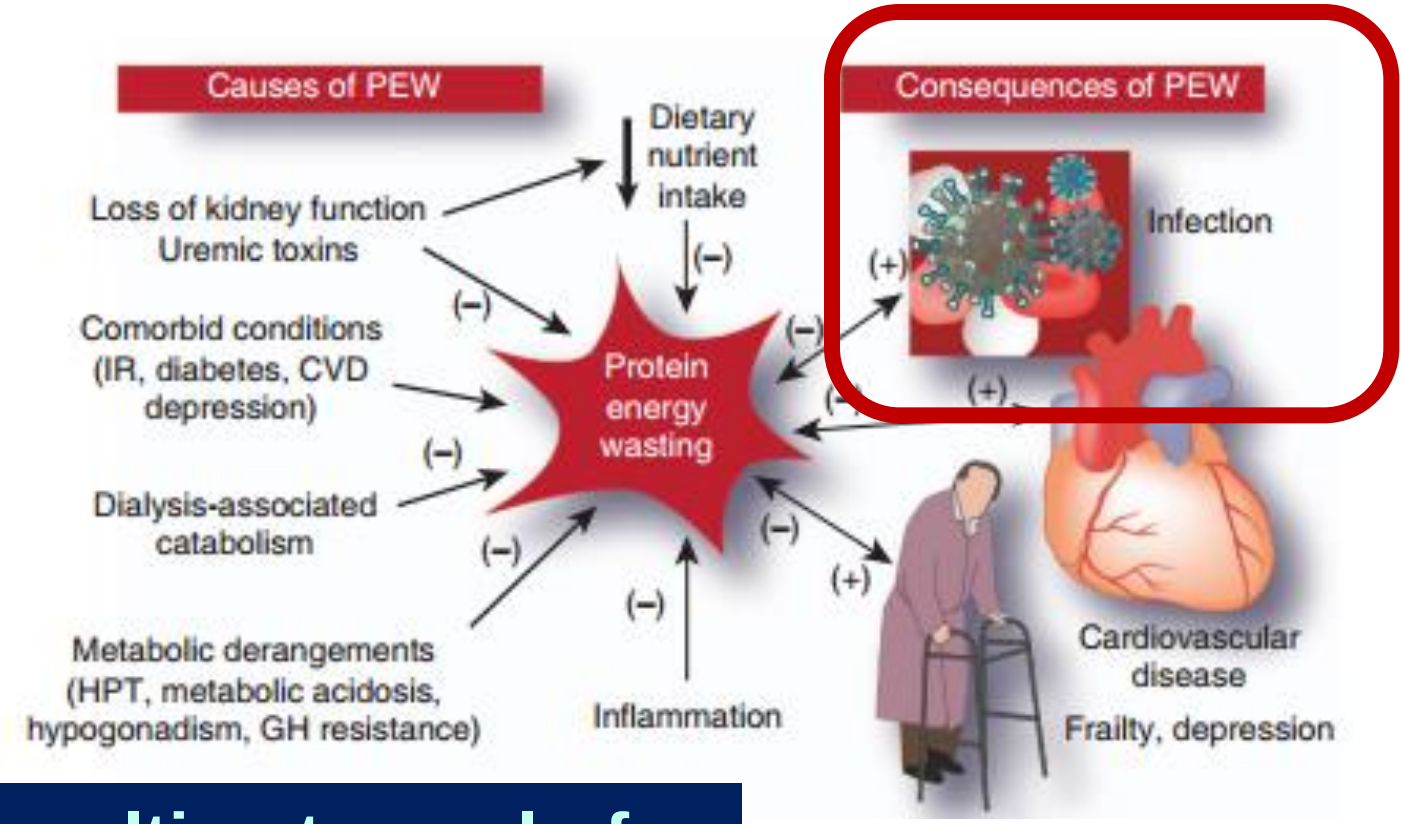
Pupim LB **et al**. Sem Dialysis 2003; 16:224-232



PEW

Complications of PEW

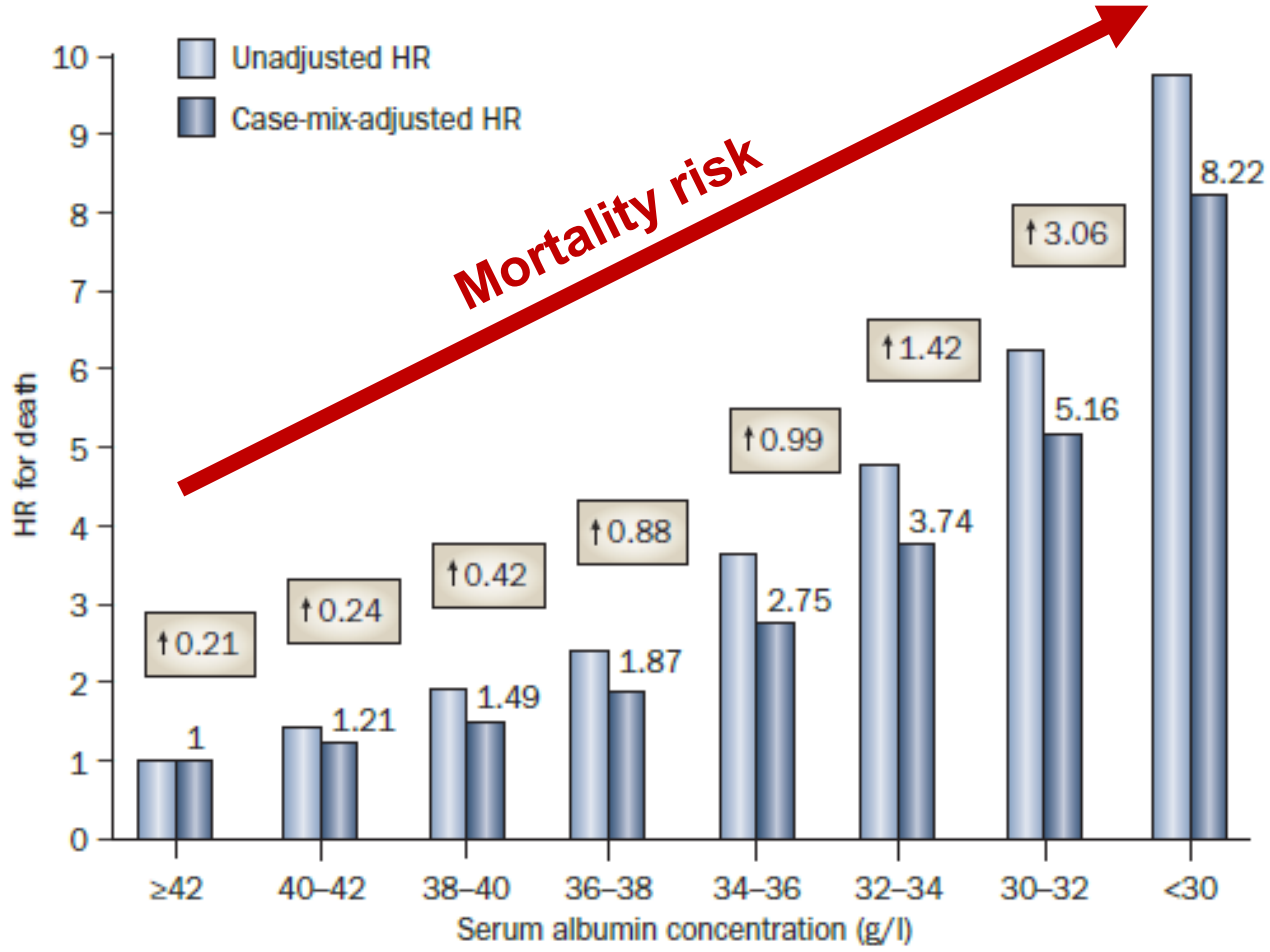
the concept of «vicious circle» of PEW in CKD/ESRD: PEW leads to complications, complications lead to PEW



The ultimate goal of nutritional support is to break this vicious circle

Ikzler TA et al. Kidney Int 2013; 84: 1096-1107

Protein-Energy Wasting (PEW) is associated with increased mortality risk in HD patients



Kalantar-Zadeh, K. et al. Nephrol Dial Transplant 2005; 20:1880–1888

What are the targets suggested for ESRD patients on dialysis?

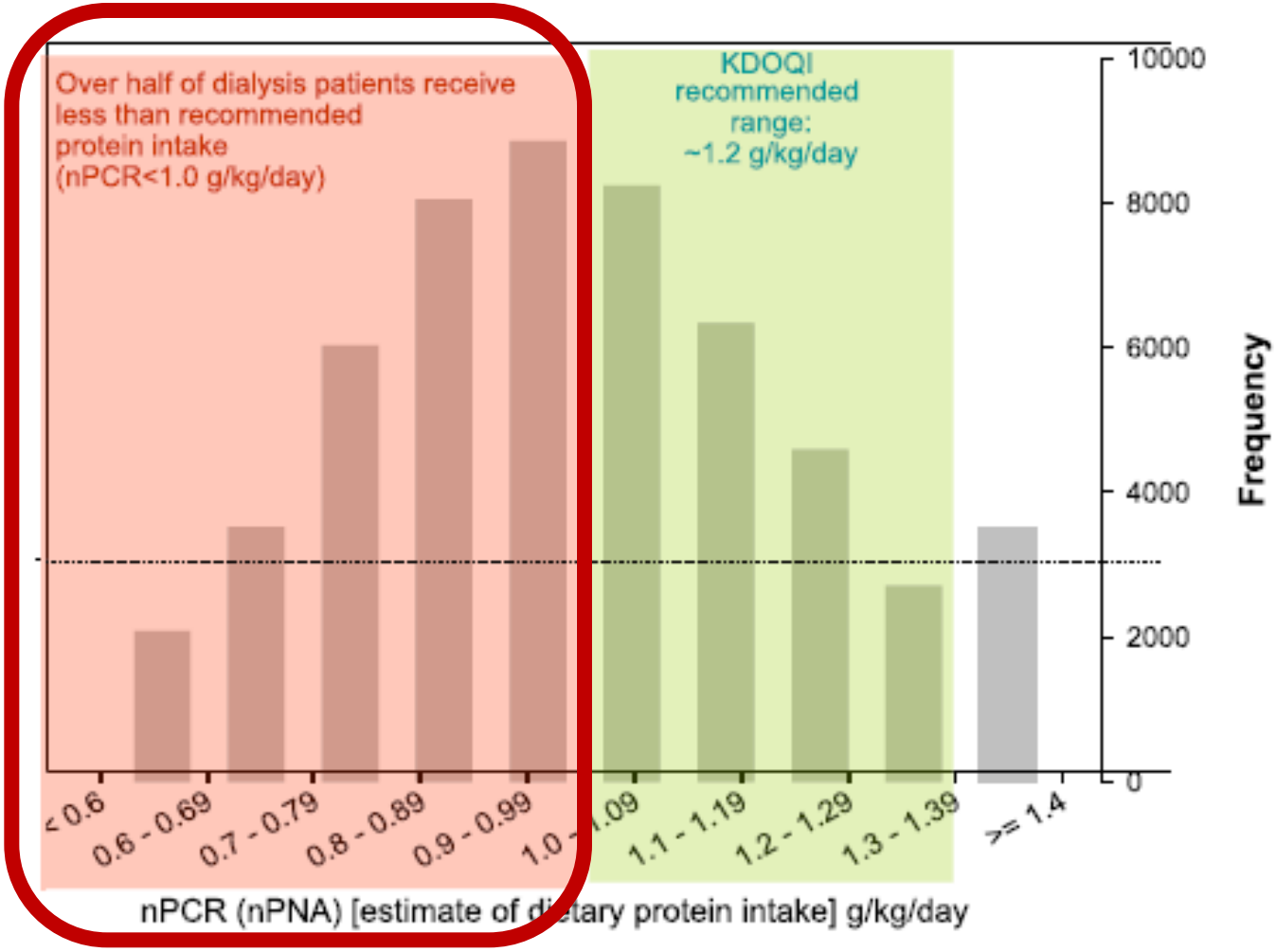
Table 5. Recommendations for protein and energy supply in adult patients on haemodialysis [8–10] and peritoneal dialysis (PD) [8–11]

	ESPEN	NKF	EBPG
Protein intake (g/kg/day) (HD)	1.2–1.4 (>50% HBV)	1.2 (>50% HBV)	≥1.1
Protein intake (g/kg/day) (PD)	1.2–1.5 (>50% HBV)	1.2–1.3 (>50% HBV)	1.3
Energy intake (kcal/kg/day) (HD)	35	<60 years 35 <60 years 30	30–40, adjusted to age, gender and activity
Energy intake (kcal/kg/day) (PD)	35	<60 years 35 <60 years 30	<60 years 35 <60 years 30

ESPEN, European Society of Parenteral and Enteral Nutrition; NKF, National Kidney Foundation; EBPG, European best practice guidelines; HD, haemodialysis; DP, peritoneal dialysis.

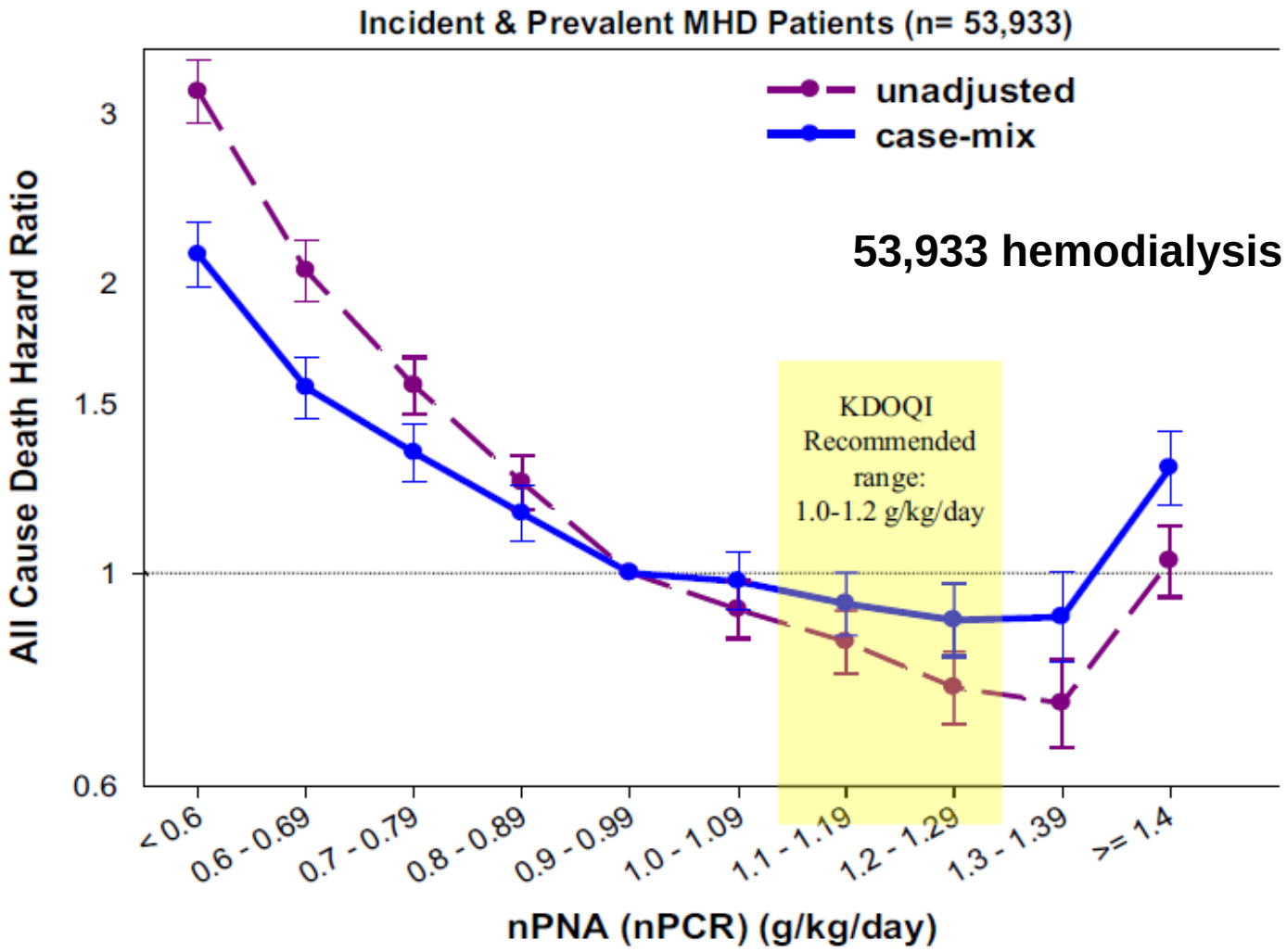
In many patients it is difficult to reach and maintain nutritional targets

Frequency distribution of protein intake in hemodialysis patients



Shinaberger CS et al., Am J Kidney Dis 2006; 48:37–49

Association between dietary protein intake, estimated by nPCR (nPNA) and survival



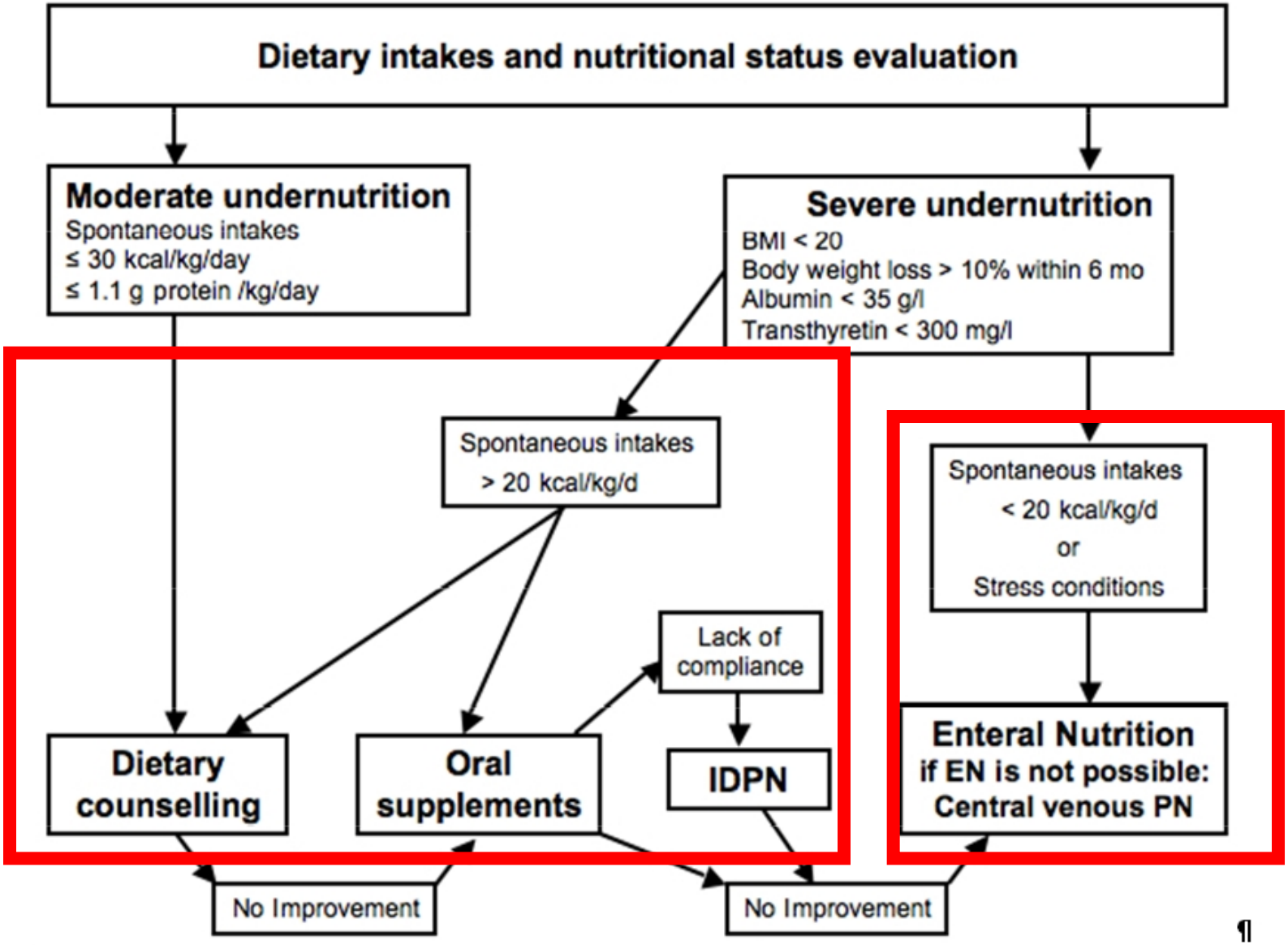
53,933 hemodialysis patients

Shinaberger CS et al., Am J Kidney Dis 2006; 48:37–49

When spontaneous nutritional intake is not enough

Nutritional support in ESRD patients

- Oral nutritional supplementation (ONS), as intradialytic or daily ONS
- Enteral nutrition (n.g. tube, PEG)
- Parenteral nutrition (in-hospital PN; home PN; intradialytic parenteral nutrition, IDPN)



ESPEN Guidelines on PN in Adult Renal Failure
Clin Nutr 2009; 28:401-414

5.2. Oral supplements and enteral feeding

- Nutritional supplements should be prescribed if nutritional counselling does not achieve an increase in nutrient intake to a level that covers minimum recommendation (see Guideline 3) (Evidence level III).
- Products specifically formulated for dialysis patients should be prescribed in preference to standard supplements for non-renal patients (Evidence level III).
- Enteral tube [naso-gastric or percutaneous entero-gastrostomy (PEG)] feeding using disease specific formulas for dialysis patients should be prescribed if attempts to increase dietary intake with oral supplements fail and nutritional status does not improve (Evidence level IV).

Nephrol Dial Transplant (2007) 22 [Suppl 2]: ii45–ii87

Intradialytic oral supplementation

- Snacks during dialysis
- Intradialytic (commercial) liquid oral supplements

Liquid oral supplements for ESRD

	Standard enteral diet	Renilon 7.5	Dialycare	Nepro HP
		Nutricia	Abbott	Abbott
Kcal/ml	1	2	2	1.8
Prot, g/L	40	75	70	81
Energy ratio %	16 prot 35 fat 49 CHO	15 prot 45 fat 40 CHO	15 prot 43 fat 41 CHO 2g FOS	18.1 prot 48.4 fat 33.5 CHO 8.4 g FOS
Na/K, mmol/L	43.5 Na/38.5 K	25.6 Na/5.6 K	36.5 Na/27.2 K	30 Na/27 K
Fibers	no	no	yes	yes
Omega -3	Not always	no	yes	yes

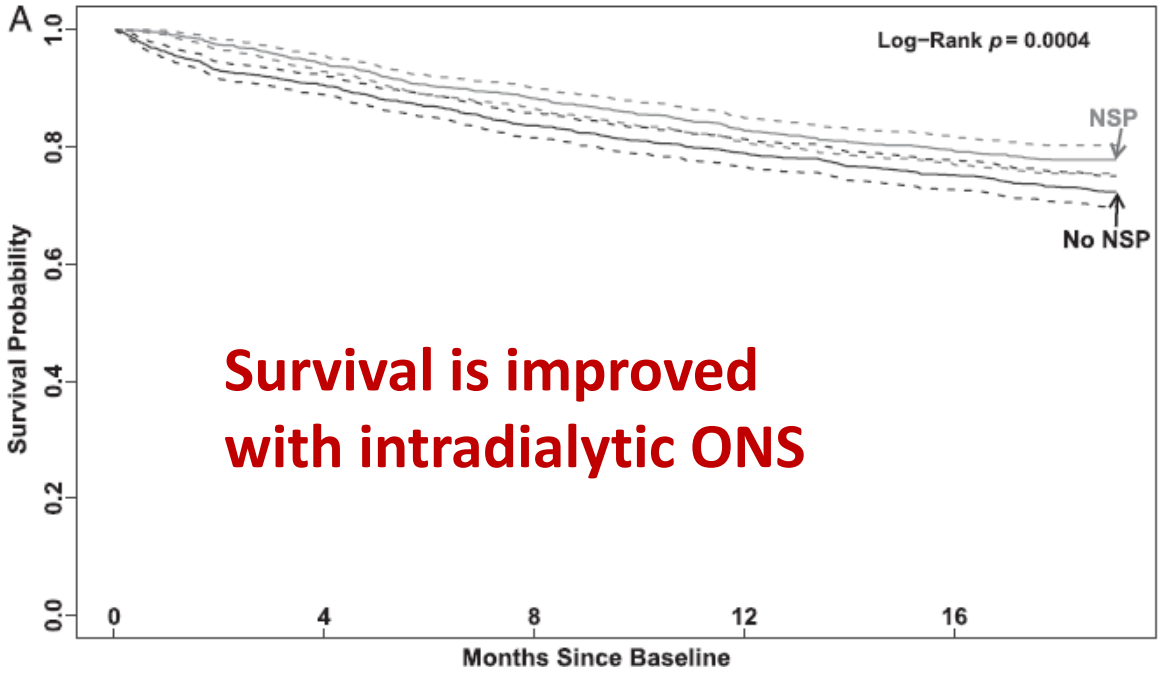
What can be expected from ONS using commercial liquid diets

- Single 200 ml can → 360-400 kcal, 14-16 g protein
- Intradialytic administration (one can) → total weekly intake 1100-1200 Kcal, 42-48 g protein
- Daily administration (one can/day, intra- and interdialytic): total weekly intake 2500-2800 Kcal, 98-102 g prot

AJKD
Original Investigation

Oral Intradialytic Nutritional Supplement Use and Mortality in Hemodialysis Patients

Daniel E. Weiner, MD, MS,[1] Hocine Tighiouart, MS,[2] Vladimir Ladik, MS,[3] Klemens B. Meyer, MD,[1] Philip G. Zager, MD,[4] and Douglas S. Johnson, MD[5]



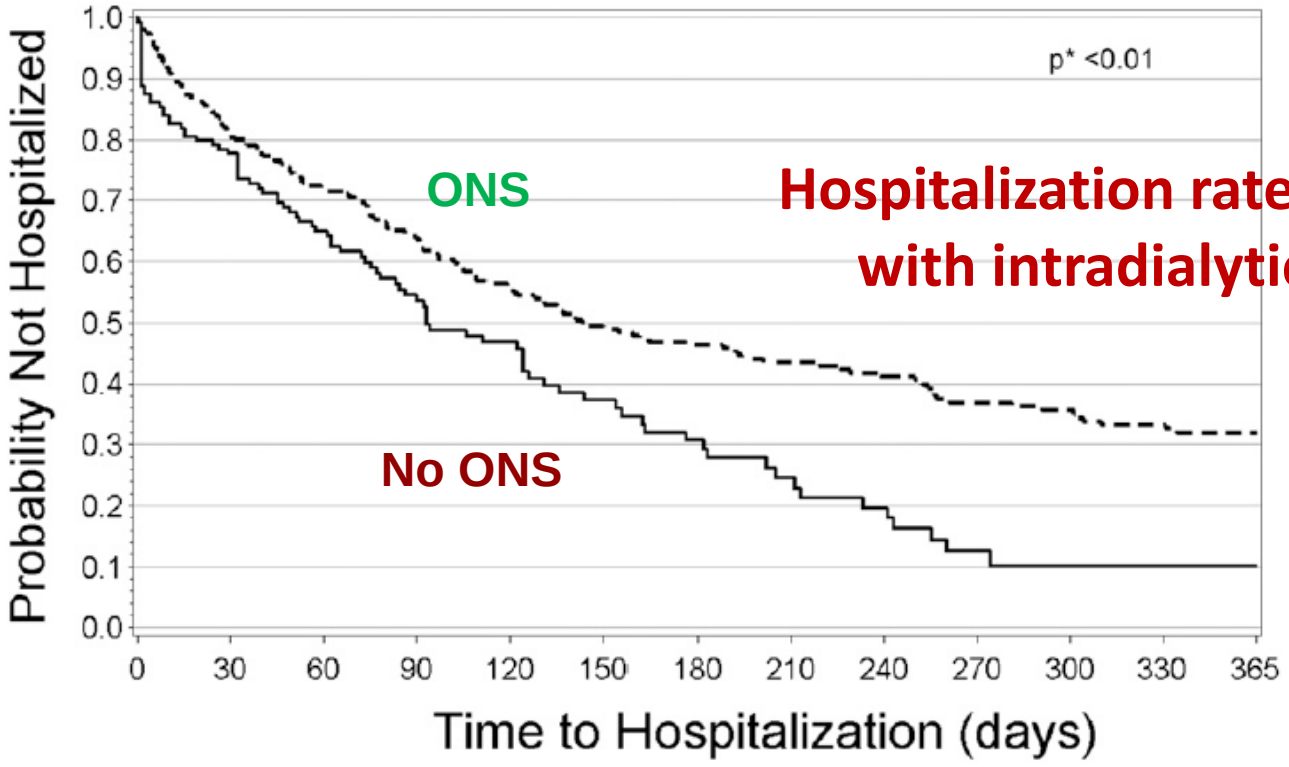
Survival is improved with intradialytic ONS

Kaplan-Meier curve shows survival probabilities by nutritional supplement protocol (NSP) status, derived from propensity score– matched analyses, for the primary cohort

Am J Kidney Dis. 2014;63(2):276-285

Association between Oral Nutritional Supplementation and Clinical Outcomes among Patients with ESRD

Christine Cheu, Jeffrey Pearson,* Claudia Dahlerus,* Brett Lantz,* Tania Chowdhury,* Peter F. Sauer,† Robert E. Farrell,† Friedrich K. Port,* and Sylvia P.B. Ramirez**



Hospitalization rate is lower with intradialytic ONS

Clin J Am Soc Nephrol 8: 100–107, 2013.

Long-Term Oral Nutrition Supplementation Improves Outcomes in Malnourished Patients With Chronic Kidney Disease on Hemodialysis

Siren Sezer, MD[1]; Zeynep Bal, MD[1]; Emre Tutal, MD[1]; Mehtap Erkmen Uyar, MD[1]; and Nurhan Ozdemir Acar, MD[1]

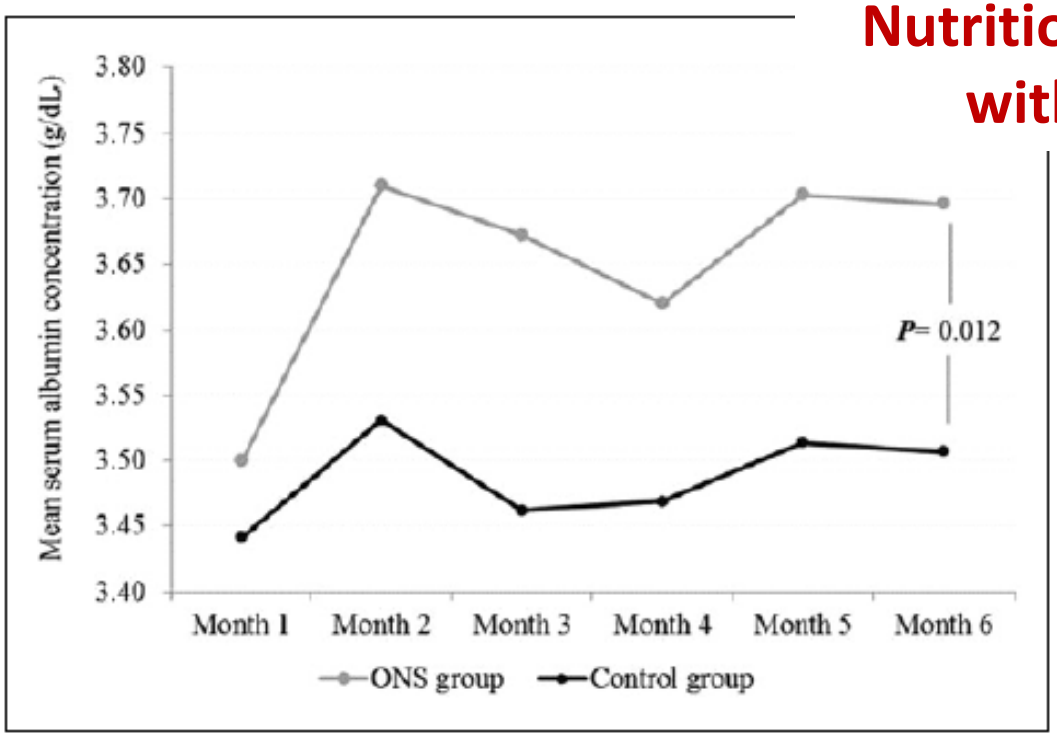


Figure 2. Mean serum albumin concentration (g/dL) in oral nutrition supplementation (ONS) and control groups during the study period.

Nutritional status is improved with intradialytic ONS

Two daily servings containing 40 Kcal and 14 g of proteins

JPEN J Parenter Enteral Nutr. 2014;38:960-965

ONS and nutritional outcomes

Table 2 | Effects of oral nutritional supplements (ONS) on nutritional outcomes i MHD patients in randomized clinical trials

Reference	*n*	Design	Days	Nutritional significant effects
Acchiardo *et al.*[149]	15	RCT: ONS versus control groups	105	↑ Albumin, transferrin, bone density
Allman *et al.*[150]	21	RCT: ONS versus control groups	180	↑ BW, LBM
Tietze *et al.*[151]	19	RCT, crossover, ONS versus control periods	120	↑ BW, arm muscle circumference
Eustace *et al.*[152]	47	RCT: ONS versus control groups	90	↑ Albumin, grip strength, SF12 mental health
Hiroshige *et al.*[153]	44	RCT, crossover, ONS versus control periods	180	↑ DEI, DPI, fat mass, fat-free mass, albumin
Sharma *et al.*[154]	40	RCT: ONS versus control groups	30	↑ Albumin
Leon *et al.*[155]	180	RCT: ONS versus control groups	365	↑ DEI, DPI, albumin
Cano *et al.*[87]	186	RCT: ONS versus ONS + IDPN groups	365	↑ nPNA, BMI, albumin, prealbumin in both groups
Fouque *et al.*[156]	86	RCT: ONS versus control groups	90	↑ DEI, DPI, SGA, QOL
Moretti *et al.*[157]	49	RCT: ONS versus control groups	365	↑ nPNA, albumin

Abbreviations: BMI, body mass index; BW, body weight; DEI, dietary energy intake; DPI, dietary protein intake; DPN, intradialytic parenteral nutrition; LBM, lean body mass; MHD, maintenance hemodialysis; nPNA, normalized protein nitrogen appearance; QOL, quality of life; RCT, randomized clinical trial; SGA, subjective global assessment.

Kidney International (2013) **84**, 1096–1107

Positive effects of ONS on nutritional status

IDPN

What is IDPN

Intradialytic parenteral nutrition (IDPN) is a specific form of nutritional supplementation for ESRD patients on hemodialysis, based on the administration of nutrients (usually a mixture of amino acids, dextrose and lipids as lipid emulsions) during each dialysis session

Modalities of IDPN

a) <u>Self-made IDPN</u>

- Sequential administration of nutrients in the circuit

- All-in-one bags with nutrients compounded in the dialysis ward

b) <u>Pharmacy-compounded IDPN</u>

- All-in-one bags with nutrients compounded by hospital pharmacy

c) <u>Commercial all-in-one admixtures</u>

XXX

Types of IDPN
(a) IDPN based on compounded all-in-one admixtures
All-in-one admixtures with bags compounded in the dialysis ward
All-in-one admixtures with nutrients compounded by the hospital pharmacy
(b) IDPN based on commercially available all-in-one admixtures
Volume 625–1,250 ml
Osmolarity 1,200–1,600 mOsm/l
Essential and non essential aminoacids + glucose + lipid emulsions
Caloric density about 1 kcal/ml
Aminoacids 40–60 g/l
Non protein kcal ratio (gluc/lip) about 2:1
P 10–16 mmol/l
K 24–40 mmol/l
Available with or without electrolytes

IDPN intradialytic parenteral nutrition

Sabatino A & Fiaccadori E, J Nephrol 2014; 27:377-383

	BBraun		Baxter	Fresenius
	Nutriflex lipid		Olimel	SmofKabiven
	Special	Plus	N9/N9E	
Total volume (ml)	1,250/1,875/ 2,502	1,250/1,875/ 2,500	1,000/1,500/ 2,000	986/1,477/1,970
Total protein (g/l)	57.6	38.4	44.3	50
Total kcal (1 l)	1,180	1,012	1,140	1,100
Non protein kcal (1 l)	936	840	960	900
g of nitrogen/l	8	5.6	7	8
Glucose (g/l)	144	120	140	125
Lipids (g/l)	40	40	40	38
Type of lipid	PUFA + MCT	PUFA + MCT	MUFA + PUFA	PUFA (omega-3) + MCT
Osmolarity (mOsm/l)	1,545	1,215	1,170	1,500
Na (mmol/l)	53.6	40	35	40
K (mmol/l)	37.6	28	30	30
P (mmol/l)	16	12	15	12
Available without electrolytes?	Yes	Yes	Yes (N9E)	Yes (only the 1,500 and 2,000 ml bags)

Sabatino A, Fiaccadori E, J Nephrol 2014; 27:377-383

Table 3 All-in-one admixtures for IDPN in ESRD

	BBraun Nutriflex lipid	
	Special	Plus
Total volume (ml)	1,250/1,875/ 2,502	1,250/1,875/ 2,500
Total protein (g/l)	57.6	38.4
Total kcal (1 l)	1,180	1,012
Non protein kcal (1 l	936	840
g of nitrogen/l	8	5.6
Glucose (g/l)	144	120
Lipids (g/l)	40	40
Type of lipid	PUFA + MCT	PUFA + MCT
Osmolarity (mOsm/l	1,545	1,215
Na (mmol/l)	53.6	40
K (mmol/l)	37.6	28
P (mmol/l)	16	12
Available without electrolytes?	Yes	Yes

IDPN intradialytic parenteral nutrition, *ESRD* end stage renal disease, *MCT* medium chain triglycerides, *MUFA* monounsaturated fatty acids, *PUFA* polyunsaturated fatty acids

Sabatino A, Fiaccadori E, J Nephrol 2014; 27:377-383

Safe IDPN

- **Volume**: not more than 1000 ml/dialysis
- **Infusion rate**: not more than 250 ml/hour
- **Aminoacids**: not more than 50 g/dialysis
- **Glucose**: not more than 500 Kcal/dialysis
- **Lipids**: ≤ 1 g/Kg/dialysis, i.e. not more than 500 Kcal/dialysis

Table 5 Practical aspects of IDPN

	Suggestions	Actions
Formula	Use the most concentrated commercial all-in-one admixtures (energy density about 1.0 kcal/ml)	
Biochemical monitoring	Check serum triglyceride levels before planning an IDPN program	Don't start IDPN if levels >300 mg/dl
	Check serum glucose levels at dialysis start, mid-dialysis, end-dialysis and 1 h after the end of the dialysis at each dialysis of the first 3 IDPN weeks	Serum glucose levels should be maintained in the 110–180 mg/dl range. If serum glucose >180 mg/dl add subcutaneous insulin administered as rapid action analogues (start with 0.1 UI/kg);
		Do not give insulin after the 3rd h of dialysis
IDPN administration	Infuse IDPN in the venous drip chamber	Always use a parenteral infusion pump
	Start nutrient administration after 15 min of dialysis, when dialysis machine pressures and patient parameters are stable	
	Start slowly, with 1/3 of the targeted amount in the first week, 2/3 in the second week and full amount from the 3rd week	If a nutrient admixture with 1 kcal/ml is used, this means not more than 1 ml/kg/h the first week, 2 ml/kg/h the second week, 3 ml/kg/h at full regimen
Dialysis procedures	Remove fluid added with IDPN by adjusting the ultrafiltration rate as per patient's needs	
	Check pre-dialysis electrolytes	In the case of severe hyperkalemia (≥6 mmol/l) and/or hyperphosphatemia (>5.5 mg/dl), use electrolyte-free admixtures
Nutrient intake	Calculate the maximum macronutrient amount given by IDPN per dialysis (4 h) as energy 15 kcal/kg/dialysis and aminoacids: 0.8 g/kg/dialysis;	Calculate the amount of nutrient admixture as ml/dialysis session and divide by the hours of dialysis to have the hourly administration rate of fluids

Sabatino A, Fiaccadori E, J Nephrol 2014; 27:377-383

Time of onset and duration of different insulin preparations

Type of Insulin	Onset	Peak	Duration
Fast-acting			
Regular	½-1 hr.	2-4 hr.	6-8 hr.
Lyspro/ Aspart/ Glulisine	<15 min.	1-2 hr.	4-6 hr.
Intermediate-acting			
NPH	1-2 hr.	6-10 hr.	12+ hr.
Long-acting			
Detemir	1 hr.	Flat, Max effect in 5 hrs.	12-24 hr.
Glargine	1.5 hr.	Flat, Max effect in 5 hrs.	24 hr.

What we can expect from IDPN

- 1 L of IDPN /dialysis (1000 Kcal, 50 g of AA) for three HD/week
- Weekly amount of nutrients by IDPN: 3000 Kcal + 150 g
- 10-15% of AA lost through the filter
- Daily supplementation (including non dialysis days): 5-6 kcal/Kg/day, 0.25 g/Kg/day of AA → i.e, not more than 20-25% of ideal daily nutrient intake targets

Is IDPN safe in daily clinical practice?

Very low rate of metabolic complications during IDPN in ESRD patients on HD

Table 2. Adverse events observed during 2-yr follow-up[a]

Adverse Event	No. of Events	
	Control Group	IDPN Group
Event		
Deaths	36	40
heart failure	10	8
stroke	7	8
infection	8	7
cancer	1	7
Other causes	10	10
Hospitalizations for arteriovenous care	64	54
vascular access thrombosis	10	10
Hospitalization for other reasons	180	180
Events inducing discontinuation of IDPN	—	11
Nausea and vomiting	34	46
Diarrhea	14	8
Abdominal pain	9	8
Increase in plasma triglycerides >2 mmol/L	2	8
Increase in serum ALAT >1 N	1	0
Increase in serum GGT >1 N	1	9

[a]Some patients had more than one event.

J Am Soc Nephrol 18: 2583–2591, 2007.

Table 3 Serum lipids of patients and controls in pre- and postdialysis states at the beginning and after 6 months of the study period

	IDPN group		P *value*	*Controls*		P *value*
	Pre-HD	*Post-HD*		*Pre-HD*	*Post-HD*	
Total cholesterol (mg/dl)						
0 months	183.3±49.9	199.2±55.6	NS	178.0±28.9	192.5±32.5	0.002
6 months	190.8±39.7	190.7±32.6	NS	156.7±25.5	167.7±26.3	0.001
HDL (mg/dl)						
0 months	58.7±17.2	60.3±16.1	NS	51.3±20.3	58.2±23.8	0.011
6 months	52.7±20.8	53.5±20.0	NS	49.7±16.6	56.0±20.4	0.028
LDL (mg/dl)						
0 months	106.3±45.1	113.7±41.1	NS	110.2±37.4	122.7±40.6	0.003
6 months	108.8±39.1	113.3±39.9	NS	92.0±31.4	101.0±32.6	0.001
Triglycerides (mg/dl)						
0 months	106.8±39.7	199.3±125.5	NS	151.8±46.3	198.8±166.2	NS
6 months	112.7±47.3	147.3±69.7	NS	160.7±58.5	167.7±159.9	NS

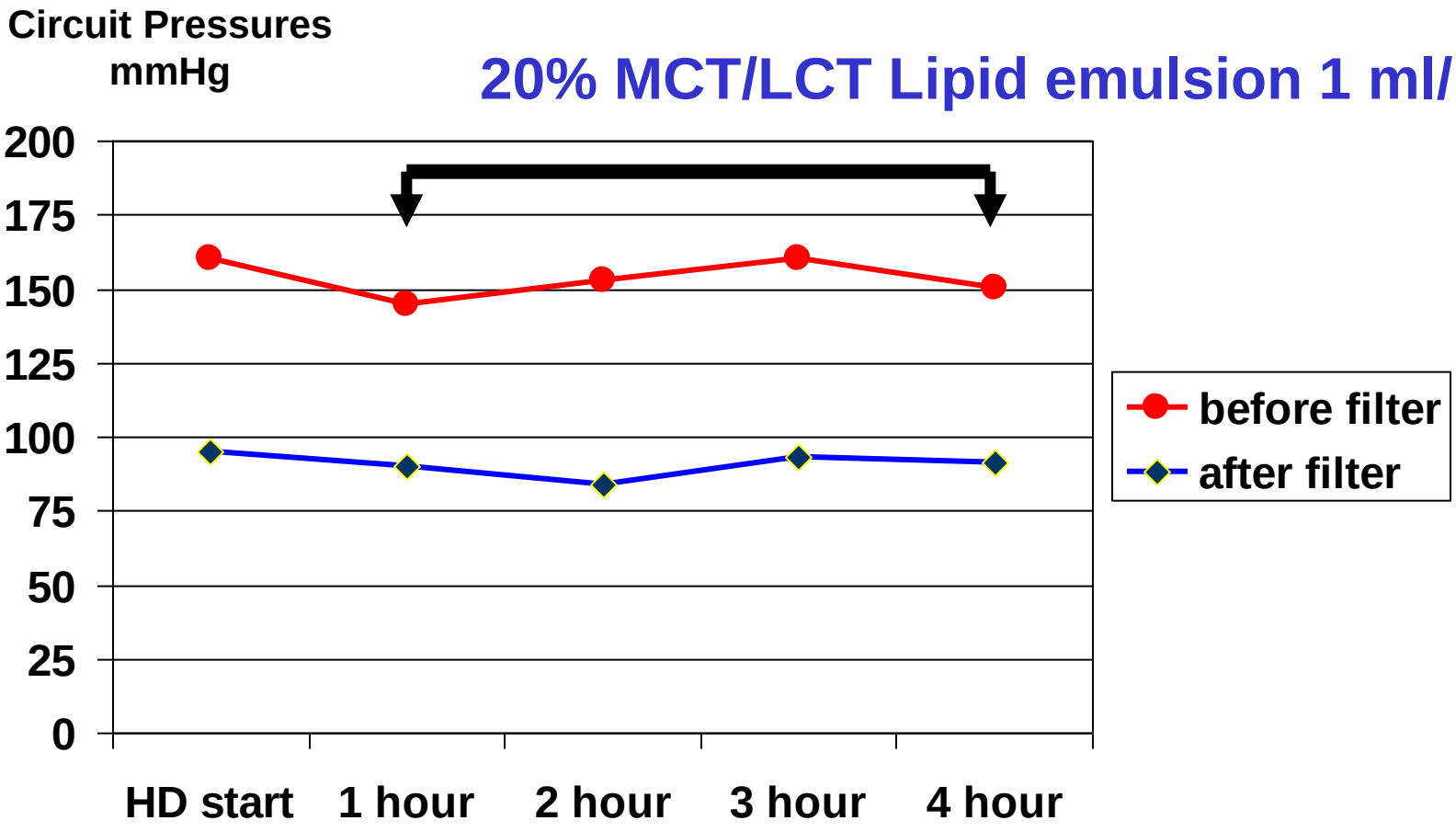
Abbreviations: HDL, high-density lipoprotein; IDPN, intradialytic parenteral nutrition; LDL, low-density lipoprotein; post-HD, post-hemodialysis; pre-HD, pre-hemodialysis.

No difference in serum triglyceride levels between IDPN group and controls

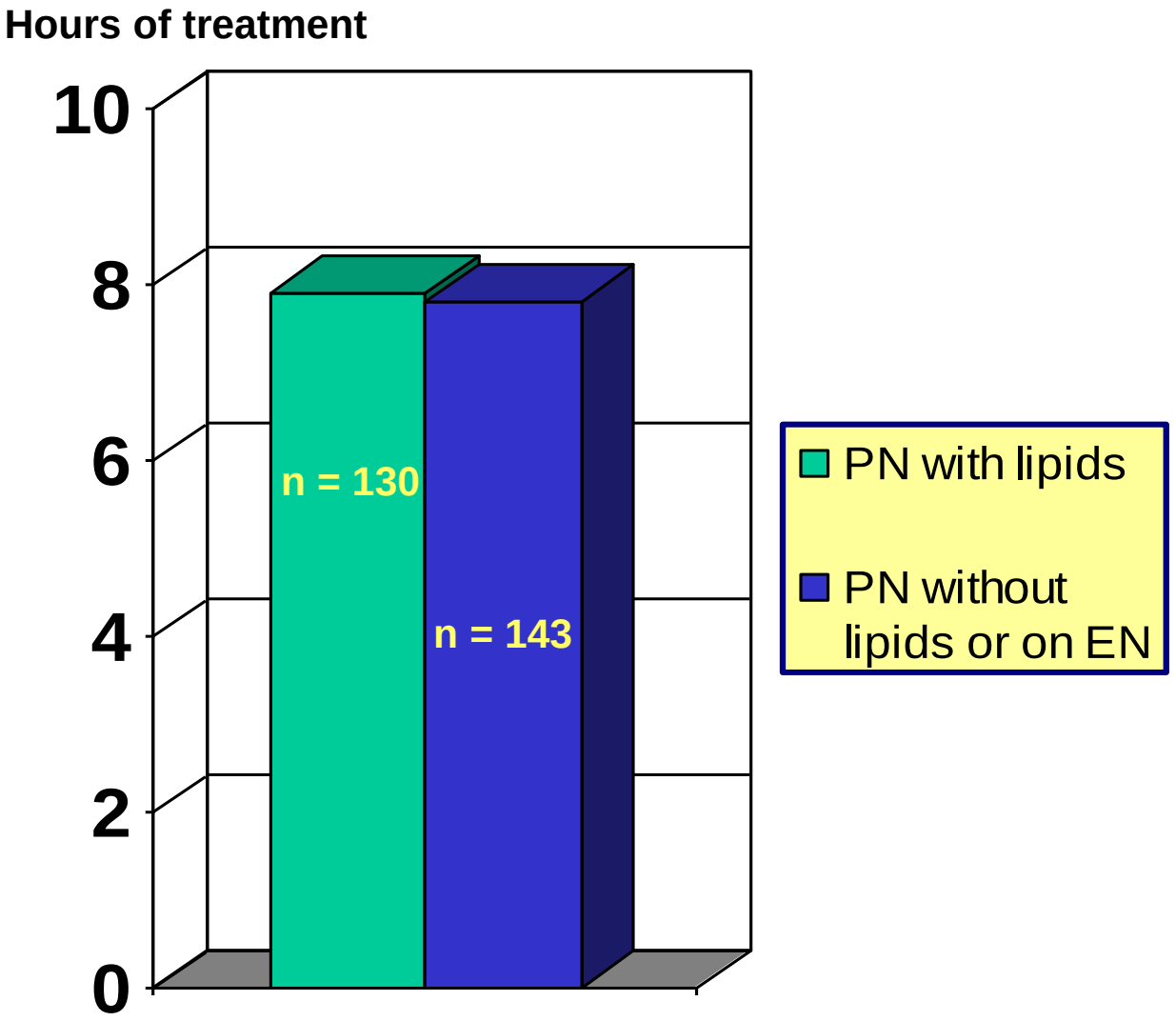
European Journal of Clinical Nutrition (2008) 62, 789–795

Any technical problem with filters and circuits when lipid emulsions are infused during the dialysis session?

No changes of pressures in the extracorporeal circuit of dialysis during IDPN with 20% lipid emulsion in ESRD



No effects of parenteral nutrition with lipid emulsions on filter duration in sustained low-efficiency dialysis (SLED)

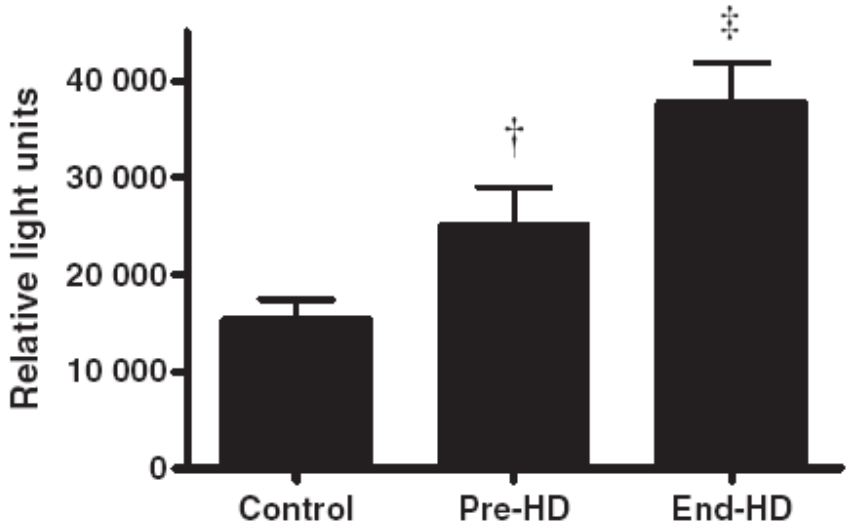


- 273 SLED in 37 ICU patients with AKI
- <u>Prescribed duration 8 hours/treatment</u>
- PN with all-in-one system
- (20% lipid emulsion 250-500 ml/24 hours)

What are the specific nutritional effects of intradialytic nutritional support in ESRD patients?

Activation of caspase-3 in the skeletal muscle during haemodialysis

Michel A. Boivin[*], Shadi I. Battah[*], Elizabeth A. Dominic[†], Kamyar Kalantar-Zadeh[‡], Arny Ferrando[§], Antonios H. Tzamaloukas[¶], Rama Dwivedi[**], Thomas A. Ma[††], Pope Moseley[‡‡] and Dominic S. C. Raj[**, §§, ¶¶]



† $P<0{\cdot}01$Pre-HD vs. Control; ‡ $P<0{\cdot}001$ End-HD vs. Pre-HD and control.

Figure 1 Caspase-3 activity in muscle was increased in patients with ESRD at baseline (pre-HD) compared with controls and was further augmented by haemodialysis (End-HD). †$P < 0{\cdot}01$Pre-HD vs. Control; ‡$P < 0{\cdot}001$ End-HD vs. Pre-HD and control.

Muscle catabolism is activated during dialysis

Eur J Clin Invest 2010; 40 (10): 903–910

Negative protein balance in skeletal muscle during hemodialysis

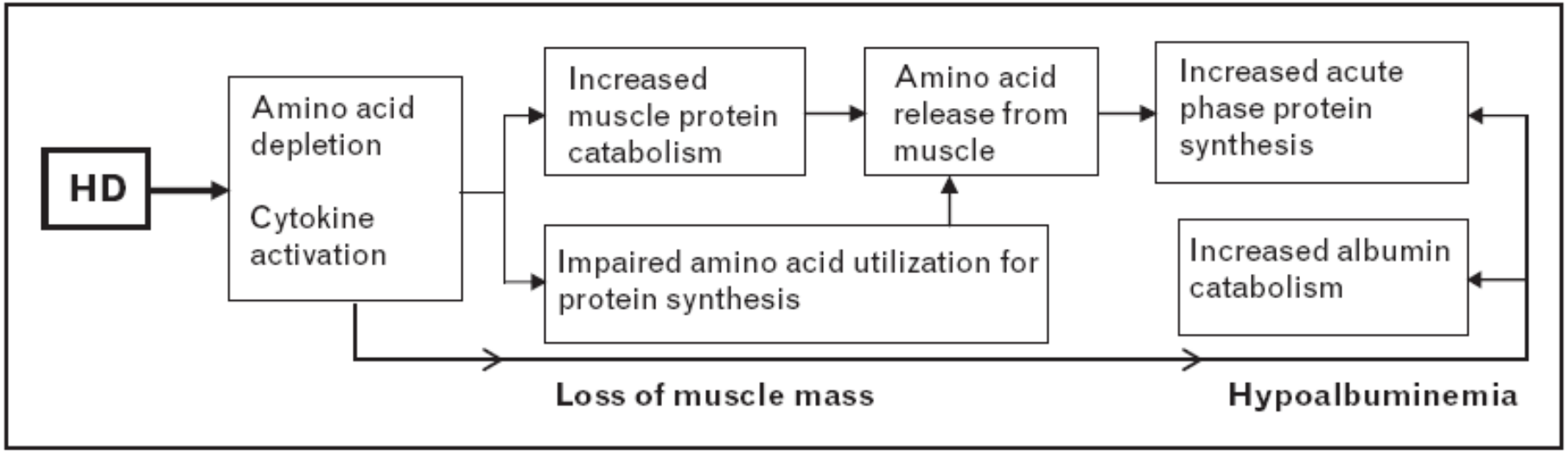
Table 2 Muscle protein kinetic studies during haemodialysis

	Control	Pre-HD	End-HD
Phenylalanine concentration in artery (Ca; μmol L^{-1})	89·8 ± 4·5	84·5 ± 7·8*	65·9 ± 5·8
Phenylalanine concentration in vein (Cv; μmol L^{-1})	92·0 ± 4·6	85·2 ± 7·9*	74·6 ± 5·4†
Leg muscle protein synthesis (Rd; nmol 100 mL^{-1} min^{-1})	42·62 ± 5·78	41·19 ± 3·03	55·15 ± 4·48‡
Leg muscle proteolysis (Ra; nmol 100 mL^{-1} min^{-1})	50·47 ± 7·69	41·63 ± 2·47	84·61 ± 3·65††,‡‡
Net balance (nmol 100 mL^{-1} min^{-1})	−7·85 ± 5·47	−2·28 ± 1·93	−29·47 ± 6·03‡‡

*$P < 0·05$ Pre-HD vs. End-HD, †Ca vs. Cv $P < 0·01$; ‡$P < 0·02$ End-HD vs. Pre-HD, ††Ra vs. Rd $P < 0·05$; ‡‡$P < 0·001$ End-HD vs. Control and Pre-HD.

Eur J Clin Invest 2010; 40 (10): 903–910

AA are released from muscle protein catabolism during hemodialysis: they are in part utilized in the liver for acute phase protein synthesis, and in part they are removed by hemodialysis itslf



Current Opinion in Nephrology and Hypertension 2008, 17:589–594

Free AA losses into dialysate 8.2 gr/dialysis
Plasma AA levels decreased by 33%

Wolfson M et al.,
Kidney Int 1982; 21:500

Positive effects of intradialytic nutritional support (oral or parenteral)

- Improved energy balance
- Improved protein (AA) balance
- Improved albumin synthesis rate
- Improved nutritional parameters

Pupim LB et al., Sem Nephrol 2006; 26:134-157

Table 3. Randomized Studies of IDPN

Study	Design	Treatment Duration	No. With PEW	Parameters Measured	Outcome
Toigo et al,[30] 1989	11 pts: 26.5 g of modified EAA 10 pts: 24 g of EAA + NEAA	6 mo	None	Nerve conduction velocity, Alb	Decrease in Alb in EAA + NEAA group
Cano et al,[31] 1990	12 pts: 0.08 g of N/kg (/HD session) from EAA + NEAA, 1.6 g/kg (/HD session) lipids 14 pts: no intervention	3 mo	All	BW, appetite, MAMC	Increase in calorie (9 kcal/kg/d) and protein intake (0.25 g/kg/d) in IDPN-treated pts
McCann et al,[14] 1999	19 pts; 70% glucose, 15% AA, 20% lipids	11 wk	NA	Delivered Kt/V, URR	Decrease in delivered Kt/V in pts who received AA-containing IDPN
Navarro et al,[32] 2000	17 pts	3 mo			Positive net AA balance Increase in PCR, Alb, transferrin
Cano et al,[33] 2006	17 pts: olive oil–based IV lipid emulsion 18 pts: soybean oil–based IV lipid emulsion	5 wk			Both groups showed similar improvement in nutritional status, plasma lipid, oxidative and inflammatory parameters
Cano et al,[34] 2007	89 pts: IDPN 93 pts: control	12 mo	All	Primary end point, all-cause mortality; secondary end points, hosp rate, BW, Karnofsky score, BMI	No difference in hosp rate or mortality between 2 groups

Positive nutritional and metabolic effects of IDPN on nutritional status in ESRD

Am J Kidney Dis 55:352-364. © *2010*

CLINICAL RESEARCH www.jasn.org

Intradialytic Parenteral Nutrition Does Not Improve Survival in Malnourished Hemodialysis Patients: A 2-Year Multicenter, Prospective, Randomized Study

Noël J.M. Cano,* Denis Fouque,† Hubert Roth,‡ Michel Aparicio,§ Raymond Azar,‖ Bernard Canaud,¶ Philippe Chauveau,** Christian Combe,§** Maurice Laville,† Xavier M. Leverve;‡ and the French Study Group for Nutrition in Dialysis

*Service d'Hépatogastroenterologie et Nutrition, Clinique Résidence du Parc, Marseille, †Service de Néphrologie, Hôpital Edouard Herriot, Lyon, ‡INSERM-E0221 Bioénergétique Fondamentale et Appliquée, Grenoble, §Université Bordeaux2 and CHU de Bordeaux and **AURAD Aquitaine, Bordeaux, ‖Service de Néphrologie, Centre Hospitalier, Dunkerque, and ¶Service de Néphrologie, Hôpital Lapeyronnie, Montpellier, France

J Am Soc Nephrol 18: 2583–2591, 2007.

The FINE study from France:

One-yr IDPN on top of optimal daily oral supplementation

ABSTRACT

Although intradialytic parenteral nutrition (IDPN) is a method used widely to combat protein-calorie malnutrition in hemodialysis patients, its effect on survival has not been thoroughly studied. We conducted a prospective, randomized trial in which 186 malnourished hemodialysis patients received oral nutritional supplements with or without 1 year of IDPN. IDPN did not improve 2-year mortality (primary end point), hospitalization rate, Karnofsky score, body mass index, or laboratory markers of nutritional status. Instead, both groups demonstrated improvement in body mass index and the nutritional parameters serum albumin and prealbumin ($P < 0.05$). Multivariate analysis showed that an increase in prealbumin of >30 mg/L within 3 months, a marker of nutritional improvement, independently predicted a 54% decrease in 2-year mortality, as well as reduced hospitalizations and improved general well-being as measured by the Karnofsky score. Therefore, although we found no definite advantage of adding IDPN to oral nutritional supplementation, this is the first prospective study demonstrating that an improvement in prealbumin during nutritional therapy is associated with a decrease in morbidity and mortality in malnourished hemodialysis patients.

No advantage per se of adding IDPN to adequate oral supplementation

Nutritional supplementation, no matter what was the modality (oral supplementation alone or IDPN+oral supplementation etc.) improved mortality in ESRD patients on HD if nutritional targets are met

J Am Soc Nephrol 18: 2583–2591, 2007.

Take home messages

- Protein-energy wasting (PEW) is frequent among ESRD patients on hemodialysis and represents a negative prognostic factor
- Intradialytic nutritional support is able to improve nutritional status in ESRD and, likel, the vicious circle of PEW
- Along with ONS, IDPN is a safe and effective modality for nutritional supplementation in selected patients