

Proteins in Surgery



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Préambule

Gern würden wir Sie zum Referat mit dem Titel "Der chirurgische Patient?" einladen. Dabei geht es um ganz praktische Aspekte, welche Proteine (qualitativ) in welchen Dosierungen (quantitativ) beim chirurgischen Patient gebraucht werden.



"I KNOW I HAVE A CASTING PROBLEM, BUT IT'S NOT THAT BAD."

Disclosure



I like to KISS

**KEEP IT SHORT
AND SIMPLE**

Malnutrition

Epidemiology

50% of admitted patients, 40% in surgery

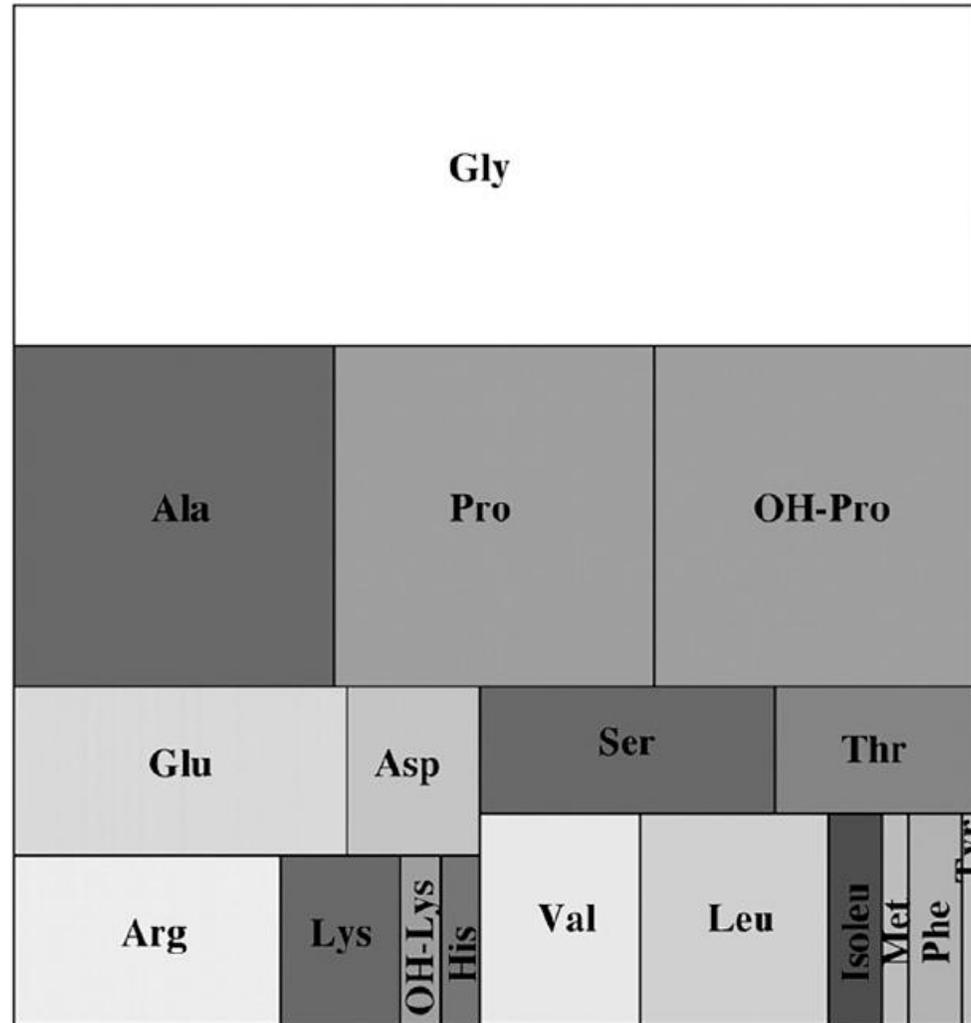
Clinical problems

↓ function, immune defence, wound healing, organ function

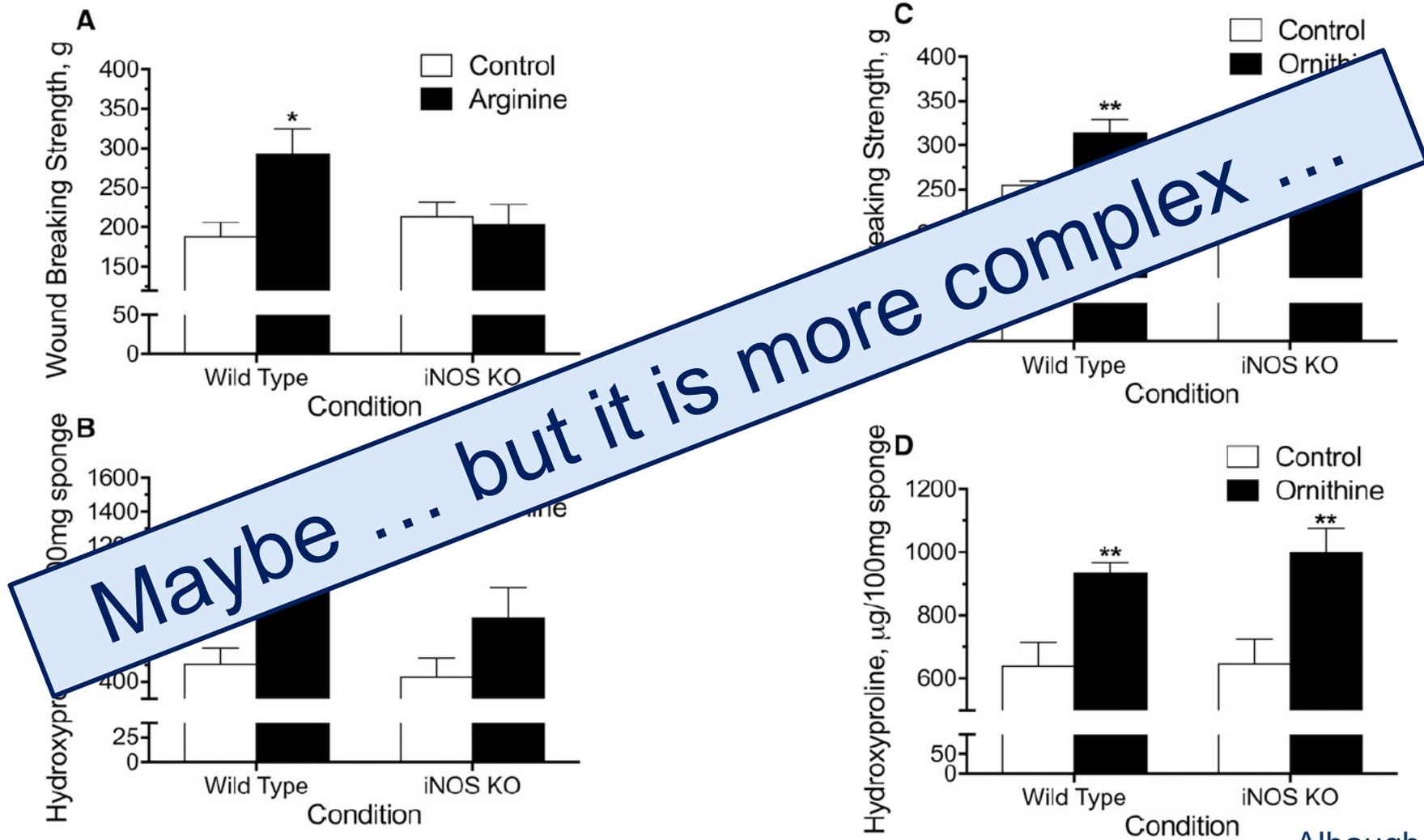
Consequences

↑ Mortality, complications, readmissions, hospital stay, costs

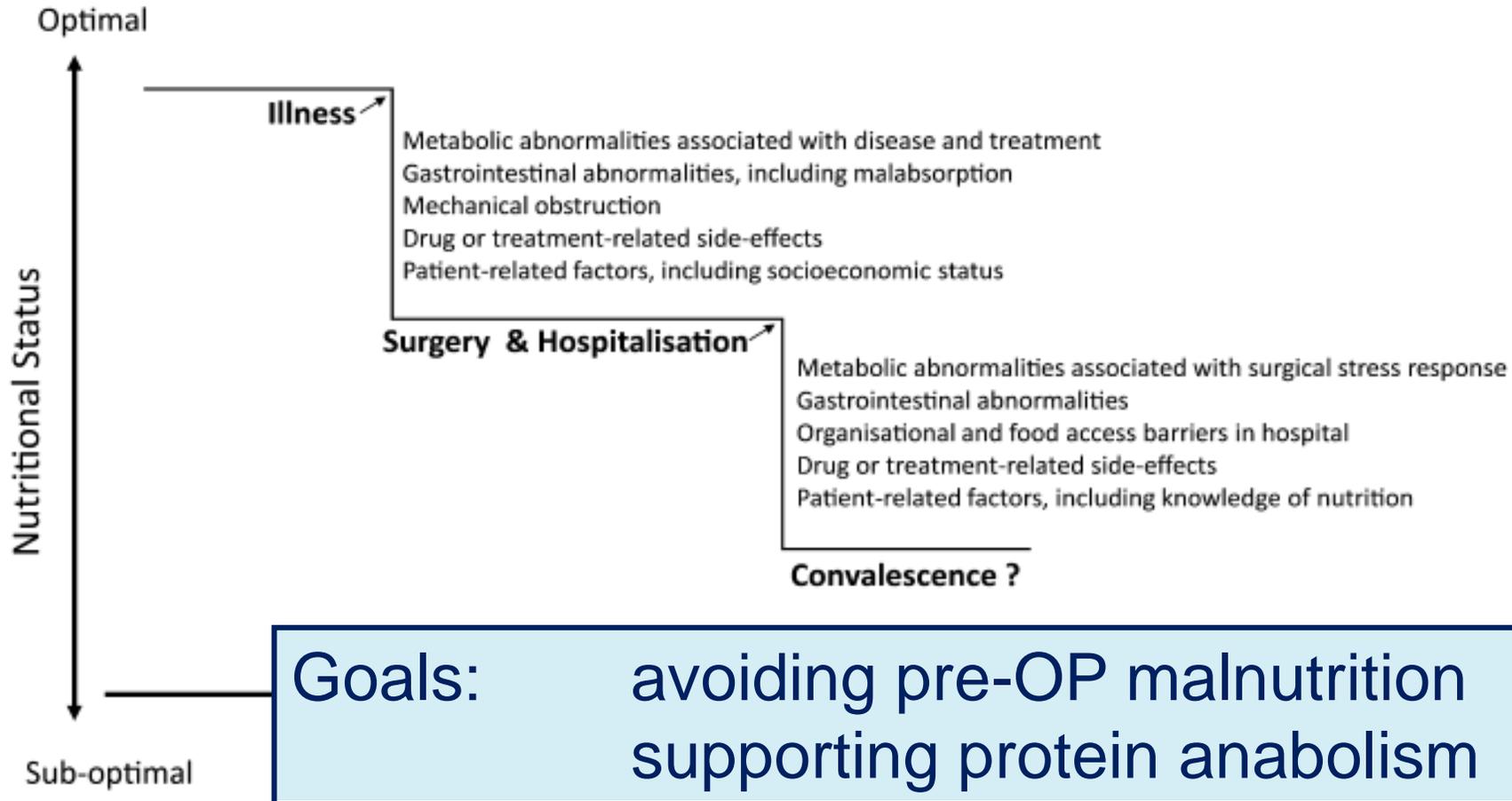
Amino acid composition of collagen



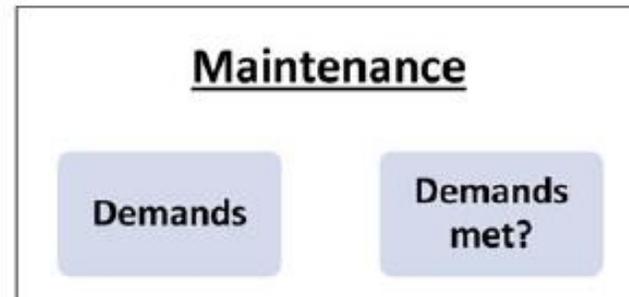
Improved wound healing by supplementation?



Nutritional status, disease and surgery



Protein metabolism



Protein metabolism: some thoughts ...

9 essential amino acids

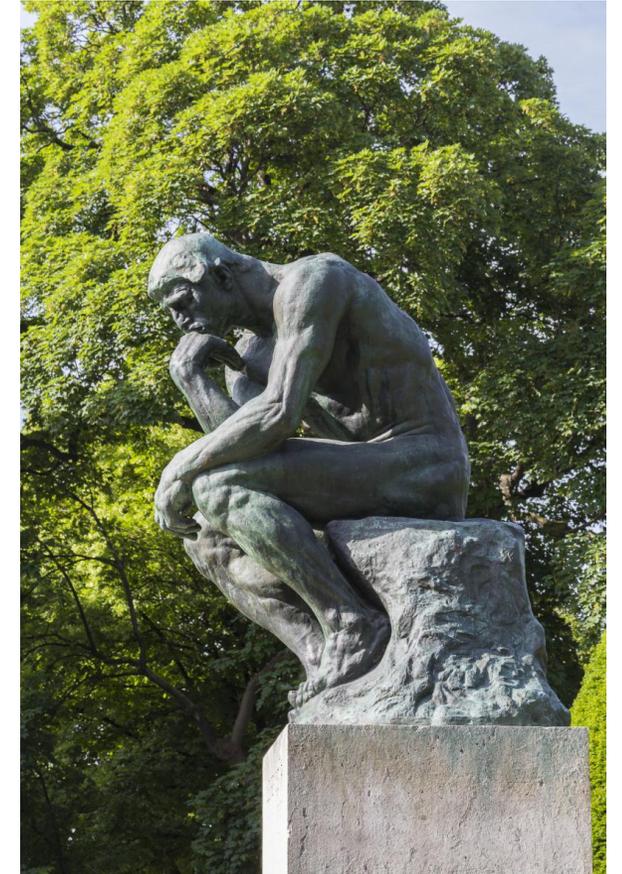
3 conditionally essential: glutamine, arginine, cysteine

2.6g muscle protein → 1g of acute phase protein

Anabolic resistance in older and tumor patients

Requirement 1.2-1.6g/kg/d vs. Reality: <1g/kg/d in 50%

Surgical patient 1.2-2.0g/kg/d



Cave: chronic kidney disease

Guideline	Protein intake recommendation
ESPEN Guidelines on Enteral Nutrition: Adult Renal Failure [16, 45]	0.55–0.6 g protein (2/3 HBV)/kg/day if GFR is 25–70 ml/min 0.55–0.6 g/kg/day (2/3 HBV) or ~0.3 g/kg/day supplemented with EAA or EAA/KA if GFR is <25 ml/min
NKF/KDOQI Clinical practice guidelines for nutrition in chronic renal failure [46]	0.60 g/kg/day, carefully determined, if GFR <25 ml/min ≤0.75 g/kg/day if malnutrition issue ≥50% of...
Australian KHA-CARI Guidelines [18]	0.8 g/kg/day for patients
International Society of Renal Nutrition and Metabolism [2]	0.8 g/kg/day in the absence of signs of malnutrition, +1.0 g/kg/day in the presence of illness
National Institute for Health and Care Excellence [17]	Do not offer low-protein diets (dietary protein intake less than 0.6–0.8 g/kg/day) to people with CKD
NKF/KDOQI Guidelines on Hypertension Management in CKD [48]	Stages 1–2: 1.4 g/kg/day (~18% of calories) Stages 3–4: 0.6–0.8 g/kg/day (~10% of calories)
Diabetic patients with chronic kidney disease	
KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for Diabetes and Chronic Kidney Disease [19]	0.8 g protein/kg/day and ≤20% of total Kcal
Canadian Diabetes Association guidelines [20]	0.8 g protein/kg/day Avoidance of intakes > 1.3 g protein/kg/day

≈ 0.6–0.8g/kg/day

ESPEN guidelines: general

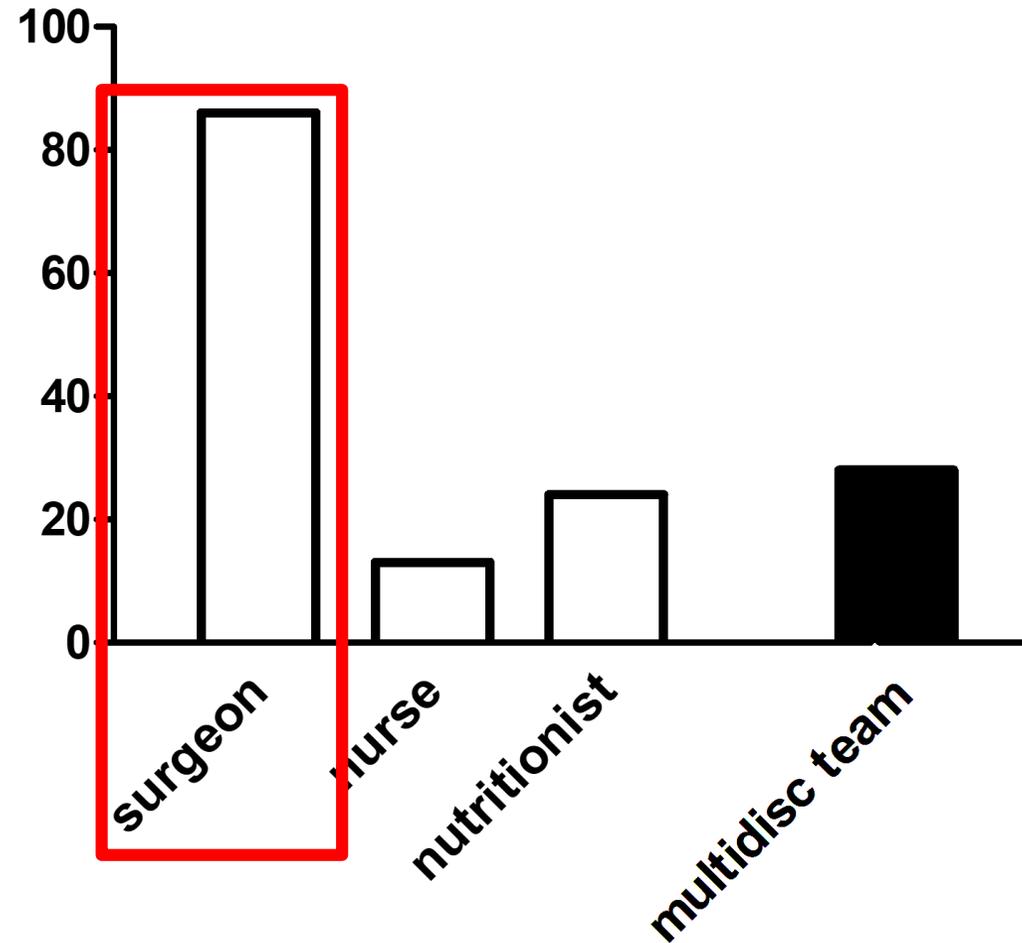
Nutritional status before and after major surgery (GPP)

Perioperative nutritional support therapy is indicated in patients with **malnutrition and those at nutritional risk** (GPP)

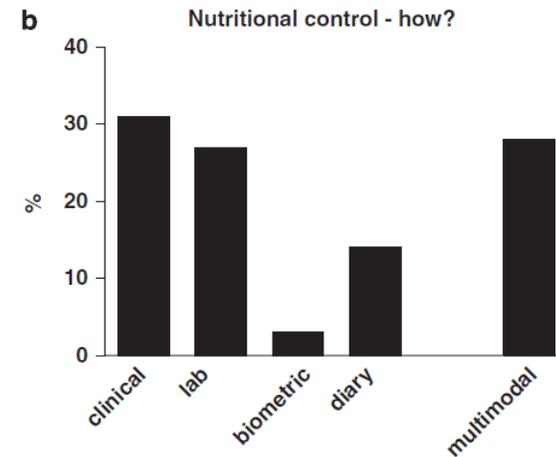
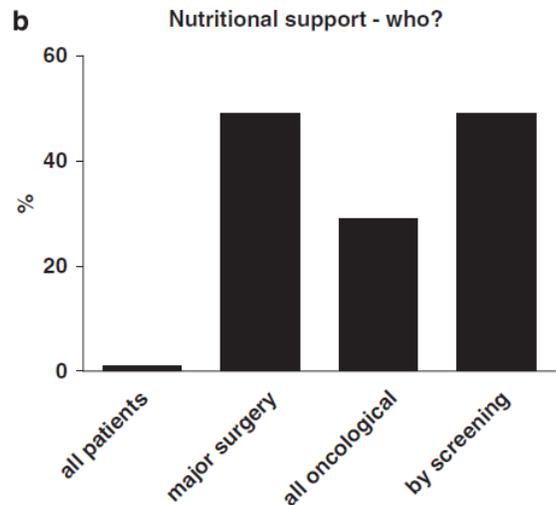
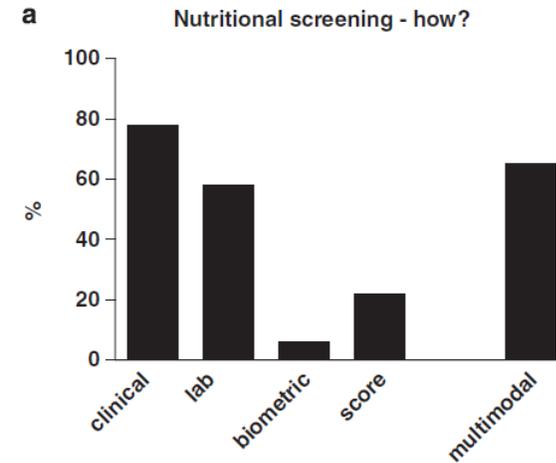
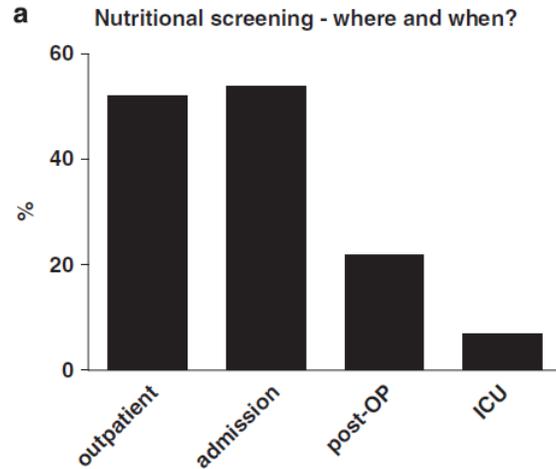
In most instances, oral nutritional intake shall be continued **after surgery without interruption** (A) ... but might be adapted according to individual tolerance and to the type of surgery carried out with special caution to elderly patients (GPP)

GPP – good practice points
(= NO good evidence)

Nutritional assessment: Swiss reality



Perioperative nutrition is still a surgical orphan: results of a Swiss–Austrian survey



Lab test for proteins

Serum albumin, half-life 18-20d

<2.2 g/dL: negative catabolic state, predictor of poor outcome

↓ Serum albumin: Surgical stress, other acute stresses, hepatic disease, and renal disease

No impact: starvation or supplementation

Serum transferrin, half-life 8-9d

≈ recent systemic inflammatory response ... and iron status

Serum prealbumin (transthyretin), 2-3d

"negative acute phase reactant" (capillary leak)

Other

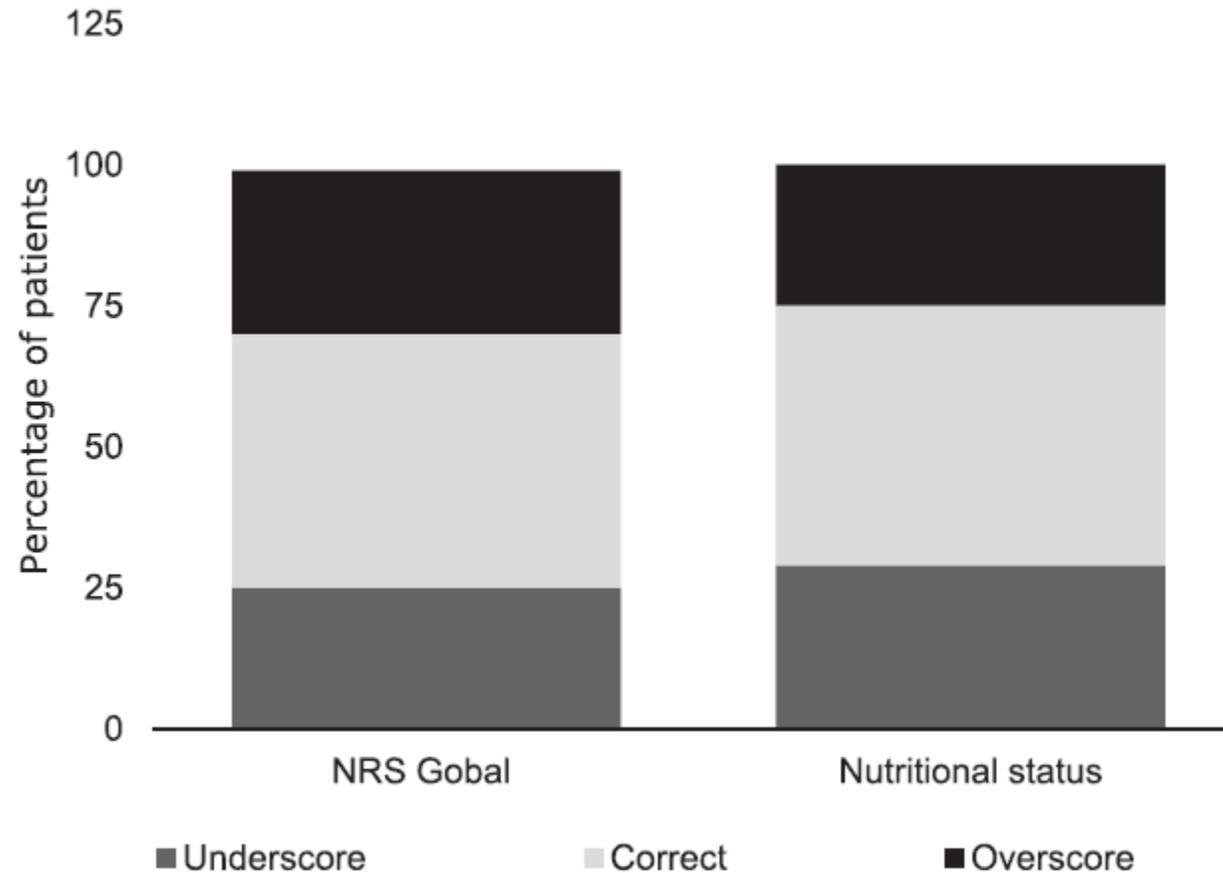
Electrolytes, glucose, blood urea nitrogen (BUN)/creatinine, iron, vitamins

UpToDate®

Accessed 18.06.2019



Correctness of surgeon's assessment of NRS



Nutrition for everybody!?

RESEARCH

Open Access

Preoperative nutritional screening by the specialist instead of the nutritional risk score might prevent **excess nutrition**: a multivariate analysis of nutritional risk factors

Fabian Grass¹, Martin Hübner^{1*}, Markus Schäfer¹, Pierluigi Ballabeni², Yannick Cerantola³, Nicolas Demartines¹, François P Pralong⁴ and Pauline Coti Bertrand⁴

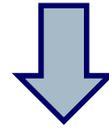
Nutritional support based on NRS-2002 only (our RCT)



Overnutrition with potentially deleterious clinical consequences!

Keep it simple for the surgeon

NRS \geq 3 ?



Detailed assessment by
dedicated specialist before
supplementation!

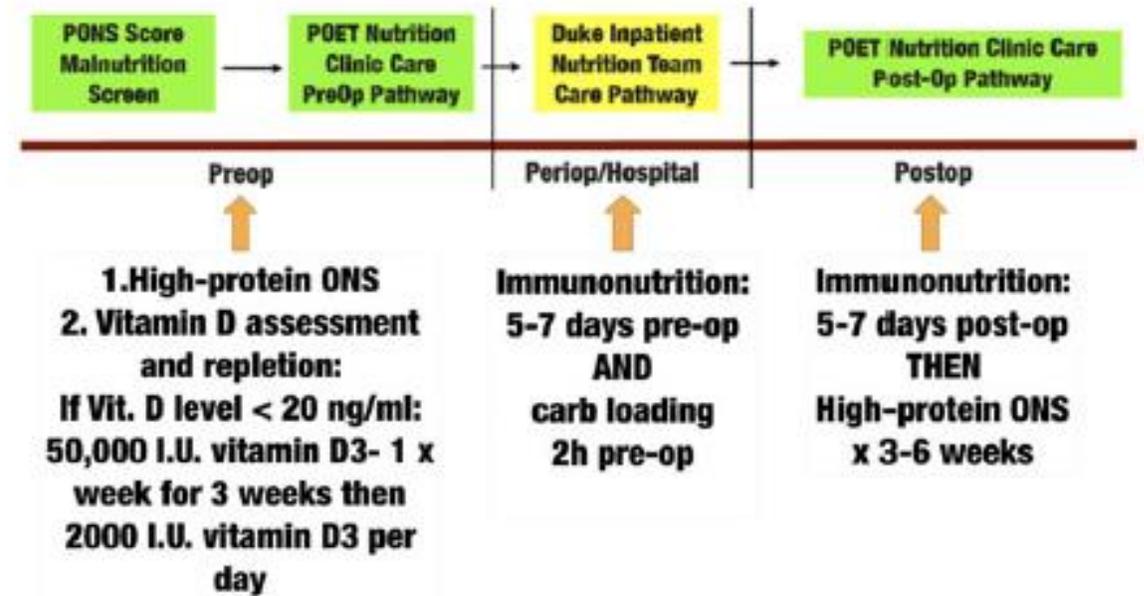
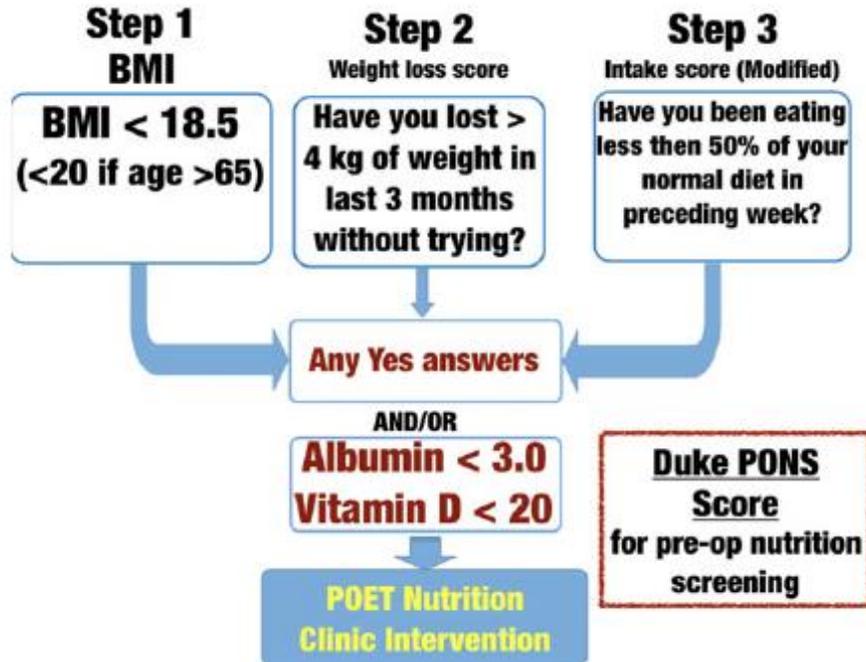
Severe malnutrition $\geq 20\%$ ≥ 5 percentile ≥ 5 percentile

MAMC: mid-arm muscle circumference.

FFM: fat-free-mass measured by bio-impedancemetry.

As indicated in the table, there are different criteria for severe and moderate malnutrition depending on weight loss and body mass composition.

Nutritional status, disease and surgery



Peri-OP nutritional suppl and complications

Σ 56 >RCTs, 6370 patients

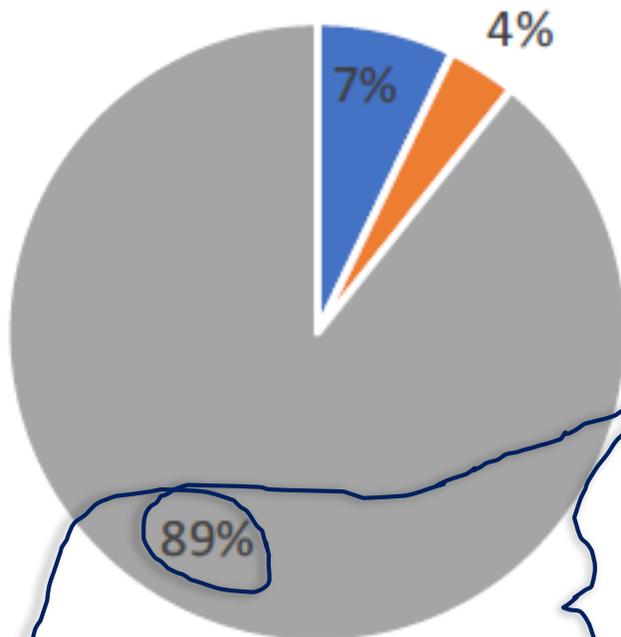
Average Sample Size:

$$44 + 40 = 84$$

Range: 8-157 Median No. of Participants in Intervention

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Types of Control:

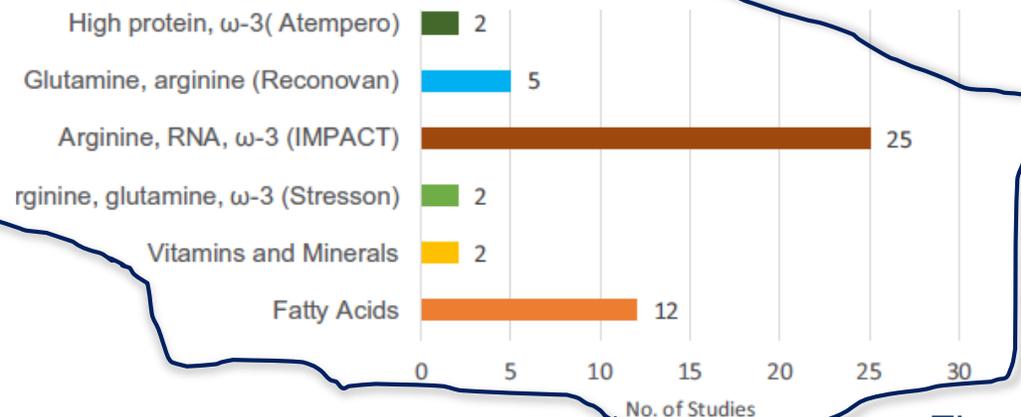
Conventional Diet (27.1%)

Placebo (10.2%)

Standard Formula (55.9%)

Other (6.8%)

- Protein Supplementation
- Carbohydrate-rich Drink
- Immunonutrition



Zhang J Gastrointestinal Surg 2019

Immunonutrition and « normal » supplements

<i>Component</i>	<i>IN</i>		<i>ICN</i>
Weight (g)	74	=	79.7
Energy (kcal)	303	=	303
<i>Proteins (g)</i>	16.8	=	15.5
Arginine (g)	3.8		0.51
<i>Lipids (g)</i>	8.3		2
Omega-3-FA (g)	1		0.02
RNA (g)	0.45		0
Carbohydrates (g)	40.2		57.7

Abbreviations: ICN, isocaloric-isonitrogenous nutrition; IN, immunonutrition; FA, fatty acids.

Recommended dose: 3/d

Peri-OP nutrition decreases post-OP complications

Σ 56 >RCTs, 6370 patients

Complications RR 0.74

Infections RR 0.71

Hospital stay -1.58 days

Immunonutrition in gastrointestinal surgery

Y. Cerantola, M. Hübner, F. Grass, N. Demartines and M. Schäfer

Department of Visceral Surgery, University Hospital Vaudois (CHUV), Bugnon 46, 1011 Lausanne, Switzerland
Correspondence to: Professor N. Demartines (e-mail: Demartines@chuv.ch)

	Complications	Infections	Hospital stay	Mortality
	OR (95% CI)	OR (95% CI)	WMD	OR (95% CI)
Overall	0.46	0.46	-2.1	0.90
	(0.38-0.56)	(0.38-0.56)	(3.0-1.3)	(0.46-1.76)

ESPEN guidelines: Post-OP nutrition

Perioperative nutritional therapy should also be initiated, if

- unable to eat for more than **five days** perioperatively
- cannot maintain above **50% of recommended intake** for more than seven days (GPP)

initiate nutritional support therapy (preferably by the **enteral route** - ONS-TF) without delay (GPP)

GPP – good practice points
(= NO good evidence)

ESPEN guidelines: immunonutrition

Peri- or at least postoperative administration of specific formula enriched with (arginine, omega-3-fatty acids, ribonucleotides) should be considered in **malnourished patients undergoing major cancer surgery (B)**.

There is currently **no clear evidence** for the sole use of these formula enriched with immunonutrients vs standard oral nutritional supplements in the preoperative period (O).



Only proteins??

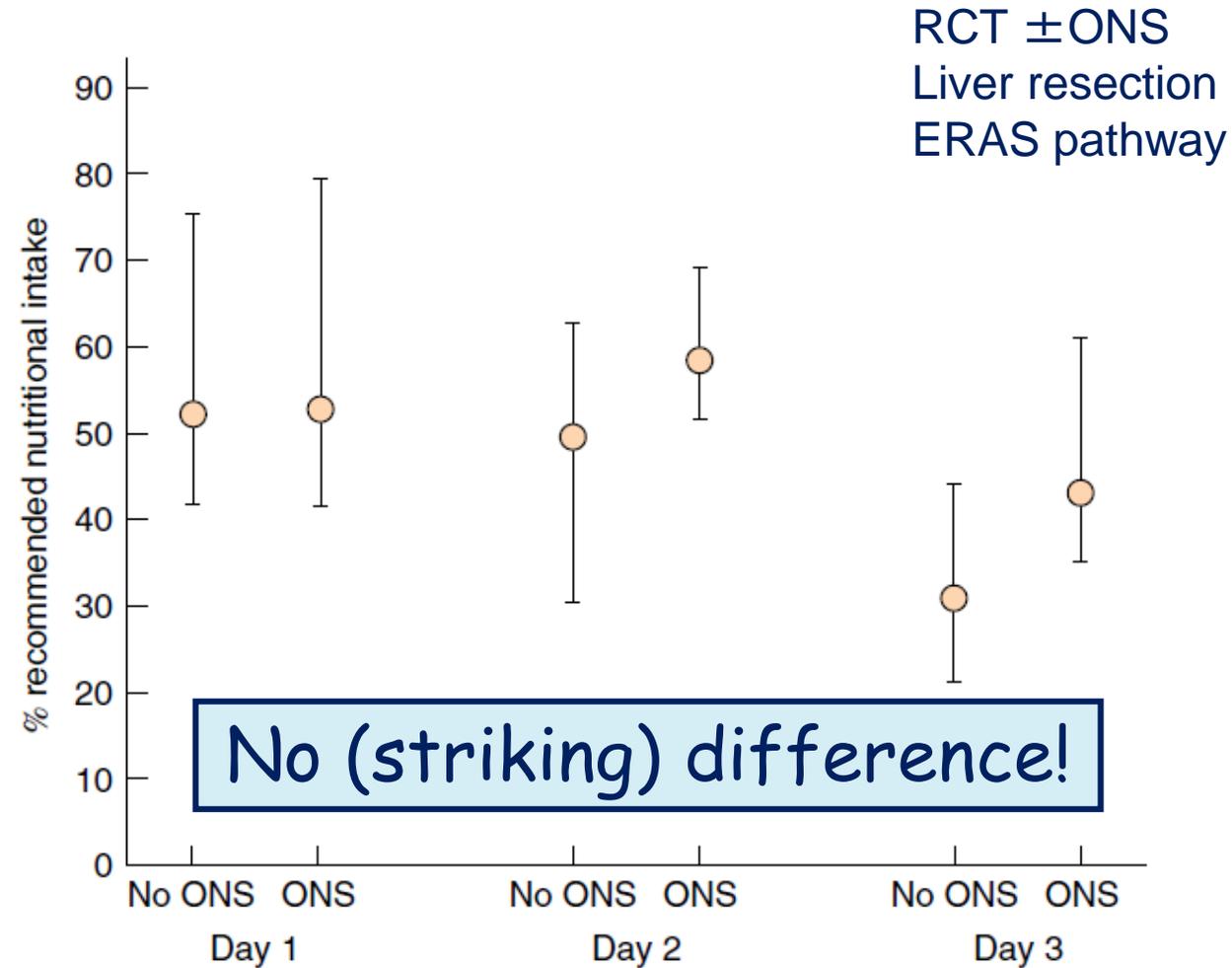
Σ 7 studies

- = mortality, hospital stay, plasma protein levels
- ↓ weight loss, grip strength deterioration, (complications)
- ↑ nutritional status

“There is evidence to suggest that protein supplementation should be routinely provided post-operatively to this population.”

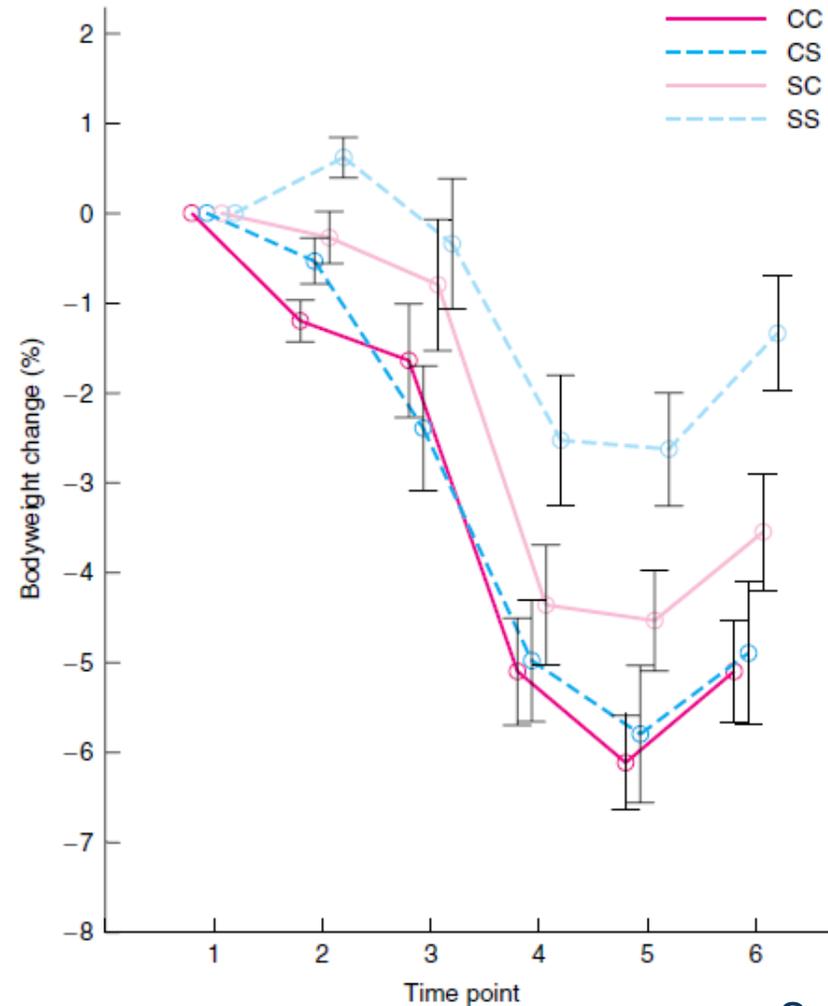
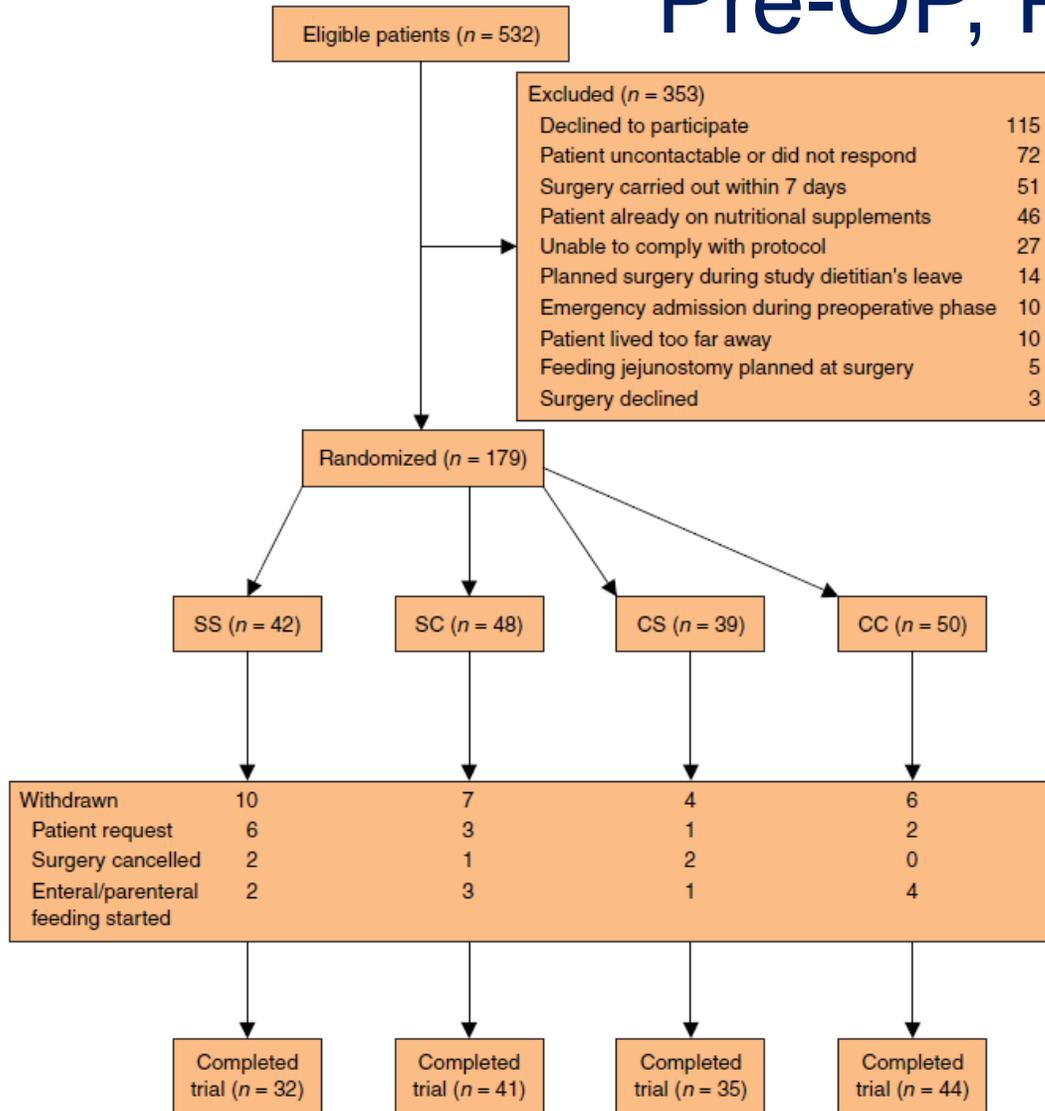
“The optimal level of protein supplementation required to maximise recovery in gastrointestinal surgery patients is effectively unknown.”

Effects of early oral supplements



Pre-OP, Post-OP or both?

Costs (BP)



2289

2286

2324

2618

Pre- and Post-OP?

	SS (n = 32)	SC (n = 41)	CS (n = 35)	CC (n = 44)
Phase I: preoperative				
Duration of ONS (days)*	14.5 (7–36)	15.1 (7–61)		
ONS (kcal/day)	536(231)	542(268)	0	0
Diet (kcal/day)	1946(544)	1993(548)	1953(630)	1923(475)
Total (kcal/day)	2478(688)†	2528(606)†	1953(630)	1923(475)
Phase II: postoperative (inpatient)				
Time from surgery to free fluids or light diet (days)*	4.7 (1–11)	5.8 (2–14)	4.7 (1–8)	5.4 (2–12)
ONS (kcal/day)	300(245)	0	258(201)	0
Diet (kcal/day)	1040(473)	996(567)	1033(579)	927(458)
Total (kcal/day)	1343(478)‡	996(567)	1296(640)‡	927(458)
Phase II: postoperative (outpatient); 2 weeks				
ONS (kcal/day)	274(163)	0	361(284)	0
Diet (kcal/day)	2110(514)	1990(609)	1761(648)	1791(360)
Total (kcal/day)	2390(503)‡	1990(609)	2133(792)§	1791(360)
Phase II: postoperative (outpatient); 4 weeks				
ONS (kcal/day)	340(160)	0	259(221)	0
Diet (kcal/day)	1981(517)	2068(555)	1946(621)	1919(447)
Total (kcal/day)	2253(590)	2068(555)	2209(688)	1919(447)

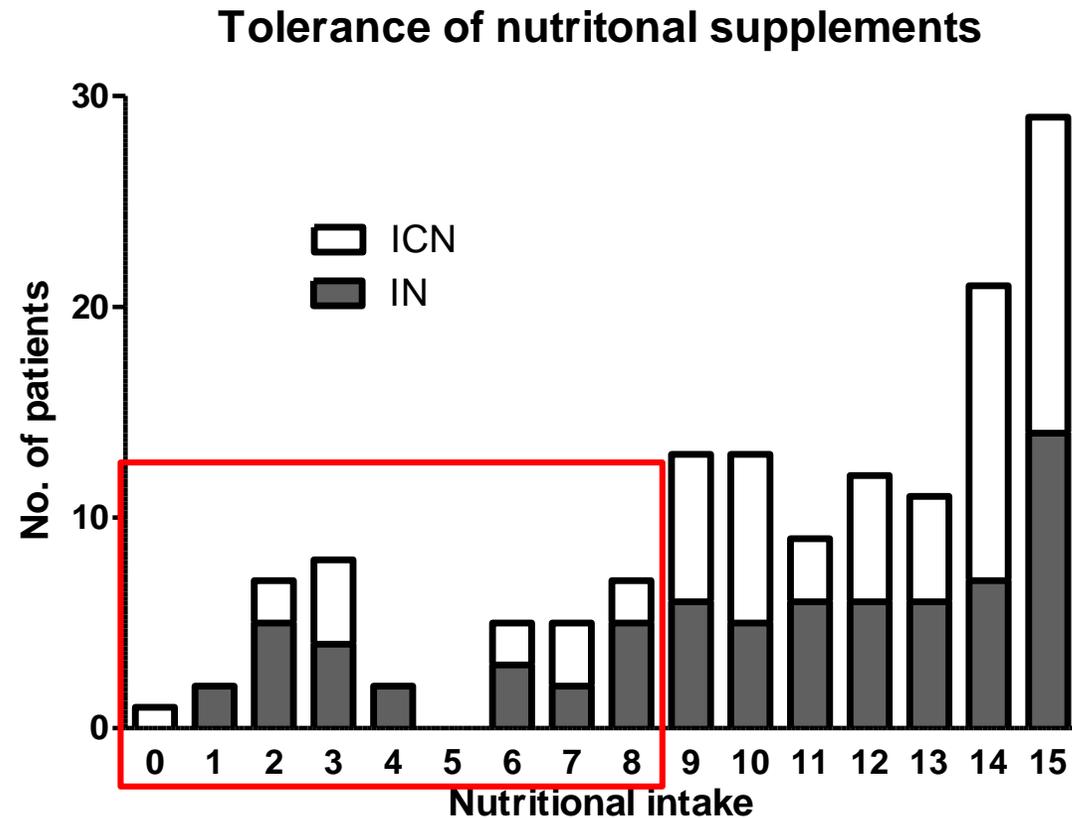
↓

Weight loss, minor complications

=

Major complications, Anthropometrics, QoL

... make sure that patients take it!



Why non-compliance?

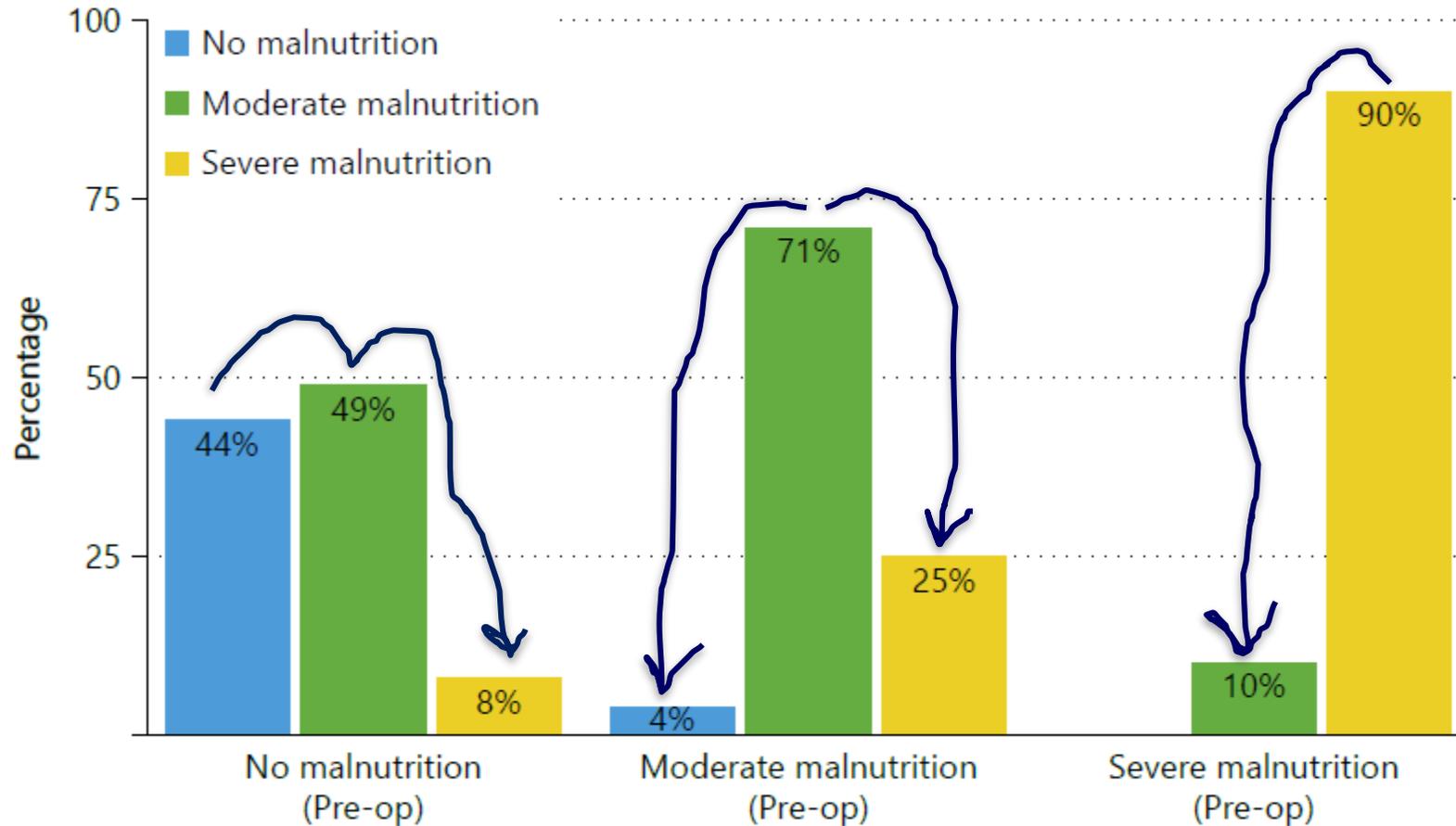
12/20: non-complicant

Compliance + well-nourished

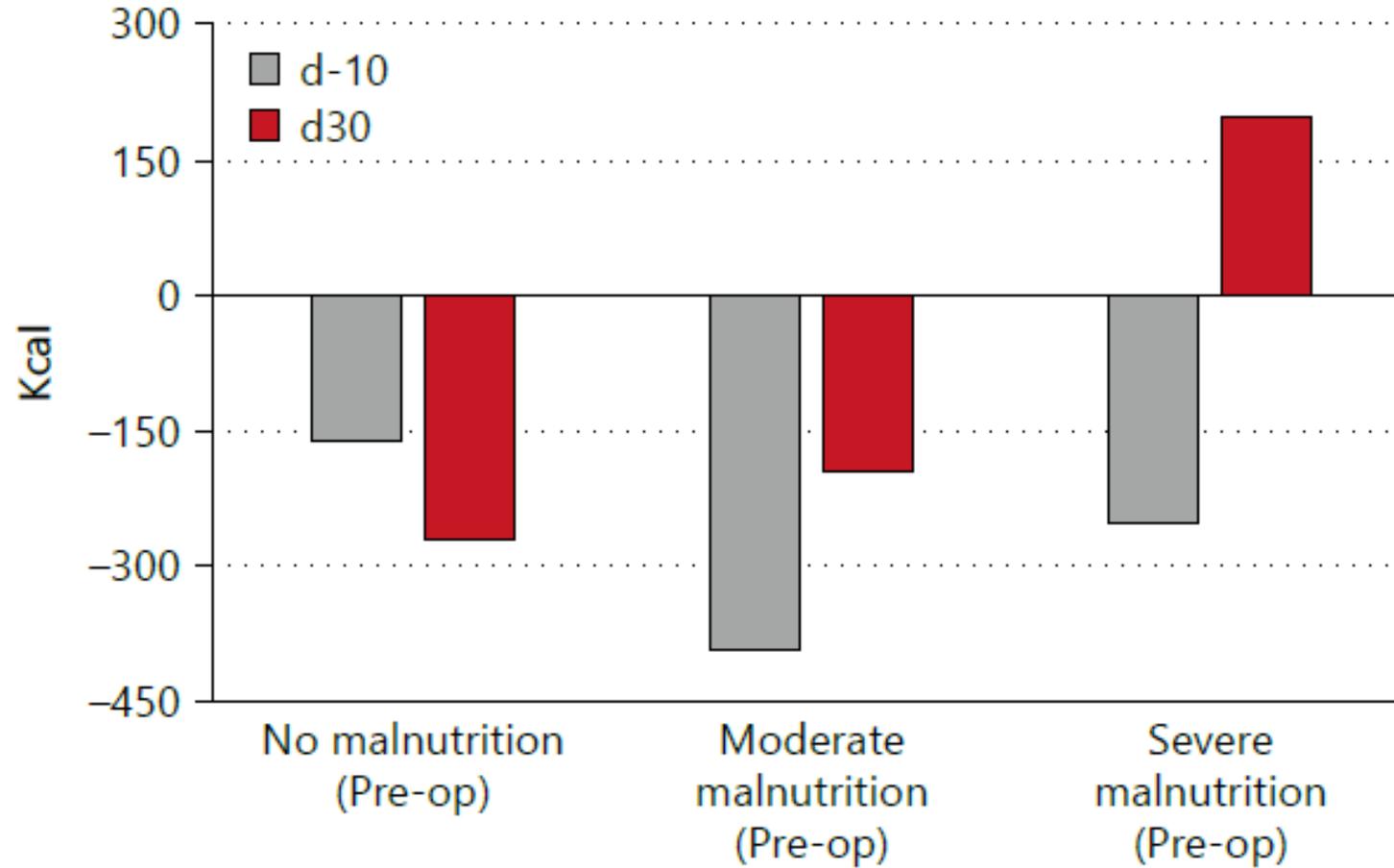
Issues: flavour, volume, texture

impact on dietary intake, and **motivation**

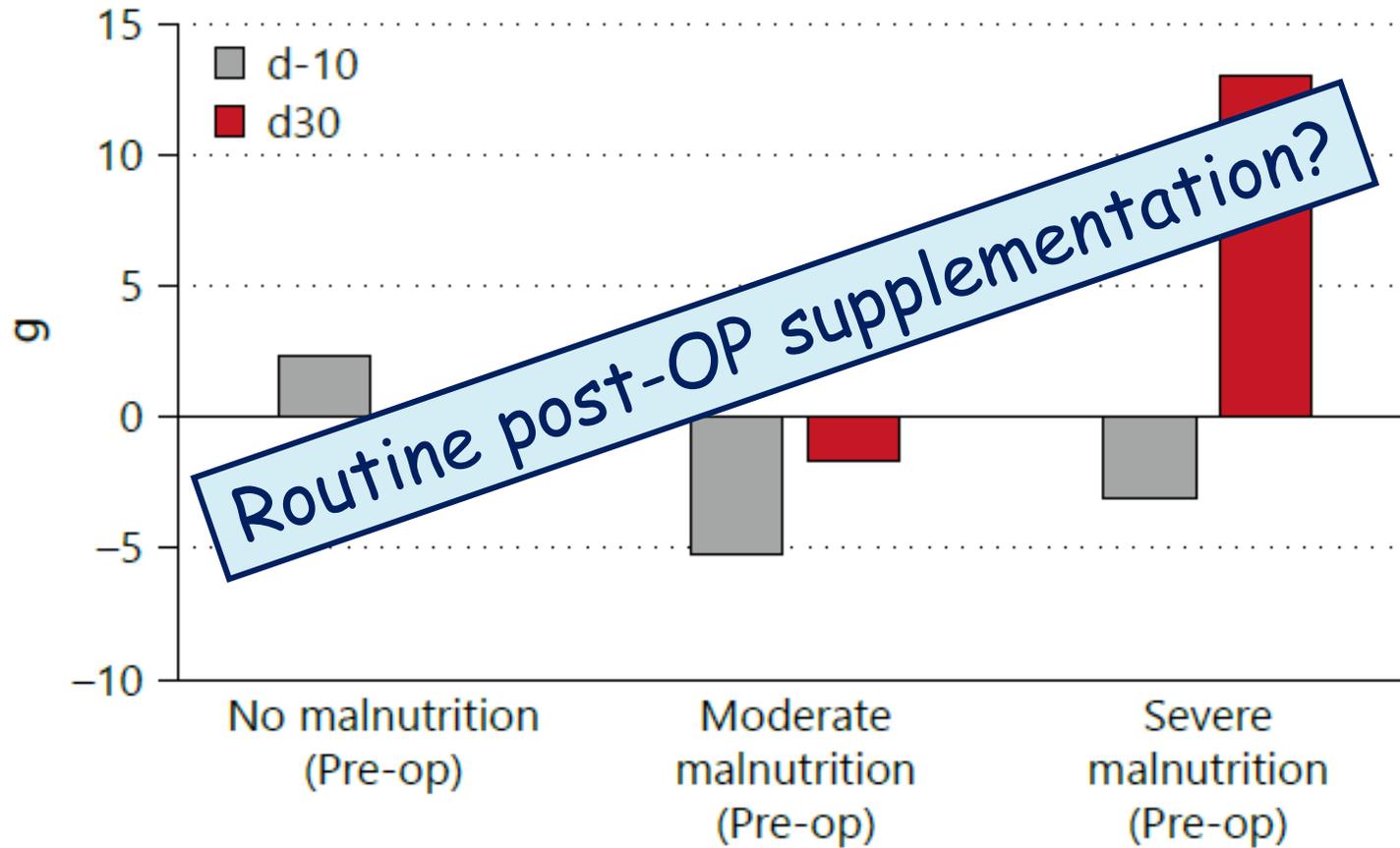
... and after discharge?



Energy coverage pre- and post-OP



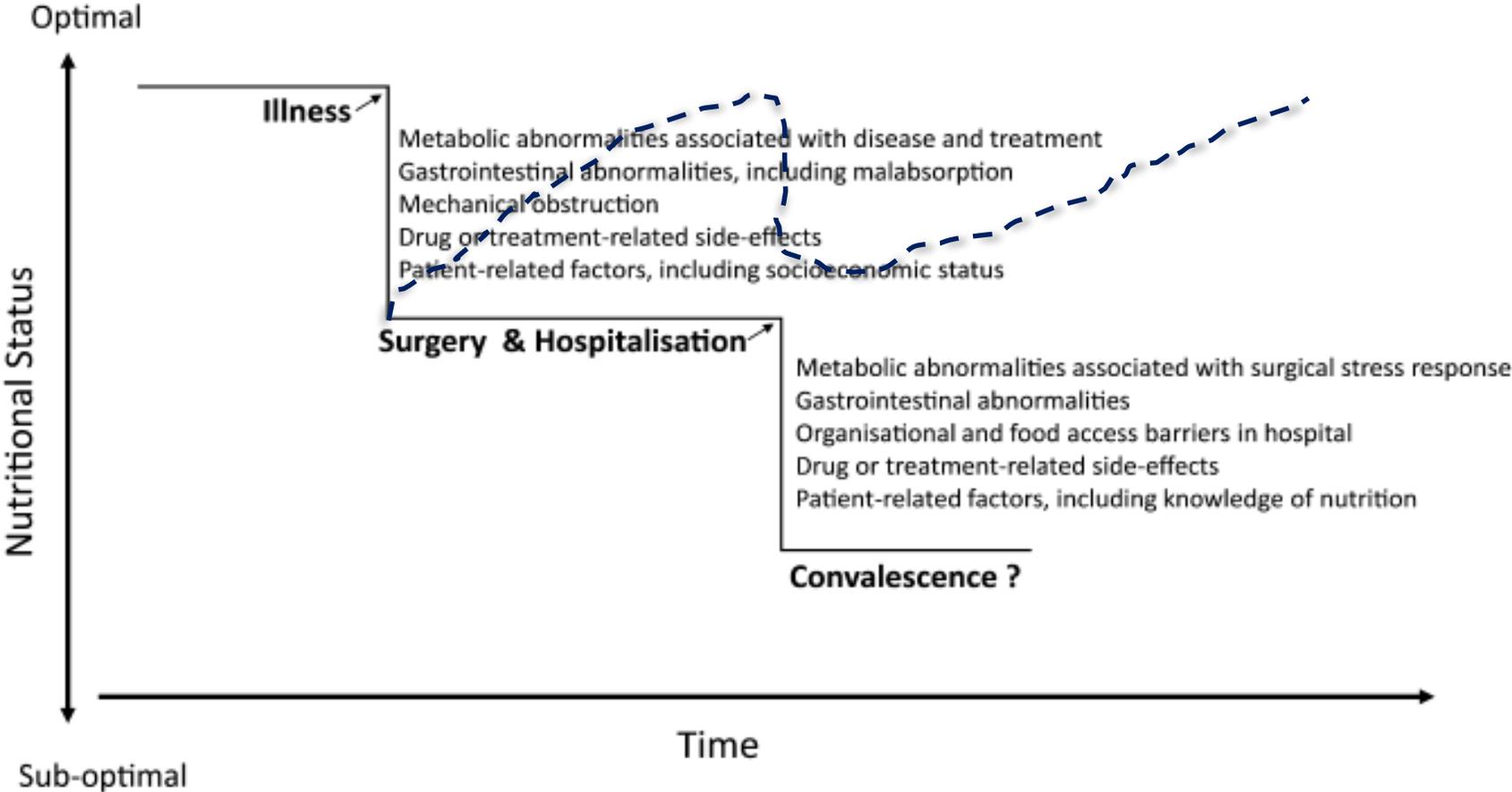
How about proteins?





“Apparently they’re better than The Cure.”

Nutritional status, disease and surgery

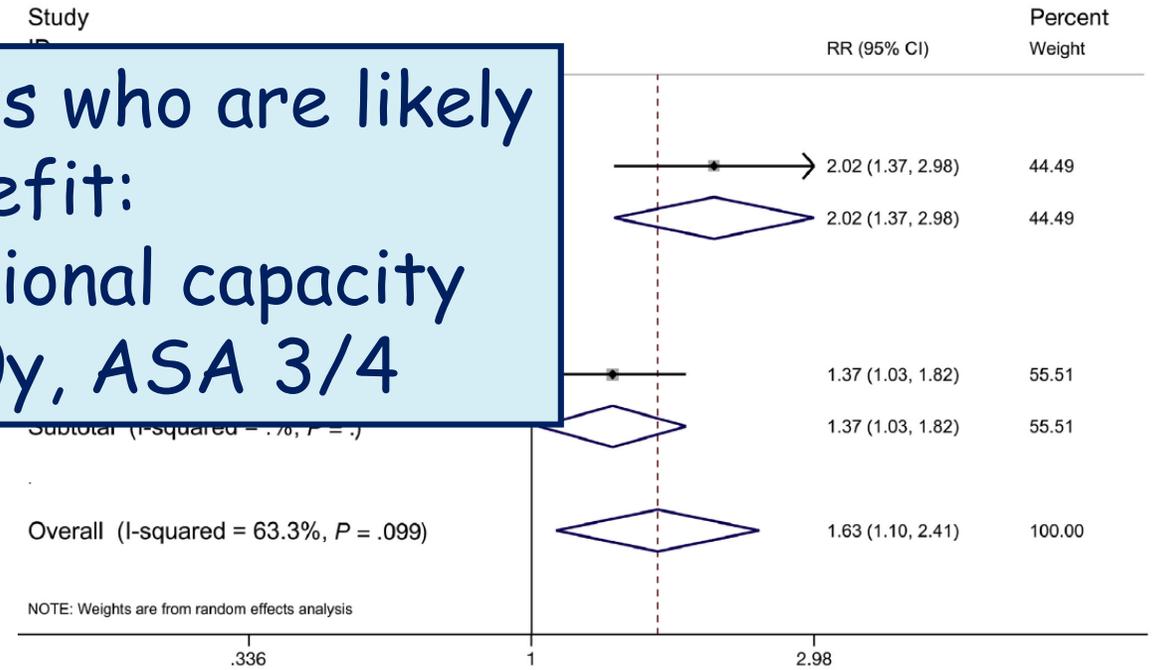
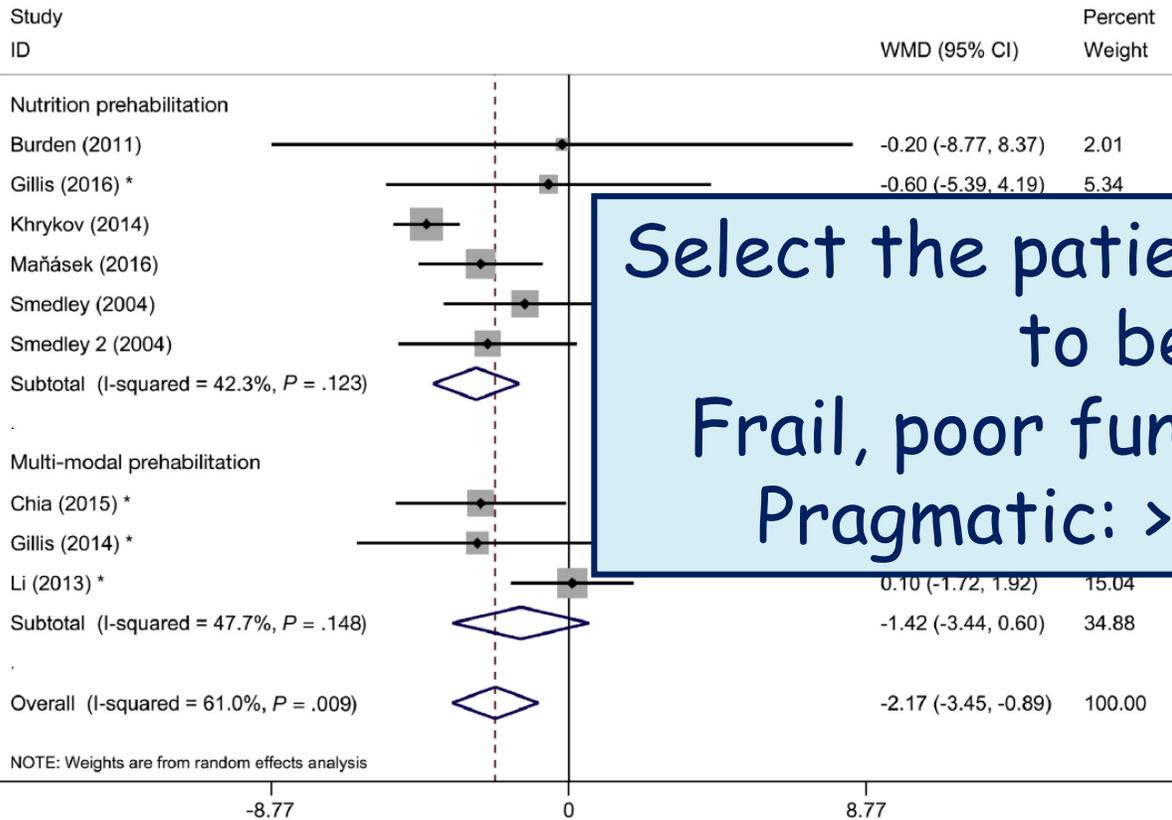


Prehabilitation: Nutrition ± Exercise

5 RCTs, 4 cohort studies
colorectal
N=914

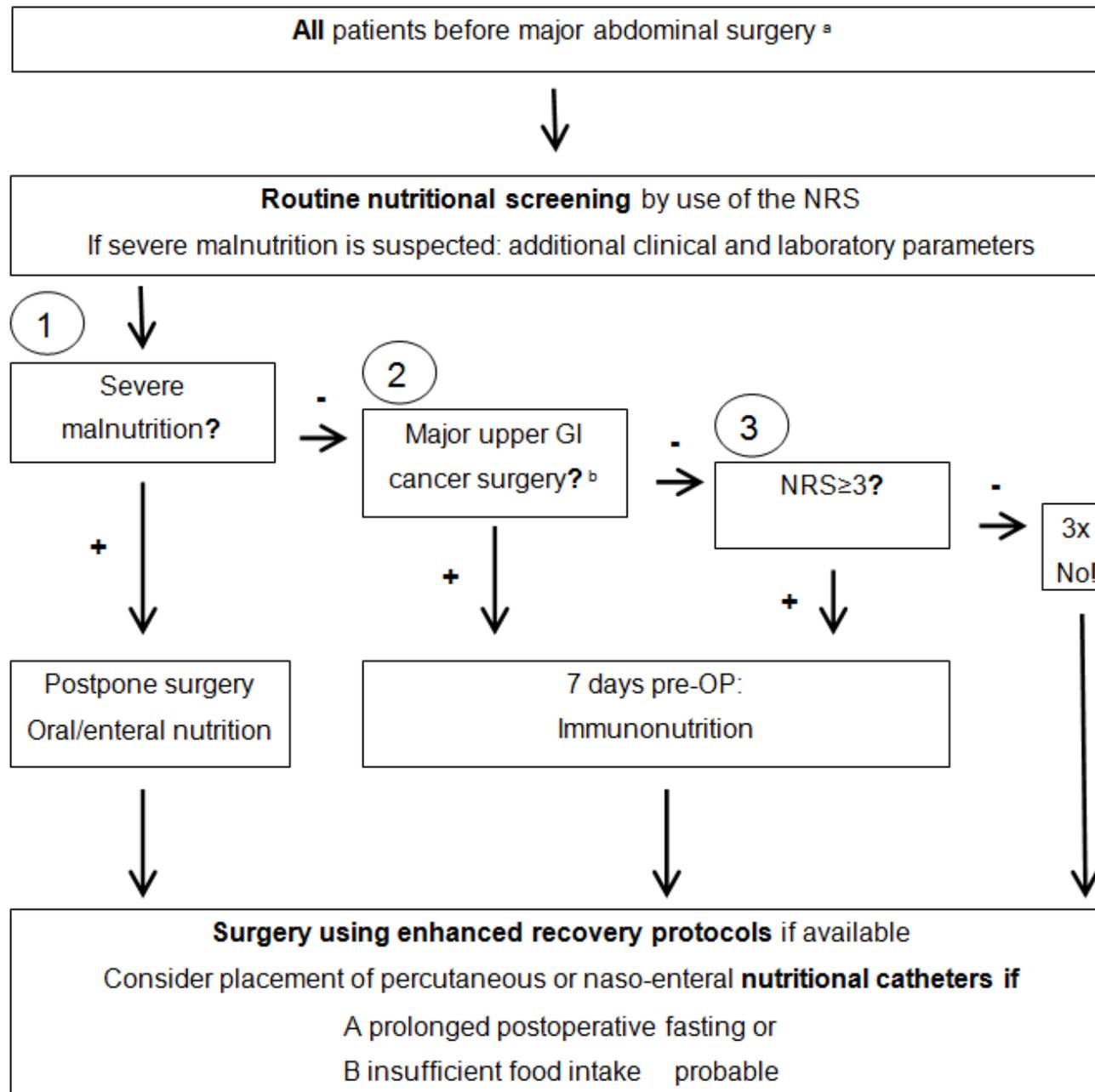
Hospital stay: -2.2 days

Functional capacity: «some benefit»



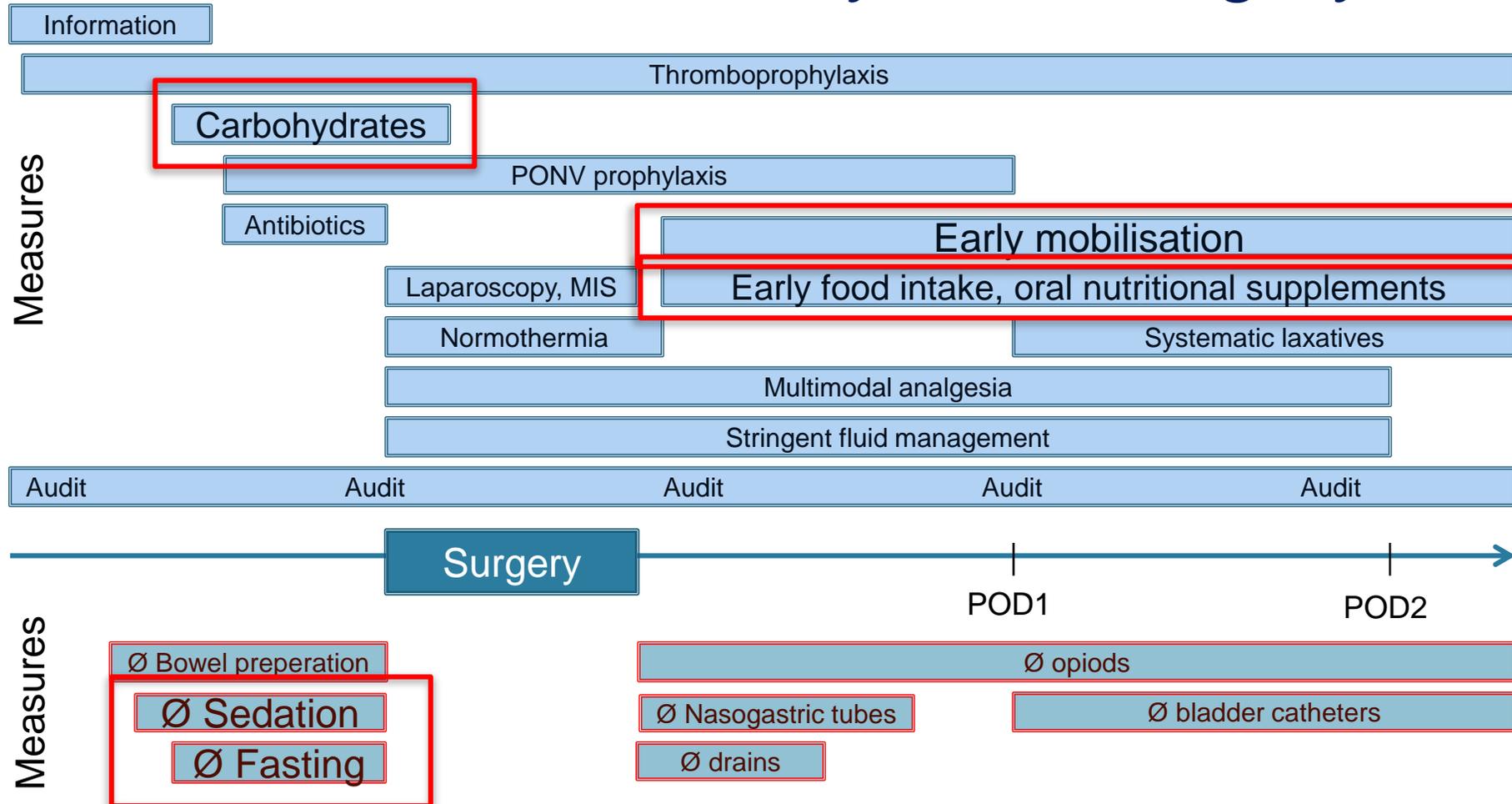
Select the patients who are likely to benefit:
Frail, poor functional capacity
Pragmatic: >70y, ASA 3/4

(Both) should probably be done!?



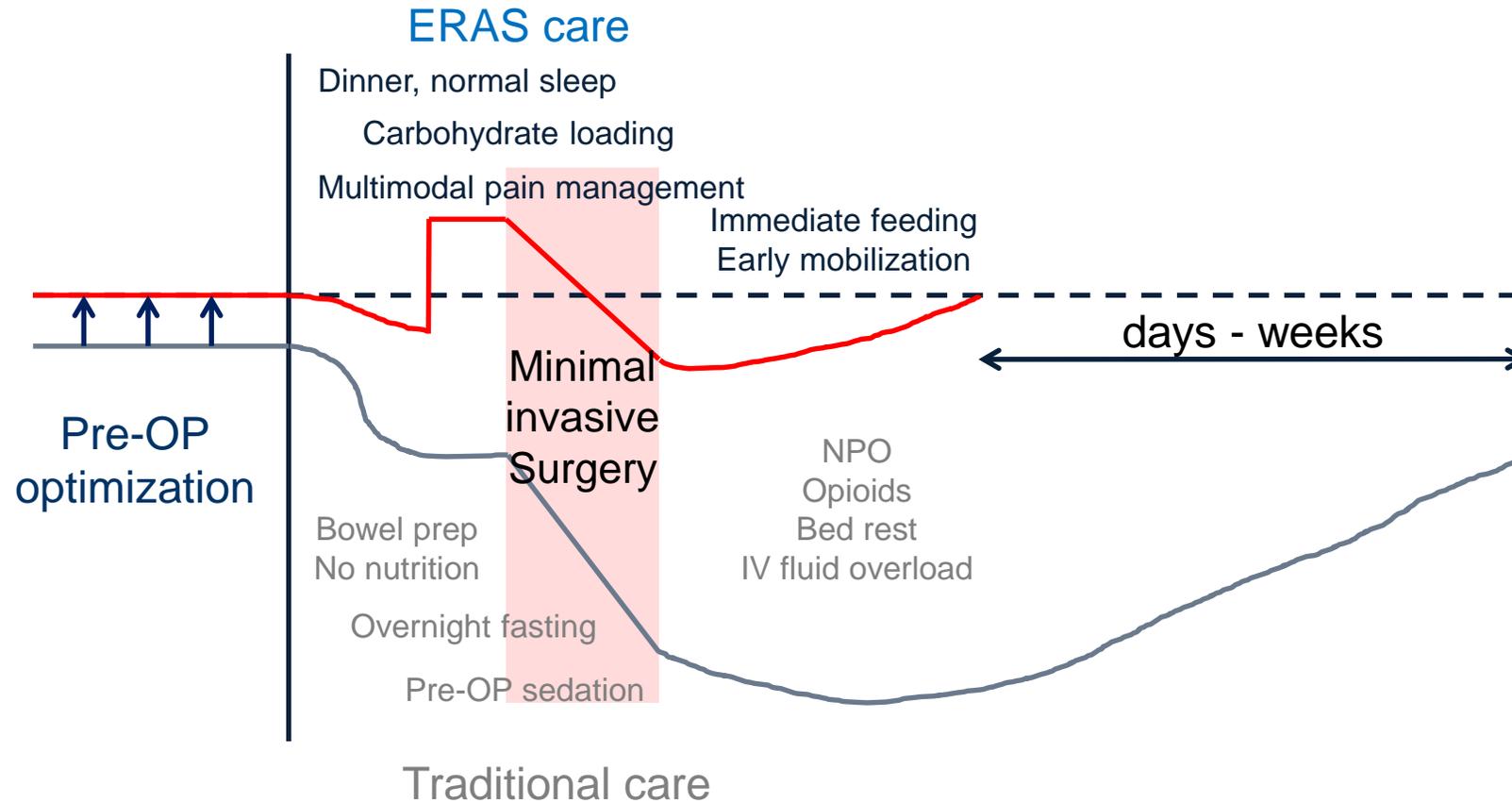
“Hot”

Enhanced Recovery After Surgery



“Not”

Optimizing perioperative care



Do you do ERAS?



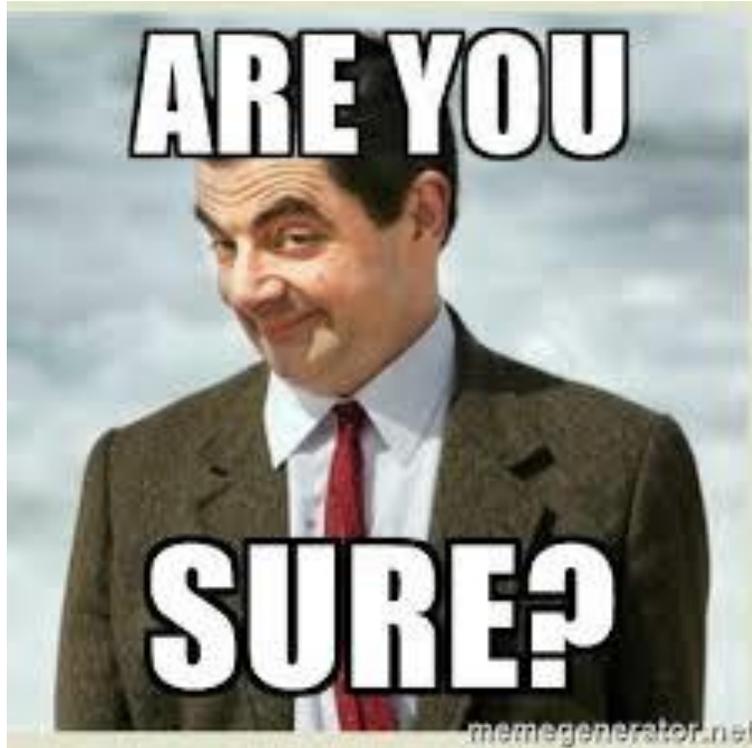
YES



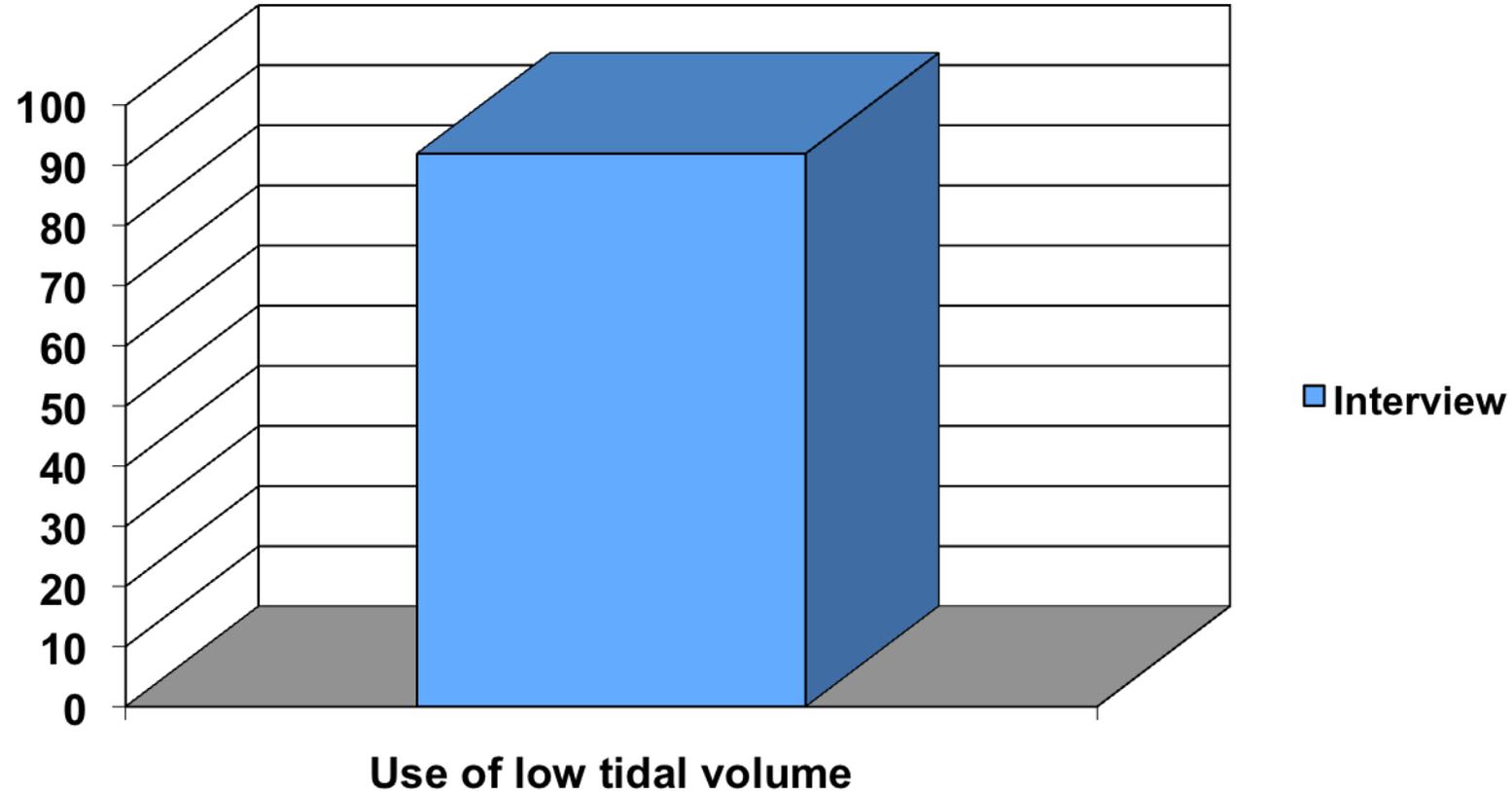
NO



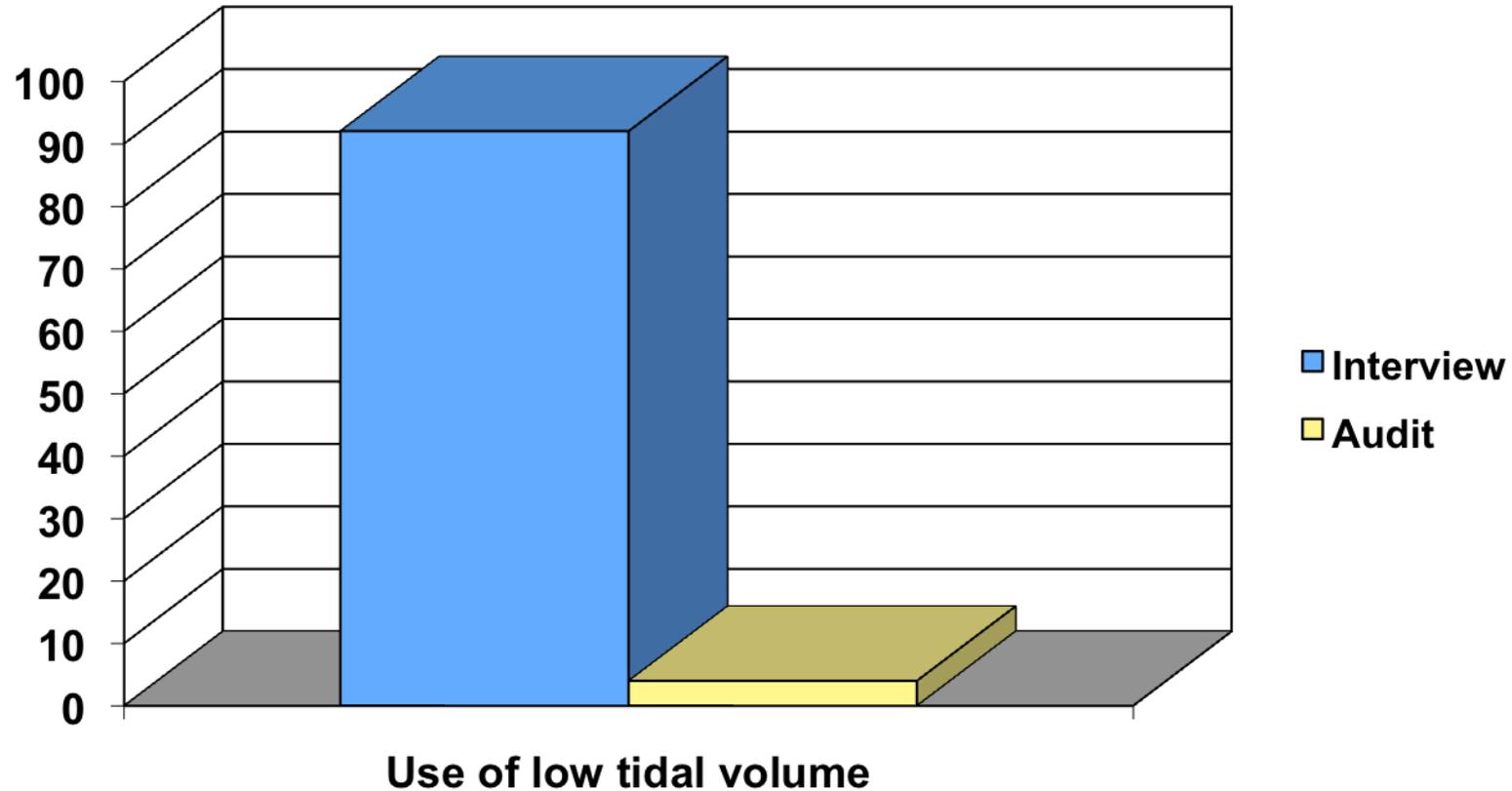
MAYBE



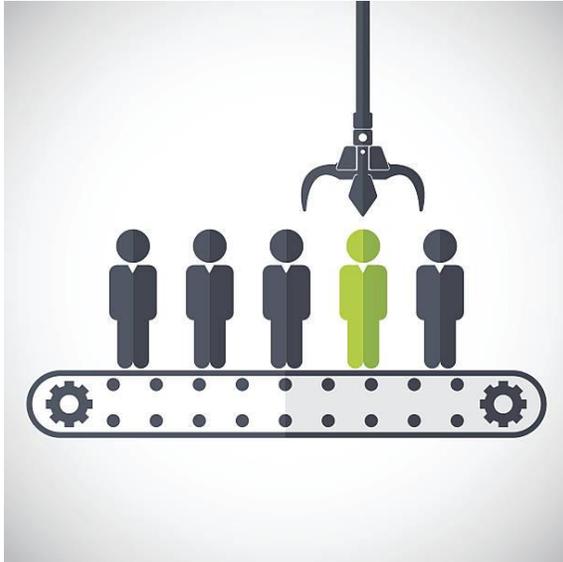
What we think we do ...



What we think ≠ we do ...



How much ERAS do you do?



I'm not perfect!
Are You?



Perfect Patient Pathway

define please

ERAS-CHUV: evolution

Chirurgie colo-rectale éleative

juin 2011

Stomies

août 2011

Colectomie en urgences

mars 2012

colorectal

N= 1690

N= 365

N= 375

N= 223

ERAS: results



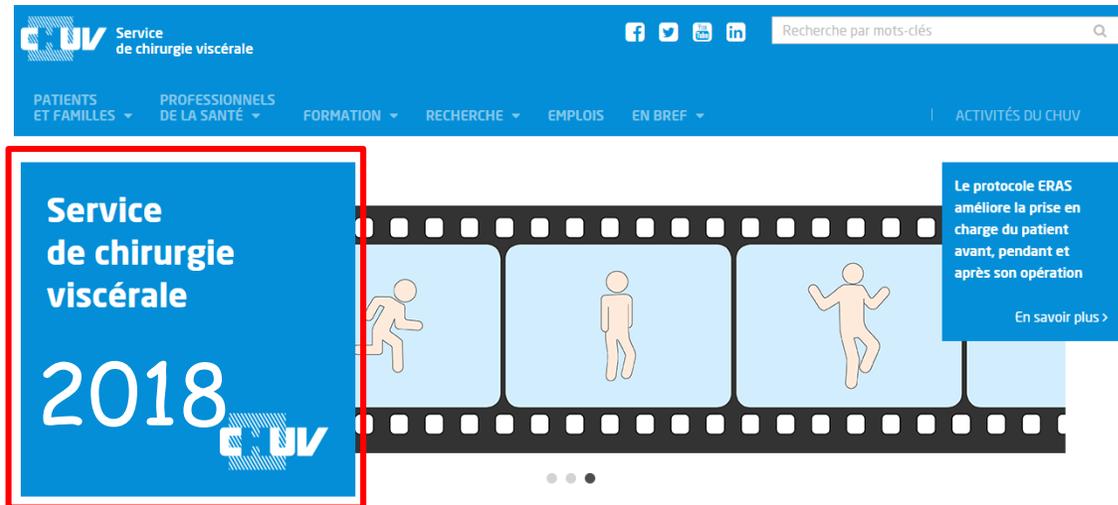
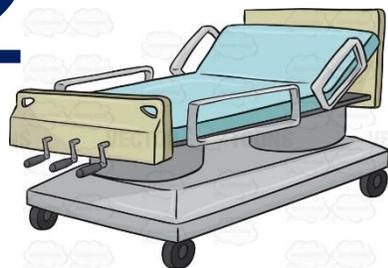
	Patients (N)	Compl. (%)	LOS	Costs	Work
Colorectal	1670	-45	Return of investment: 3.8 "Every \$1 invested in ERAS would bring \$3.8 (range \$2.4-\$5.1) in return."		

updated
03/04/2019 adapted from Grass Swiss Knife 2015

ERAS benefits

1'314'598

2012



Service de chirurgie viscérale

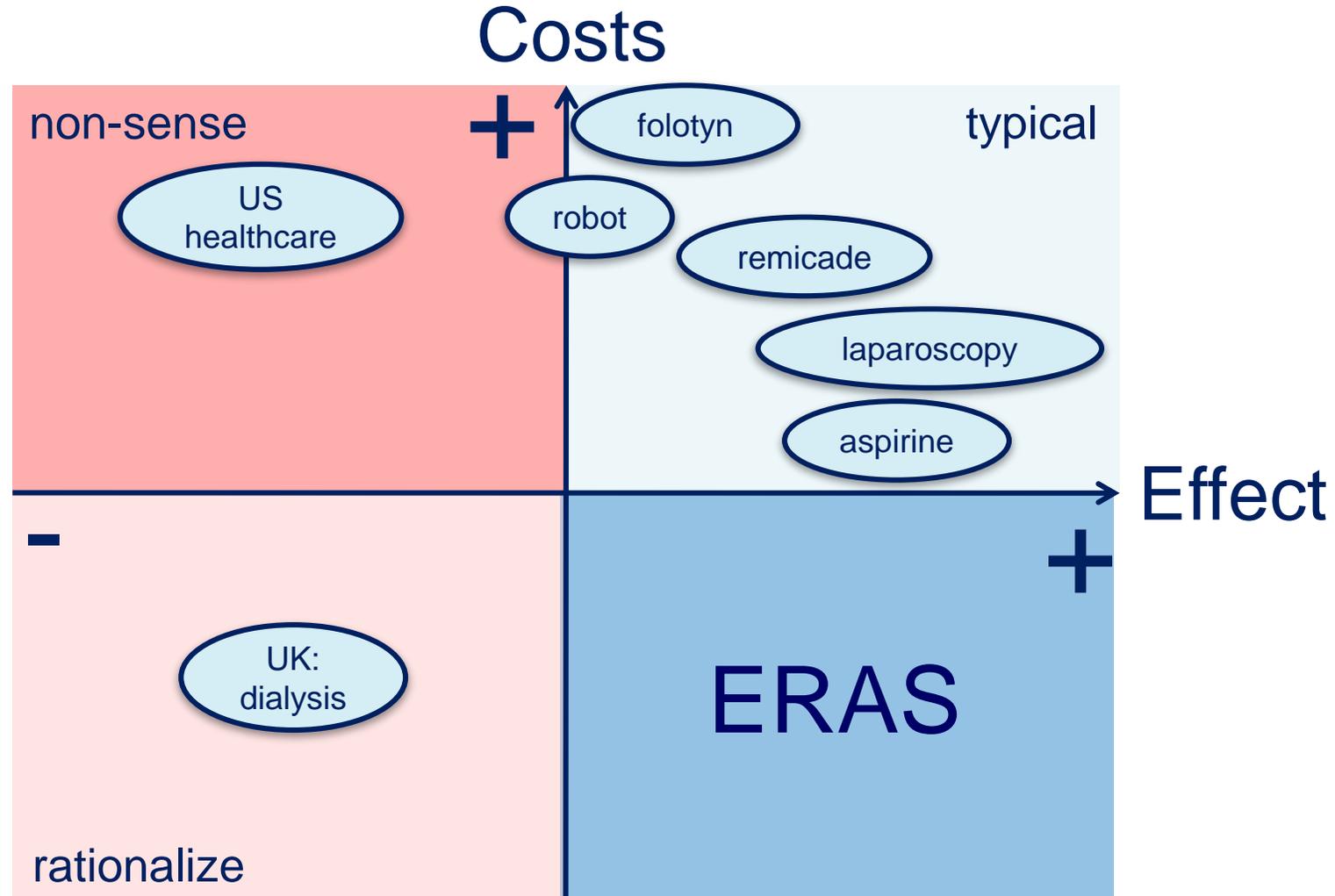
2018

Le protocole ERAS améliore la prise en charge du patient avant, pendant et après son opération

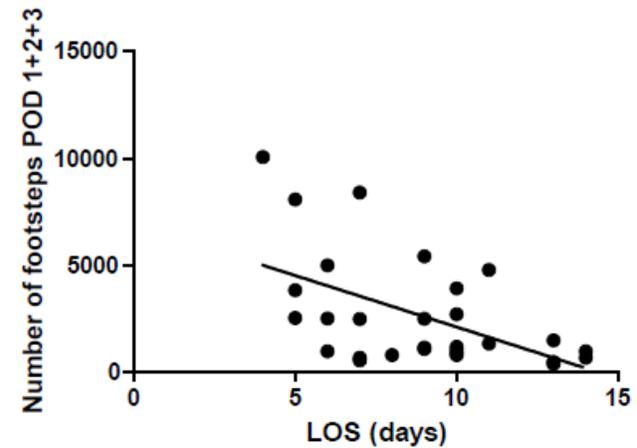
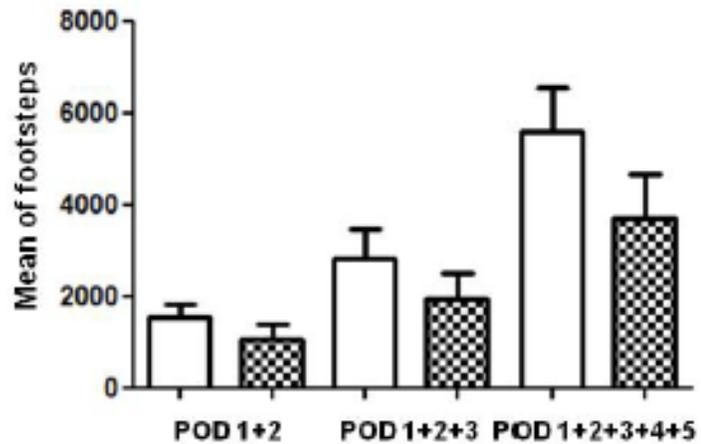
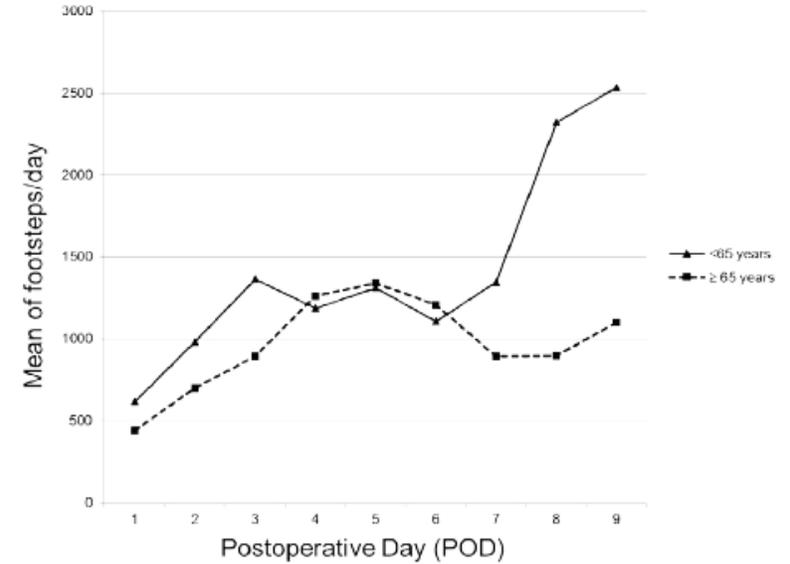
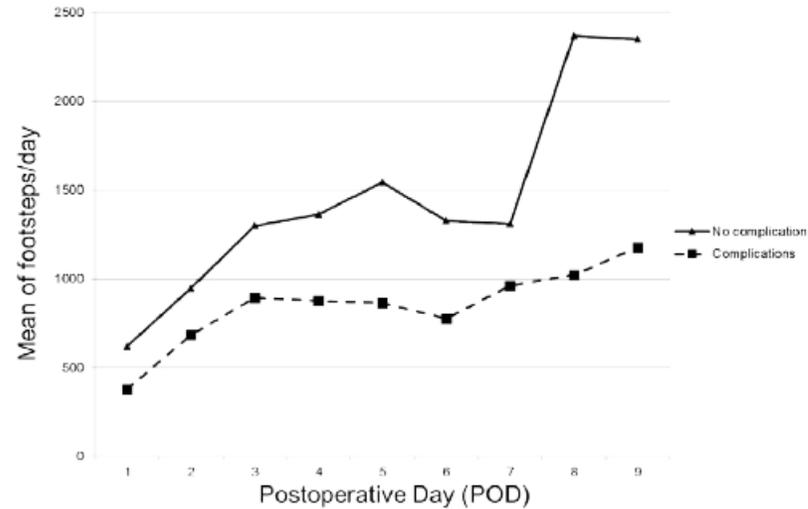
En savoir plus >



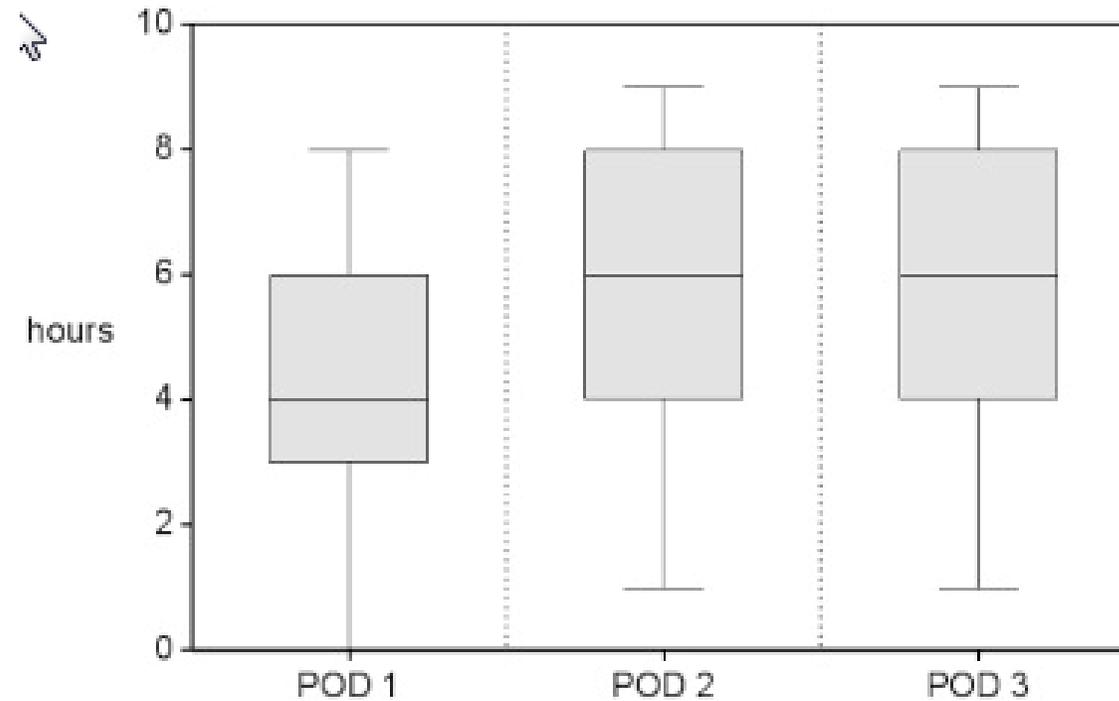
Cost-benefit analysis



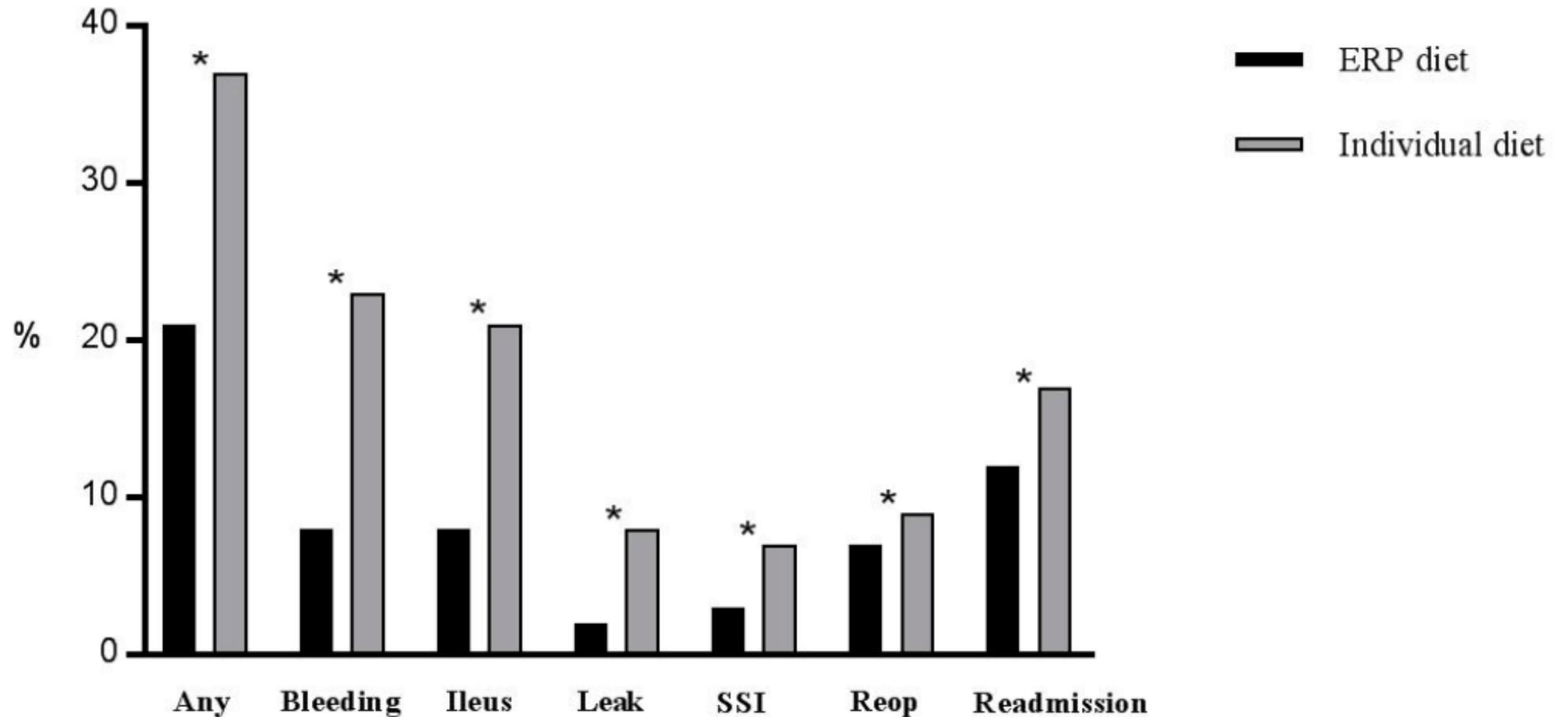
Mobilisation and outcomes



Early mobilisation: reality CHUV



Early nutrition and complications



Early nutrition and complications



nutrients



Article

Normal Diet within Two Postoperative Days—Realistic or Too Ambitious?

Fabian Grass , Markus Schäfer , Nicolas Demartines *  and Martin Hübner

Ordering a Normal Diet at the End of Surgery—Justified or Overhasty?

Fabian Grass ^{1,2} , Martin Hübner ^{2,*}, Jenna K. Lovely ³, Jacopo Crippa ¹ , Kellie L. Mathis ¹ and David W. Larson ¹



www.chirurgieviscerale.ch

Centre Hospitalier Universitaire Vaudois

Grass Nutrients 2017, Grass Nutrients 2018

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Feasibility of early nutrition

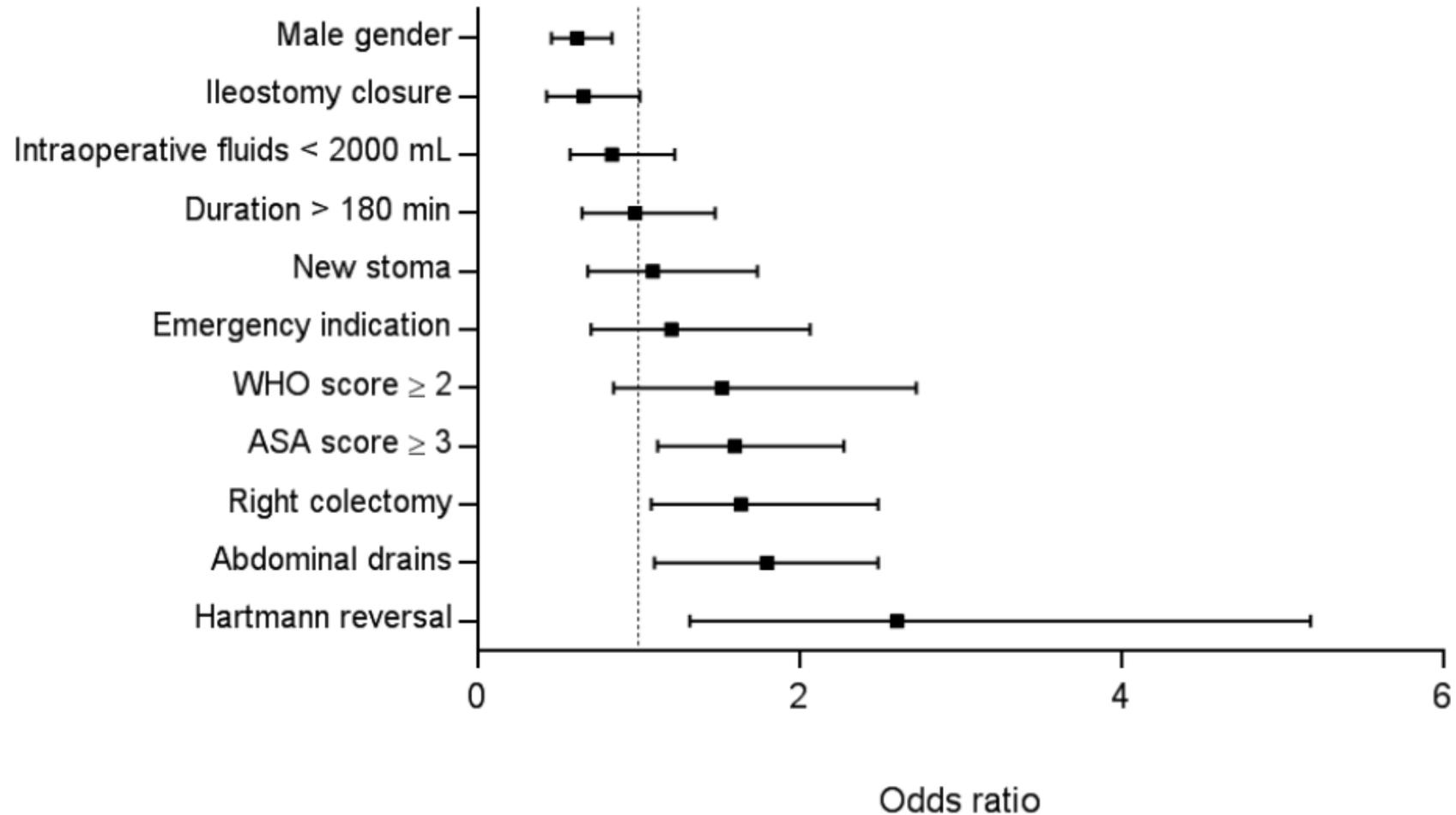
= normal intake by POD 3

CHUV: 53% only

Risk factors: ASA 3/4, drains,
right colectomy, Hartmann's reversal

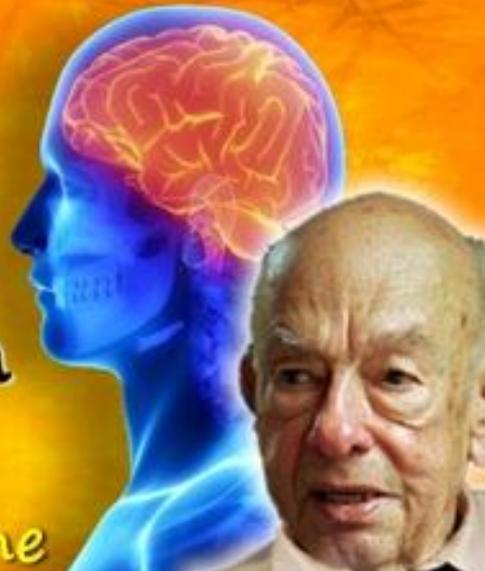
Consequence: ↑ complications

Who is a « delayed eater »?



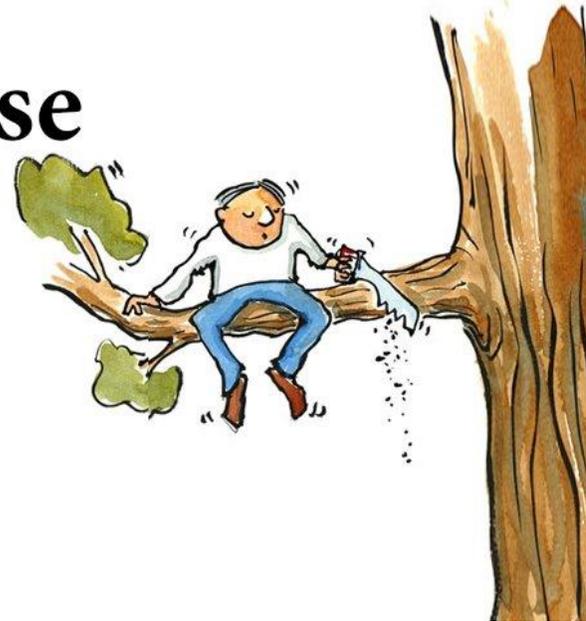
Science is not a
substitute for
common sense,
but an extension
of it.

Willard Van Orman Quine

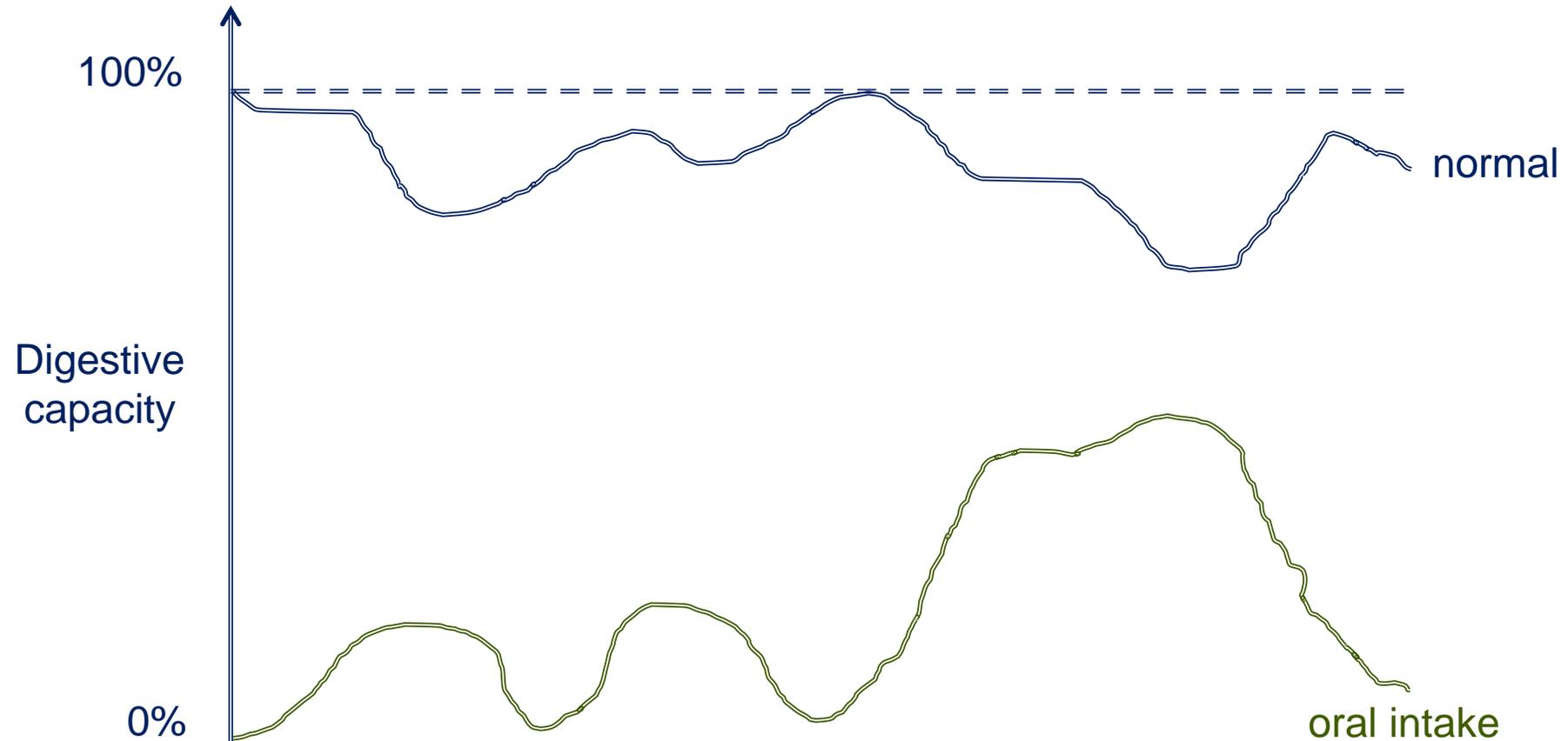


**Common sense
is not so
COMMON.**

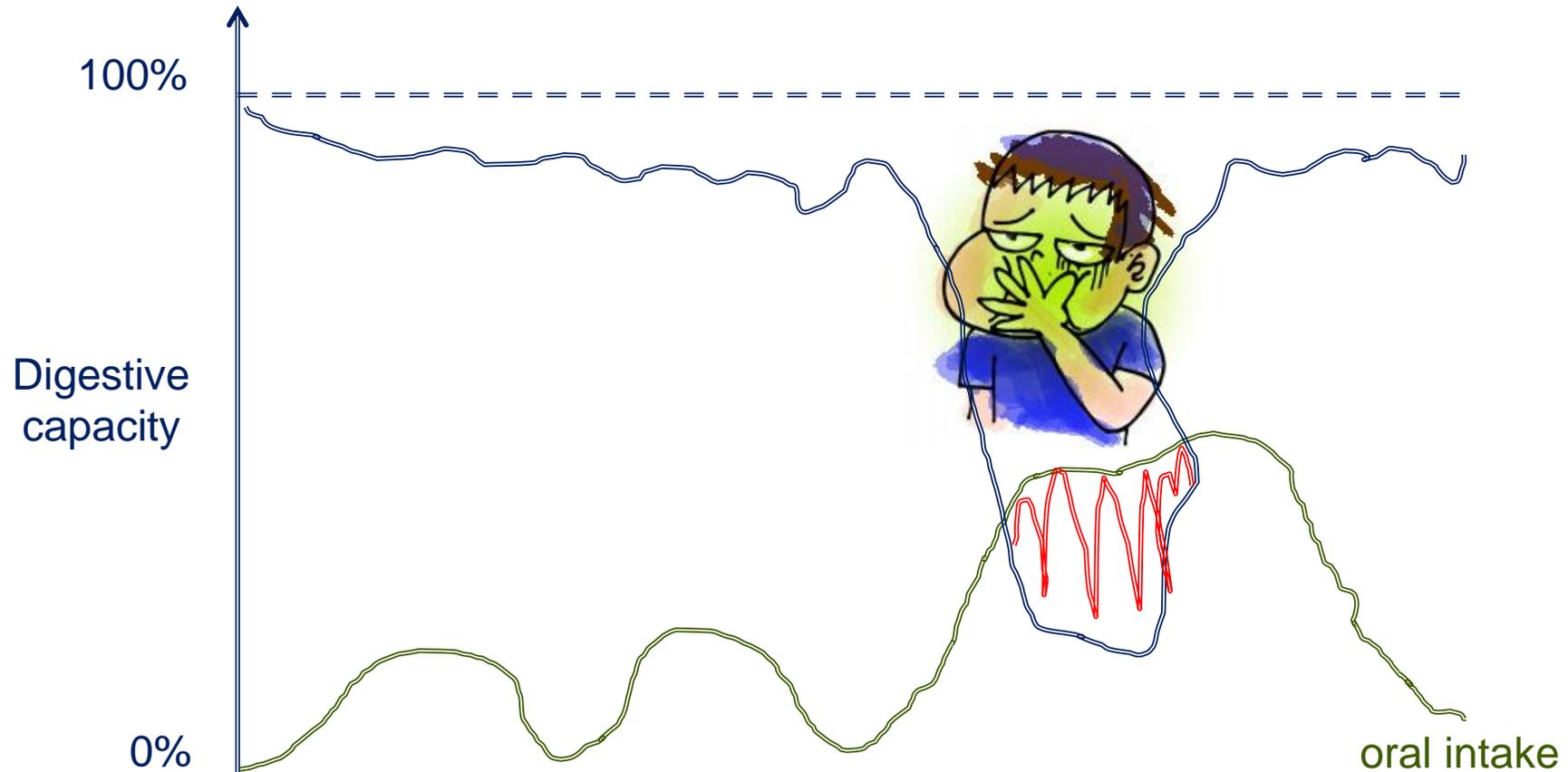
- Voltaire



"Digestive capacity" and oral intake: The normal situation

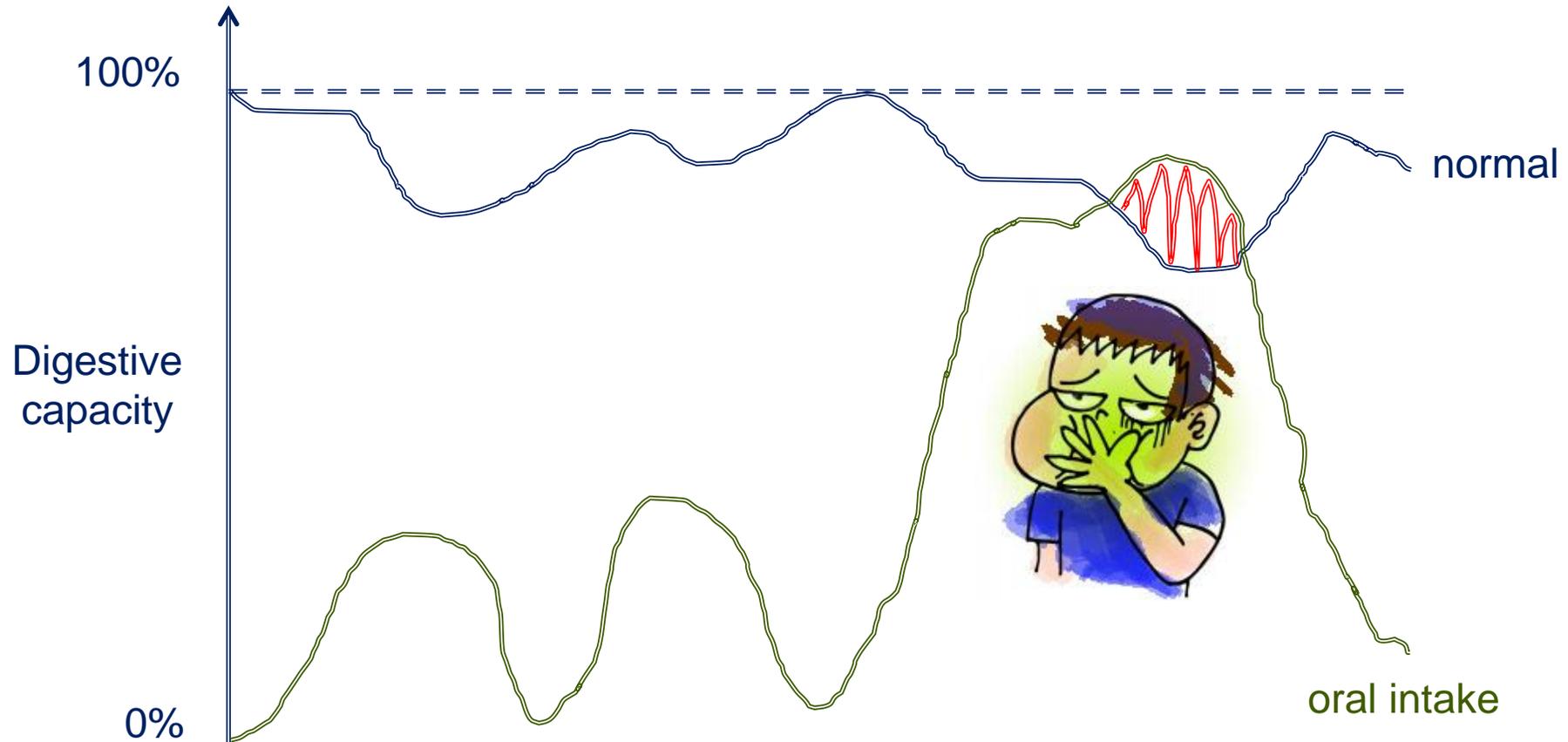


"Digestive capacity" and oral intake: medication, etc.

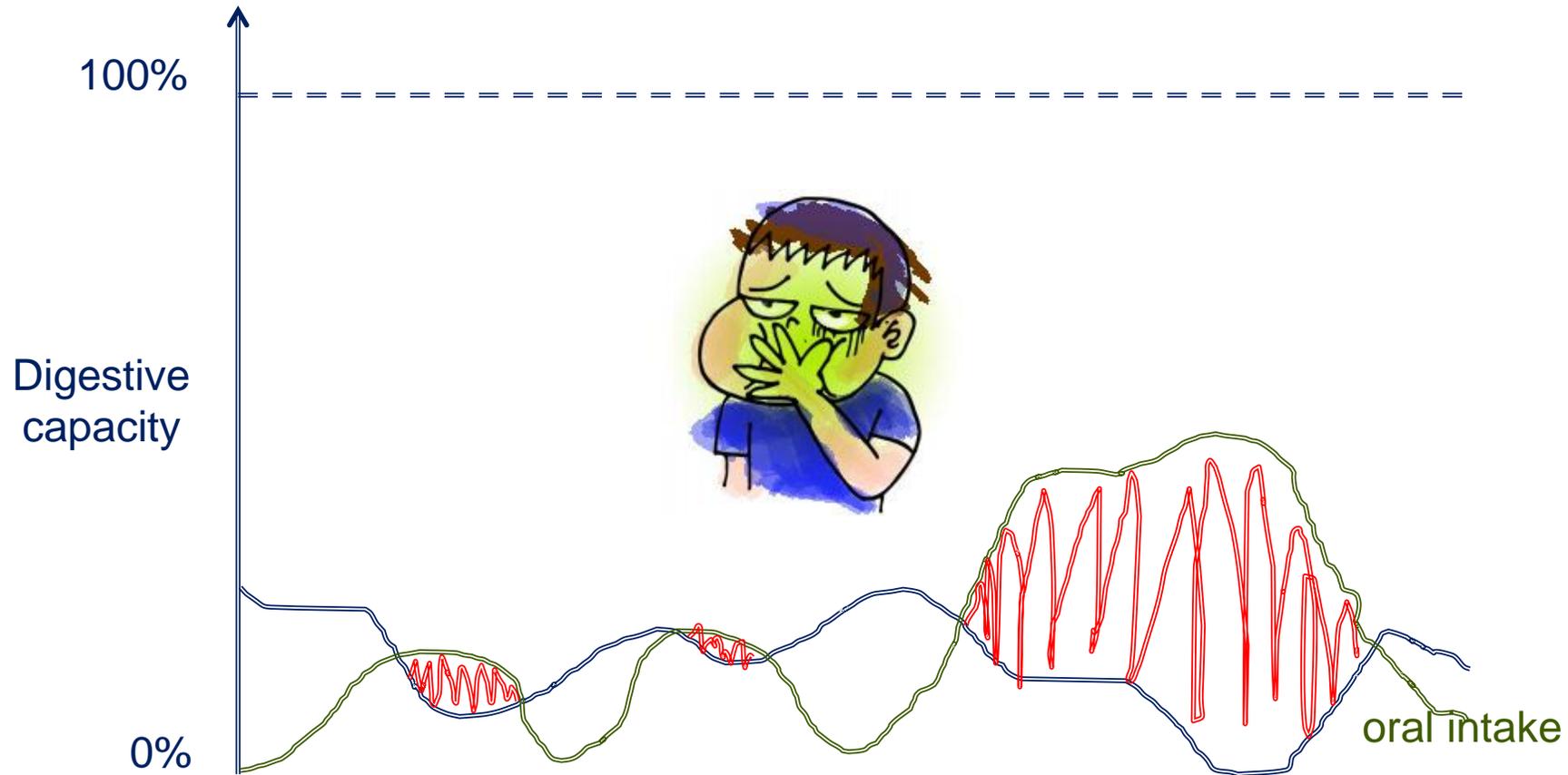


"Digestive capacity" and oral intake:

Excess / toxic oral intake

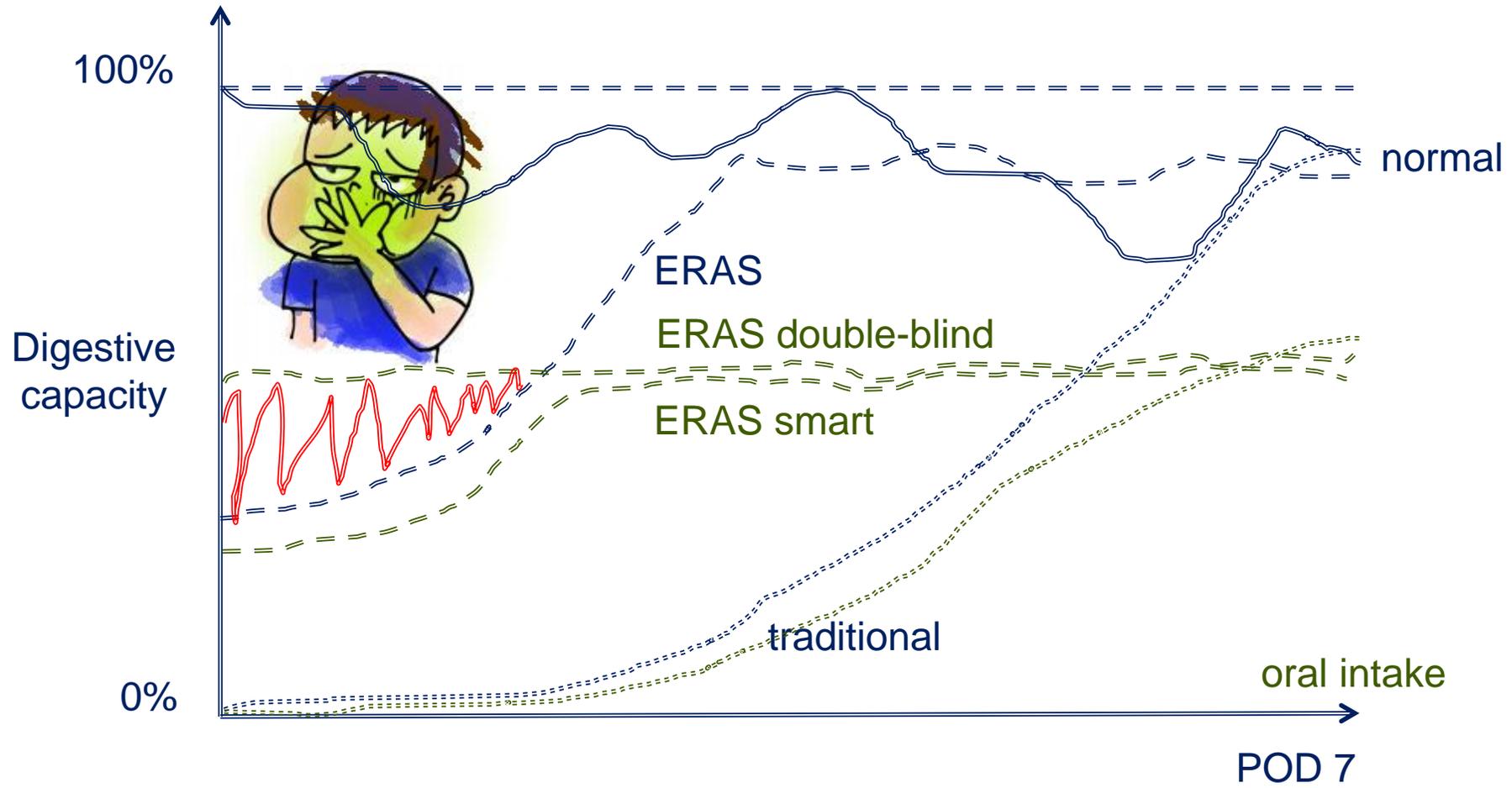


"Digestive capacity" and oral intake: The sick intestine



"Digestive capacity" and oral intake:

Post-OP: combination of all



Conclusion



Surgeons like proteins!