Optimizing Parenteral Nutrition: The Synergistic Role of Micronutrients & Fish Oil.

- 癌症治療中的營養守護力：微量營養素與魚油的協同作用
- 改善預後提升治療耐受與生活品質-關鍵營養素，從「微」開始

高雄阮綜合醫院NTT小組
孫金梅營養師
2025/7/26

阮綜合醫療社團法人 阮綜合醫院
YUAN'S GENERAL HOSPITAL

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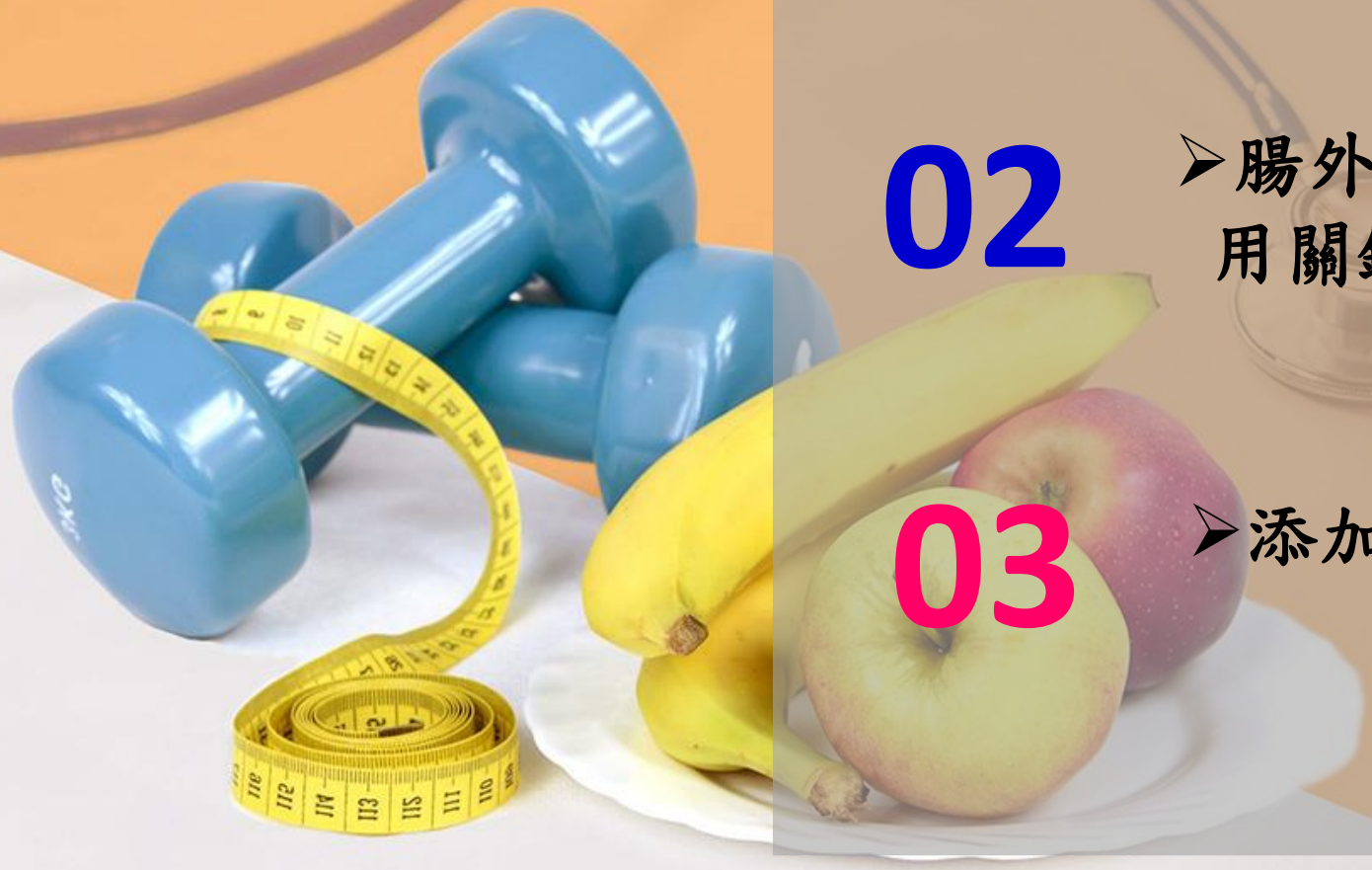
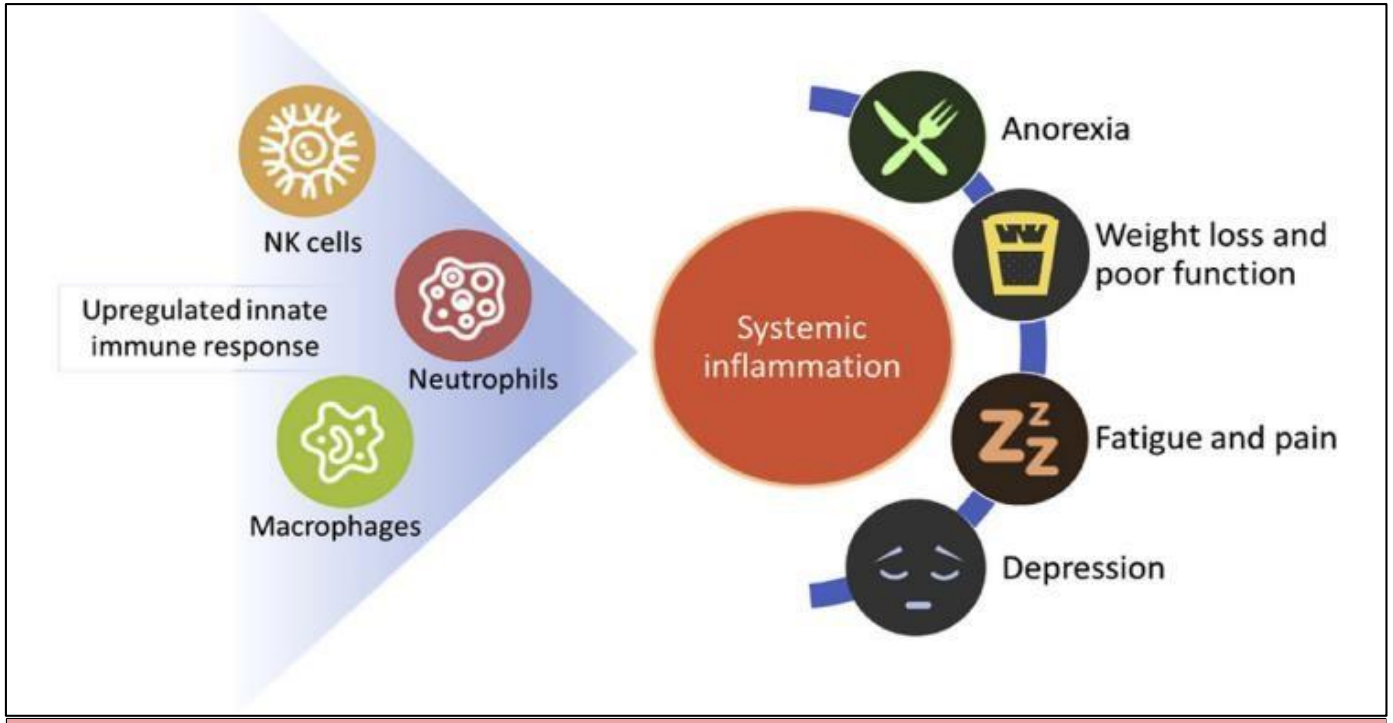


01 癌症營養不良的機轉與臨床意義

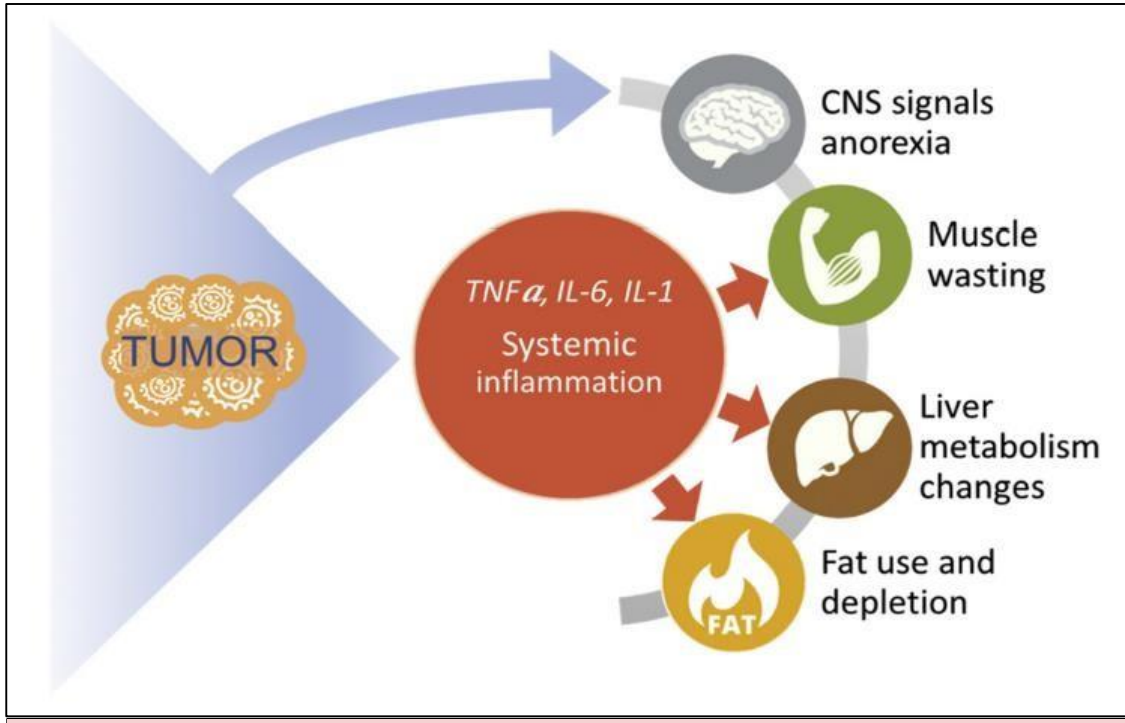
02 腸外營養在化放療癌症病患中的應用關鍵

03 添加微量營養素與魚油的臨床效益

Mechanism of Cancer-related Malnutrition



Systemic inflammation is associated with clinical symptoms



Tumor-released inflammatory factors affect the brain, muscle, liver, and fat function

Clinical Nutrition 36 (2017) 1187-1196

亞太國家住院病患營養不良的患病率[1]

- UCN Systemic Literature Review

Surgical population
28 studies (n = 18,914)

Half of the studies reporting a prevalence of **>40%**

(Prevalence estimates based on **BMI** ranged from 4% - 61.3% while those based on **albumin** ranged from 2% - 62%)

Critically ill population
7 studies (n = 2,384)

Prevalence estimates according to the **SGA** ranged from **28% - 78%**

Elderly population
12 studies (n = 4,269)

The proportion of hospitalized elderly patients who were either malnourished or at risk for malnutrition according to the **MNA** ranged from **56.7% - 98.8%**

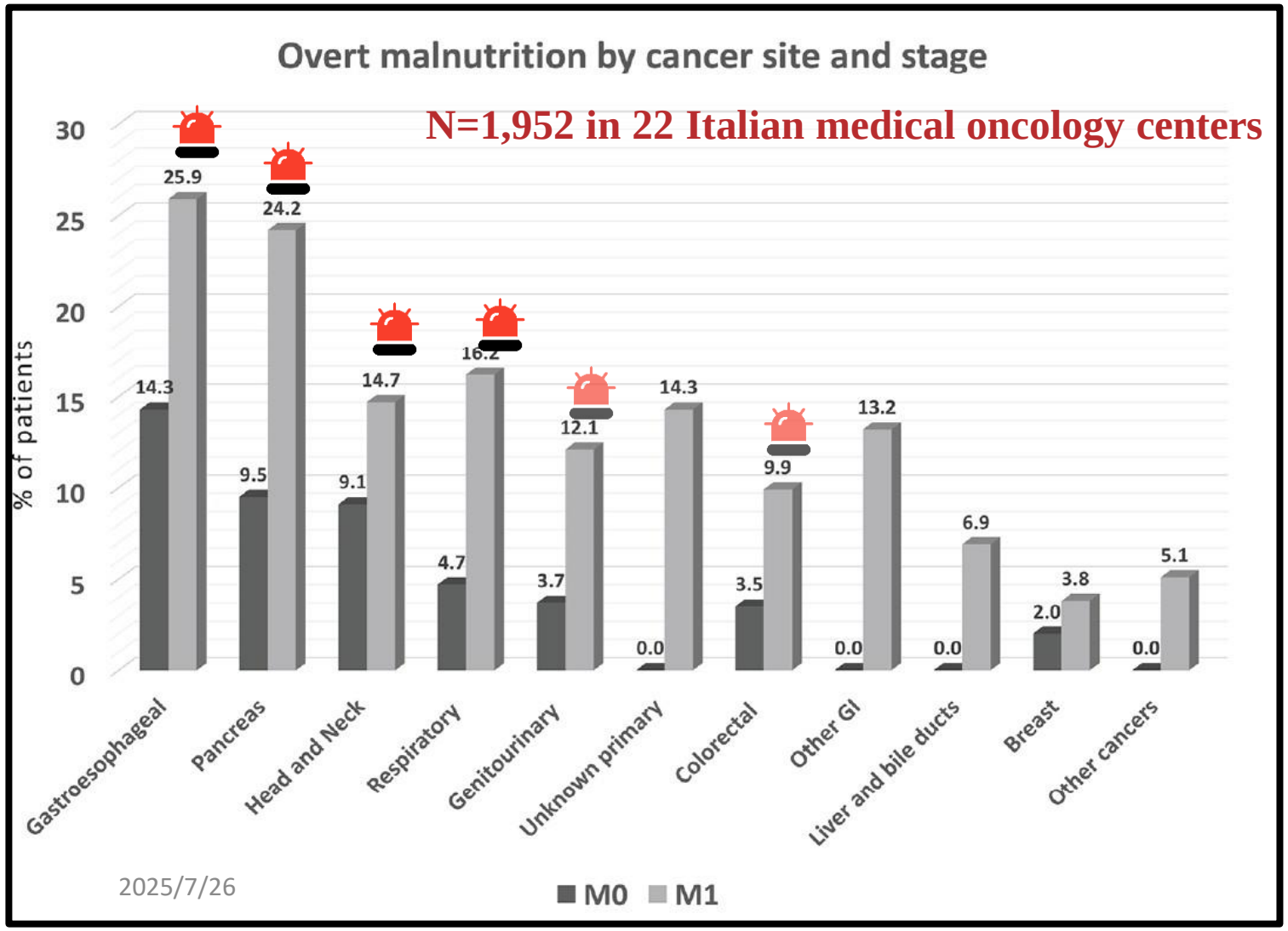
Cancer population
9 studies (n = 11,258)

Prevalence estimates based on **BMI** ranged from 4.2% - 43.8% while those based on the **SGA** ranged from **40.2% - 65.8%**

營養不良會對生活品質(QoL)和治療毒性產生負面影響，據估計多達 10-20% 的癌症患者死於營養不良而非腫瘤本身[2]

1. J.F.B. Inciong et al. Clinical Nutrition ESPEN. October 2020. 39; 30-45.
2. M. Muscaritoli, J. Arends, P. Bachmann et al. Clin Nutr. 2021 May;40(5):2898-2913. (ESPEN in Cancer 2021)

Treatment-naïve pts with a life expectancy >3mons and Mini Nutritional Assessment (MNA) as score < 17



- 與 M0 (無癌症轉移)患者相比，**M1 (癌症轉移)** 患者明顯營養不良的患病率顯著升高 (P<0.001)
- 營養不良發生率最高的患者是患有**胃食管、胰腺、頭頸部和肺部**腫瘤的患者 (**gastroesophageal**, **pancreatic**, **head and neck**, and **lung** tumors)

Muscaritoli M et al. Oncotarget. 2017 Aug 10;8(45):79884-79896.

Cancer Incidence and Ranking in Taiwan (2023)

-超過半數癌症病患具營養不良風險

高風險包含：胰臟、胃、食道、頭頸、大腸、肺

營養不良與惡病質在不同癌症中的發生率[1,3]

腫瘤位置	營養不良比例(%)	惡病質比例(%)
胰臟癌(pancreatic ca)	83	~76%
胃癌(gastricca ca)	83	~75%
食道癌(esophageal ca)	79	~75%
頭頸癌(head and neck ca)	72	~54%
大腸直腸癌(colorectala ca)	55-60	~60%
肺癌(lung ca)	50-66	~64%
攝護腺癌(prostate ca)	56	~51%
乳癌(breast ca)	10-35	~29%

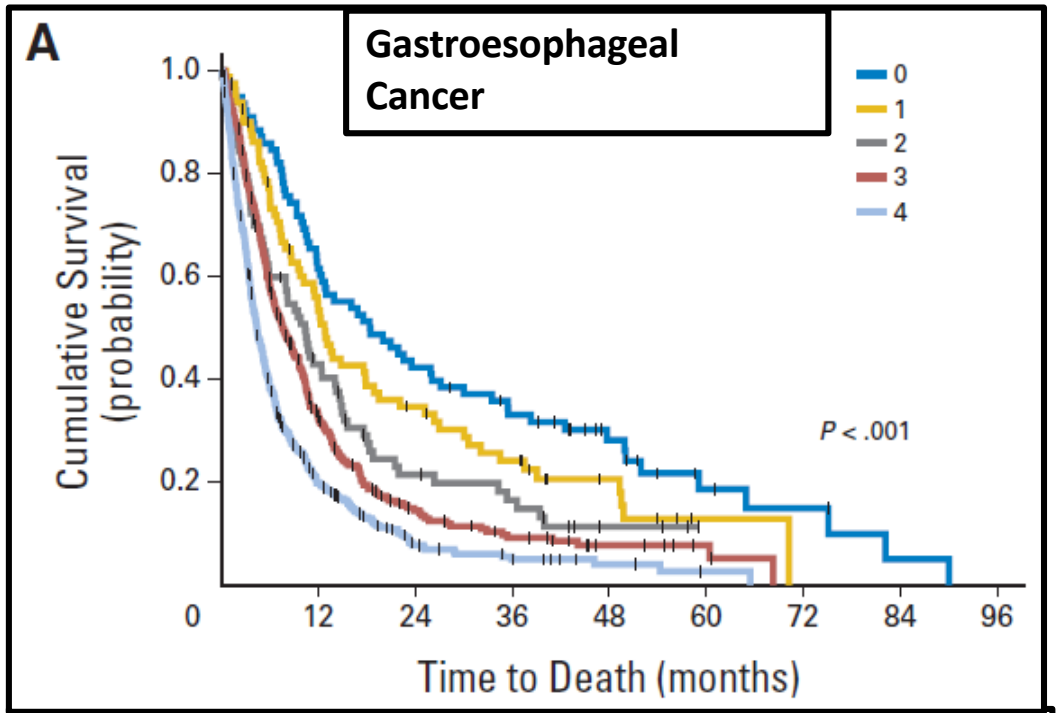
Gröber, Uwe et al. *Nutrients* vol. 8,3 163. 12 Mar. 2016

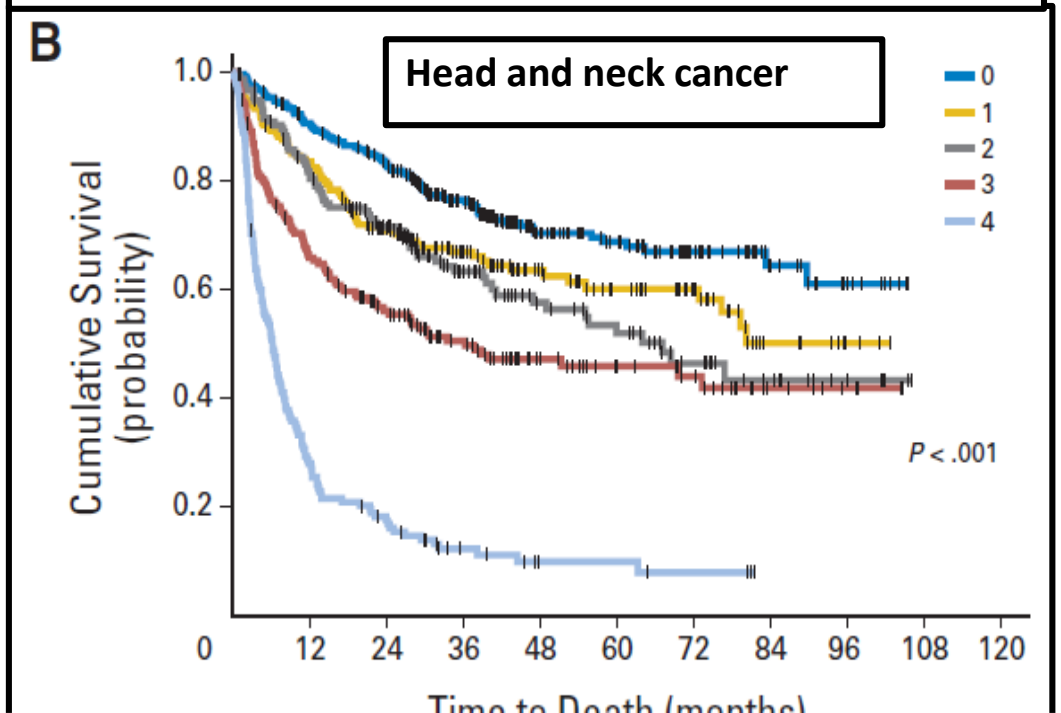
註: 1. 台灣癌症登記資料庫（不含原位癌）; 2. 此張發生率係指年齡標準化率，以2000年世界標準人口計 算（單位：每10萬人） 3. 圖片來源：Flaticon （www.flaticon.com ）

2023年癌症登記年報, Dec 2020 published

Weight Loss (%)	BMI (kg/m²) 28	25	22	20
2.5	0	0	1	1	3
6	1	2	2	2	3
11	2	3	3	3	4
15	3	3	3	4	4
	3	4	4	4	4

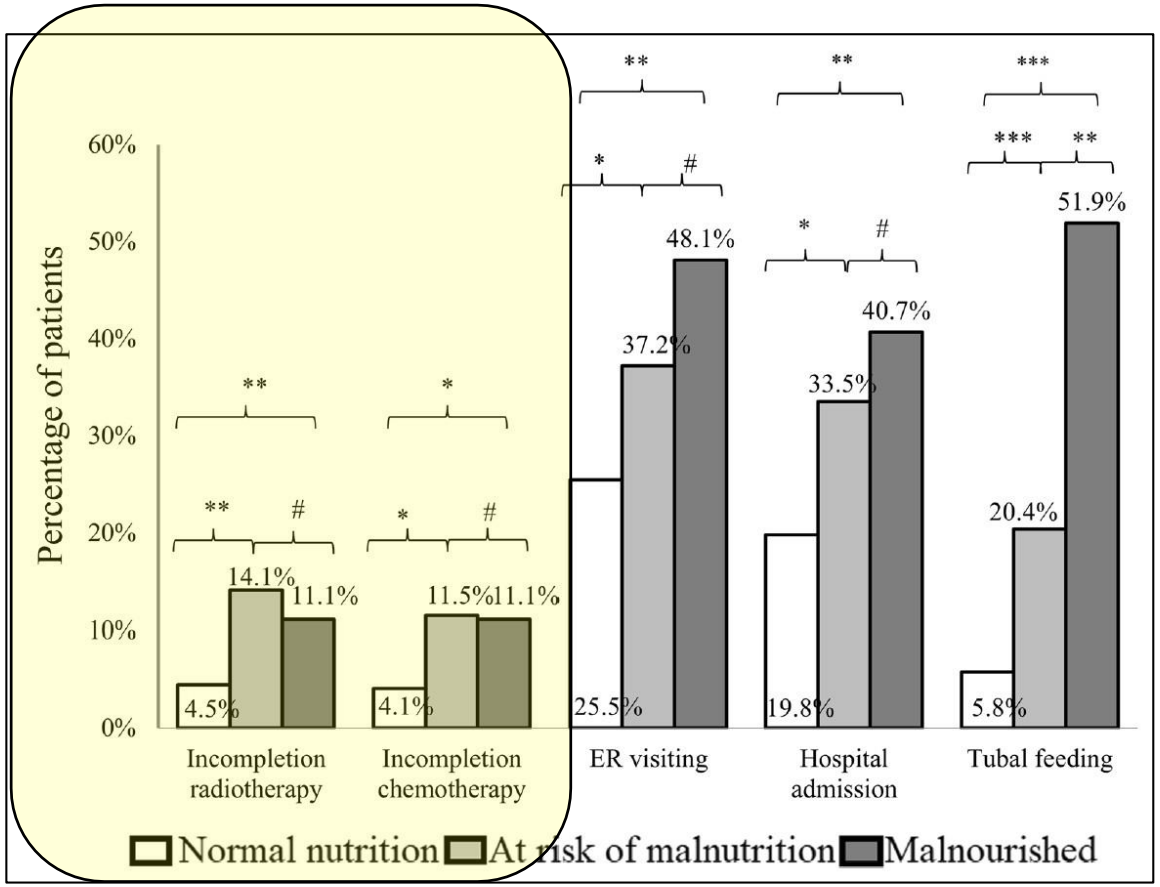
BMI-adjusted weight loss grading system
for cachexic patients

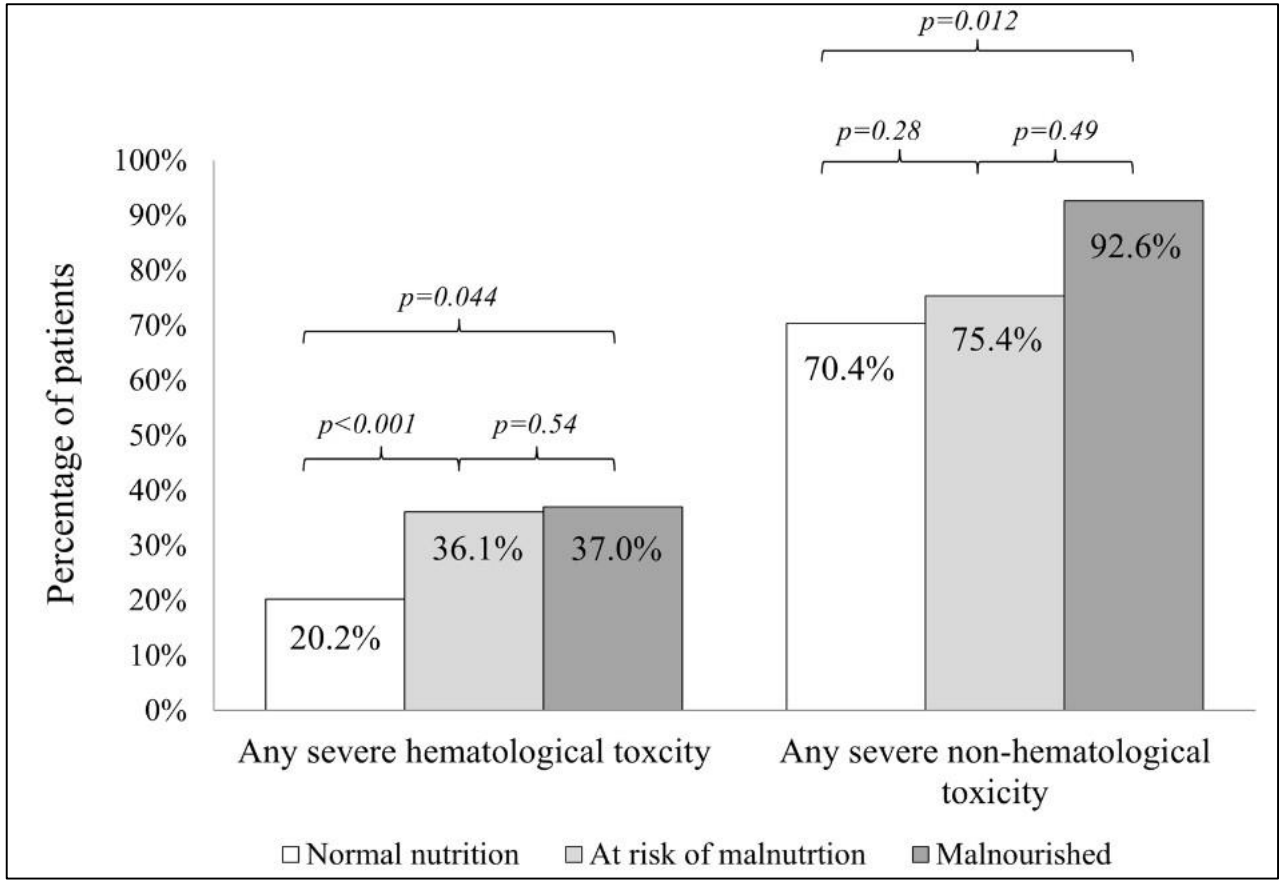




461 Patients with head and neck cancer (HNC) receiving concurrent chemoradiotherapy (CCRT) at CGMH

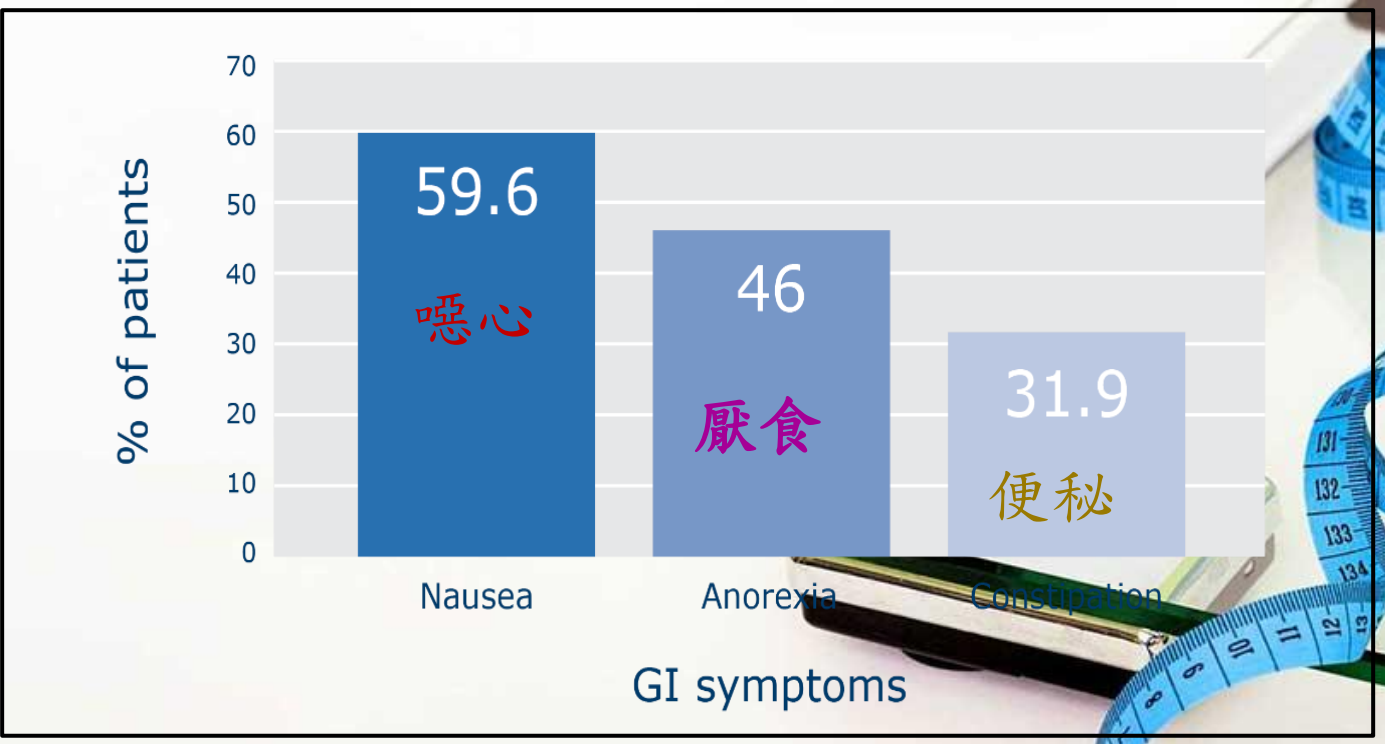
Support Care Cancer. 2021 Mar;29(3):1509-1518.





Malnourished HNC patients or at risk has higher incidence of treatment intolerance and severe treatment-related AE

化療期間癌症患者最常見胃腸道症狀



Most frequent GI symptoms in cancer patients receiving chemotherapy (n=191)

體重流失 ≥ 5%

以下腸胃道症狀息息相關

- Nausea 噁心 (OR 2,15; P=0,03)
- Vomiting 嘔吐 (OR 6,1; P=0,017)
- Anorexia 厭食 (OR 9,5, P=0,003)

「值得注意的是，這些症狀的發生率**在非大腸癌（如胃癌、胰臟癌）與肺癌病人中特別高**，這類病人更容易出現進食困難與營養風險。」

Br J Nutr 2013;109:894-897

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01

➢ 癌症營養不良的機轉與臨床意義

- 慢性發炎、代謝異常與肌肉耗損（cachexia）
- 對化放療預後與生活品質的影響

02

➢腸外營養在化放療癌症病患中的應用關鍵

- 化療/放療期間的營養挑戰
- 腸外營養的適應症與介入時機
- 實證依據與指引建議（ESPEN、ASCO）

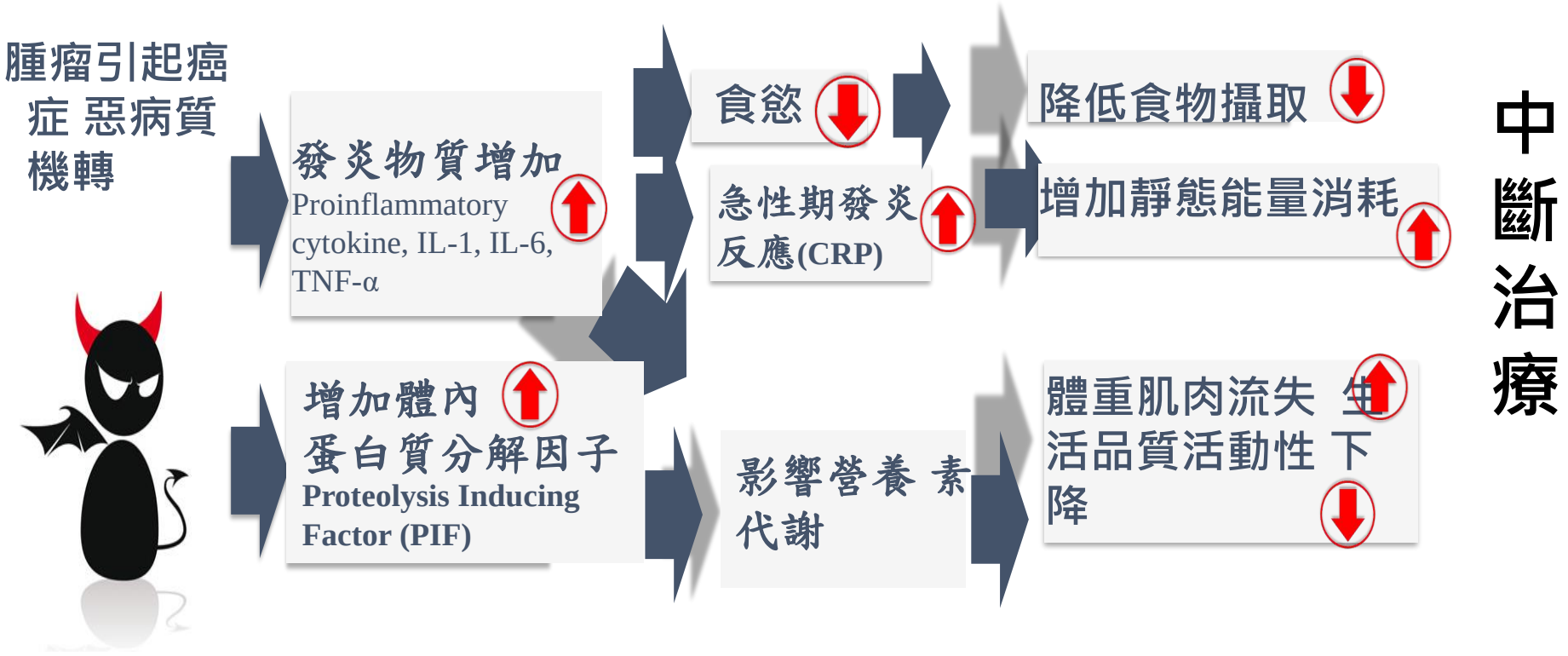
03

➢添加微量營養素與魚油的臨床效益

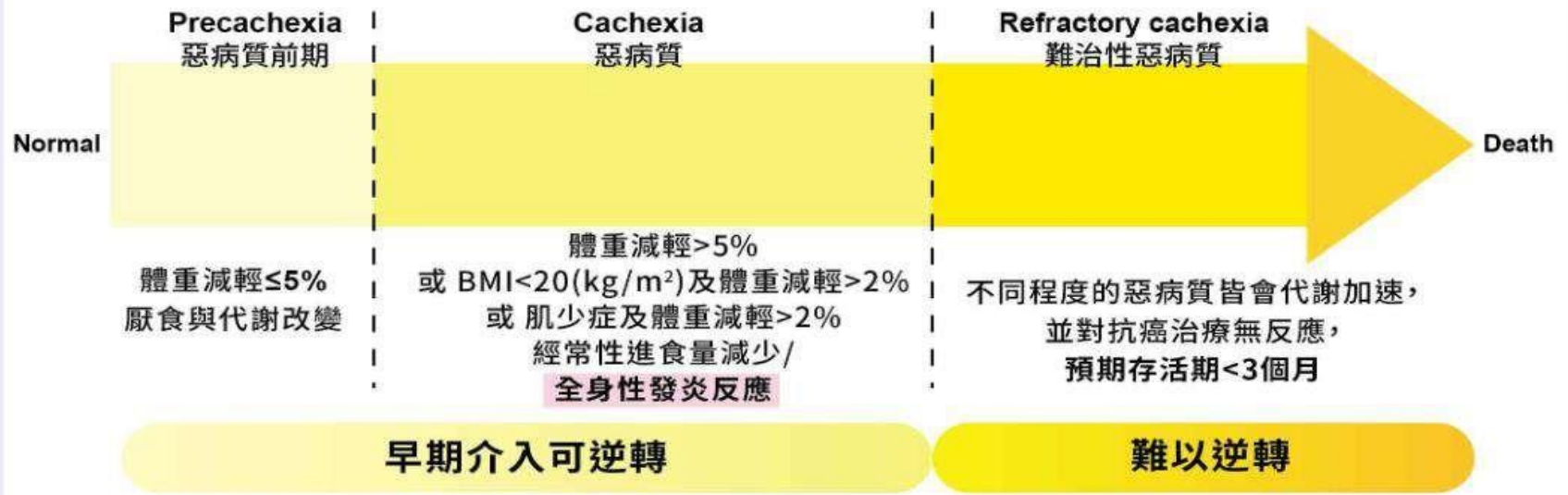
- 抗氧化與抗發炎機轉
- 臨床應用及實證

腫瘤細胞造成病患惡病質
體重下降而中斷治療

腫瘤引起癌症惡病質造成體重下降, 肌肉質量減少, 發炎反應, 脂肪組織耗損, 影響患者整體生活品質與體能活動能力，可能導致中斷或延遲癌症治療



惡病質及早進行營養介入可逆轉



1. Int. J. Mol. Sci. 2021, 22(16), 8491 2.Lancet Oncol 2011 May;12(5):489-95.

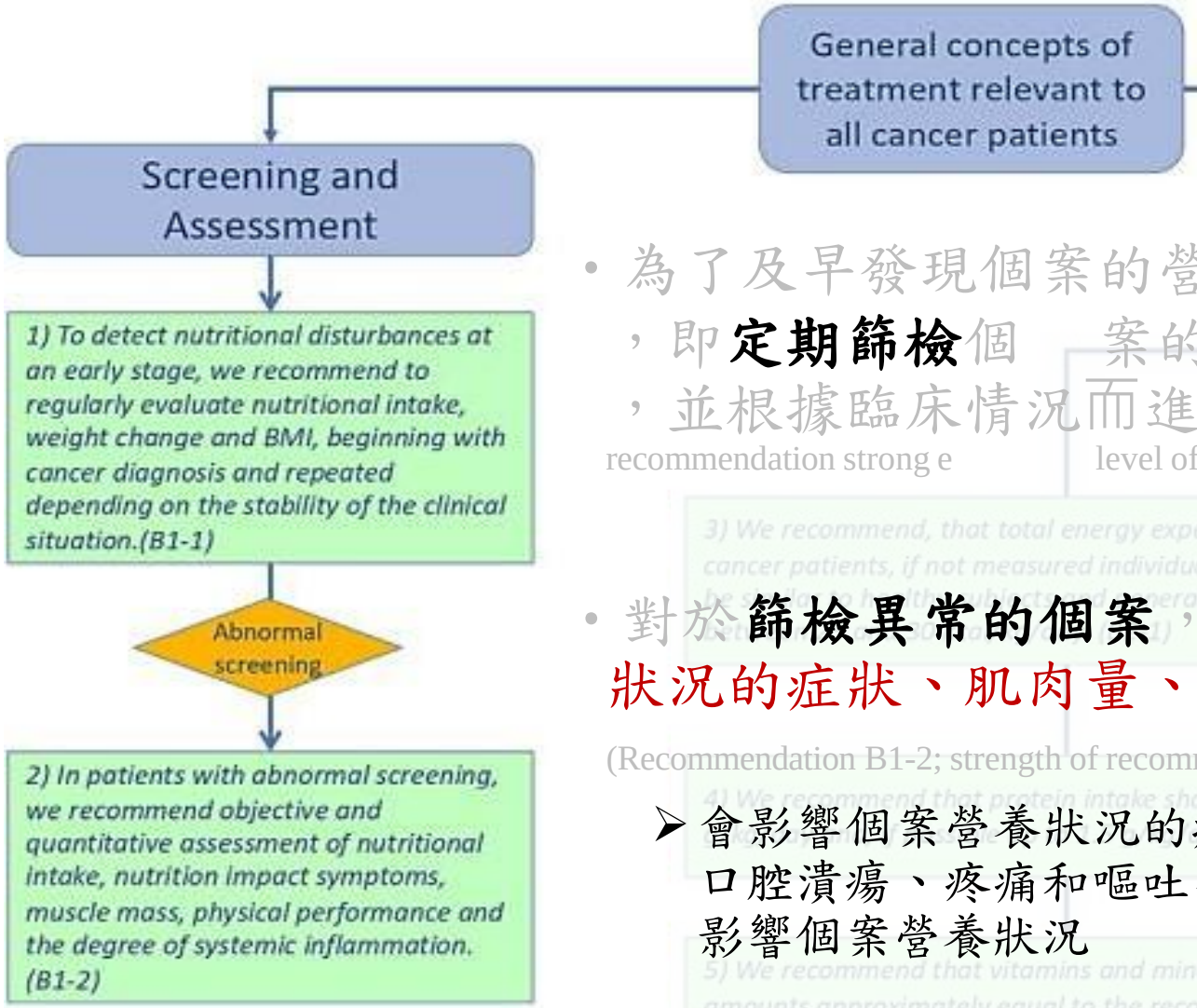
惡病質
非藥物治療

ESPEN指南建議於惡病質前期，
患者發生食慾下降、體重減輕時，
即開始積極營養介入與監測

*Bozzetti F, Arends J, Lundholm K, Micklewright A, Zurcher G, Muscaritoli M and ESPEN: ESPEN Guidelines on Parenteral Nutrition: non-surgical oncology. Clin Nutr 28(4): 445-454, 2009. PMID: 19477052. DOI: 10.1016/j.clnu.2009.04.011

*Arends J, Bodoky G, Bozzetti F, Fearon K, Muscaritoli M, Selga G, van Bokhorst-de van der Schueren MA, von Meyenfeldt M, DGEM (German Society for Nutritional Medicine), Zürcher G, Fietkau R, Aulbert E, Frick B, Holm M, Kneba M, Mestrom HJ, Zander A and ESPEN (European Society for Parenteral and Enteral Nutrition): ESPEN Guidelines on Enteral Nutrition: Non-surgical oncology. Clin Nutr 25(2): 245-259, 2006. PMID: 16697500. DOI: 10.1016/j.clnu.2006.01.020

2021年ESPEN的癌症臨床營養照護指引



Clinical Nutrition 40 (2021) 2898–2913
Contents lists available at ScienceDirect
Clinical Nutrition
journal homepage: http://www.elsevier.com/locate/clnu
ESPEN Guideline

Maurizio Muscaritoli [a, *], Jann Arends [b], Patrick Bachmann [c], Vickie Baracos [d], Nicole Barthelemy [e], Hartmut Bertz [b], Federico Bozzetti [f], Elisabeth Hütterer [g], Elizabeth Isenring [h], Stein Kaasa [i], Zeljko Krznaric [j], Barry Laird [k], Maria Larsson [l], Alessandro Laviano [a], Stefan Mühlebach [m], Line Oldervoll [n], Paula Ravasco [o], Tora S. Solheim [p], Florian Strasser [q], Marian de van der Schueren [r, s], Jean-Charles Preiser [t], Stephan C. Bischoff [u]

- 為了及早發現個案的營養問題，建議從個案確診為癌症開始，即**定期篩檢**個案的**營養攝取、體重變化和 BMI** 狀況，並根據臨床情況而進行重複性 篩檢。(Recommendation B1-1; strength of recommendation strong e level of evidence very low e strong consensus)

- 對於**篩檢異常的個案**，建議針對個案的營養攝取、影響營養狀況的症狀、肌肉量、身體機能和全身發炎程度進行**評估**。(Recommendation B1-2; strength of recommendation strong e level of evidence very low e consensus)

  - 會影響個案營養狀況的症狀，如：厭食、不願進食、噁心、便秘、口腔潰瘍、疼痛和嘔吐等症狀會影響到個案進食與營養攝取量，進而影響個案營養狀況

Fig. 2. General concepts of treatment relevant to all cancer patients: screening and assessment; energy and substrate requirements.

熱量與營養需求

所有癌症病人
一般性概念

- 如果未能測量個案的**總能量消耗** (total energy expenditure, TEE)，則建議
  假定癌症患者的總 能量消耗與健康受試者相似，
  其能量消耗通常為每日 **25至30 kcal/kg**。(Recommendation B2- 1; strength of recommendation strong e Level of evidence low e consensus)
- 建議**蛋白質**攝取量應**高於 1 g/kg/day**，如果情況允許，攝取量應達到 **1.5 g/kg/day**。 (Recommendation B2-2; strength of recommendation strong e Level of evidence moderate e strong consensus)

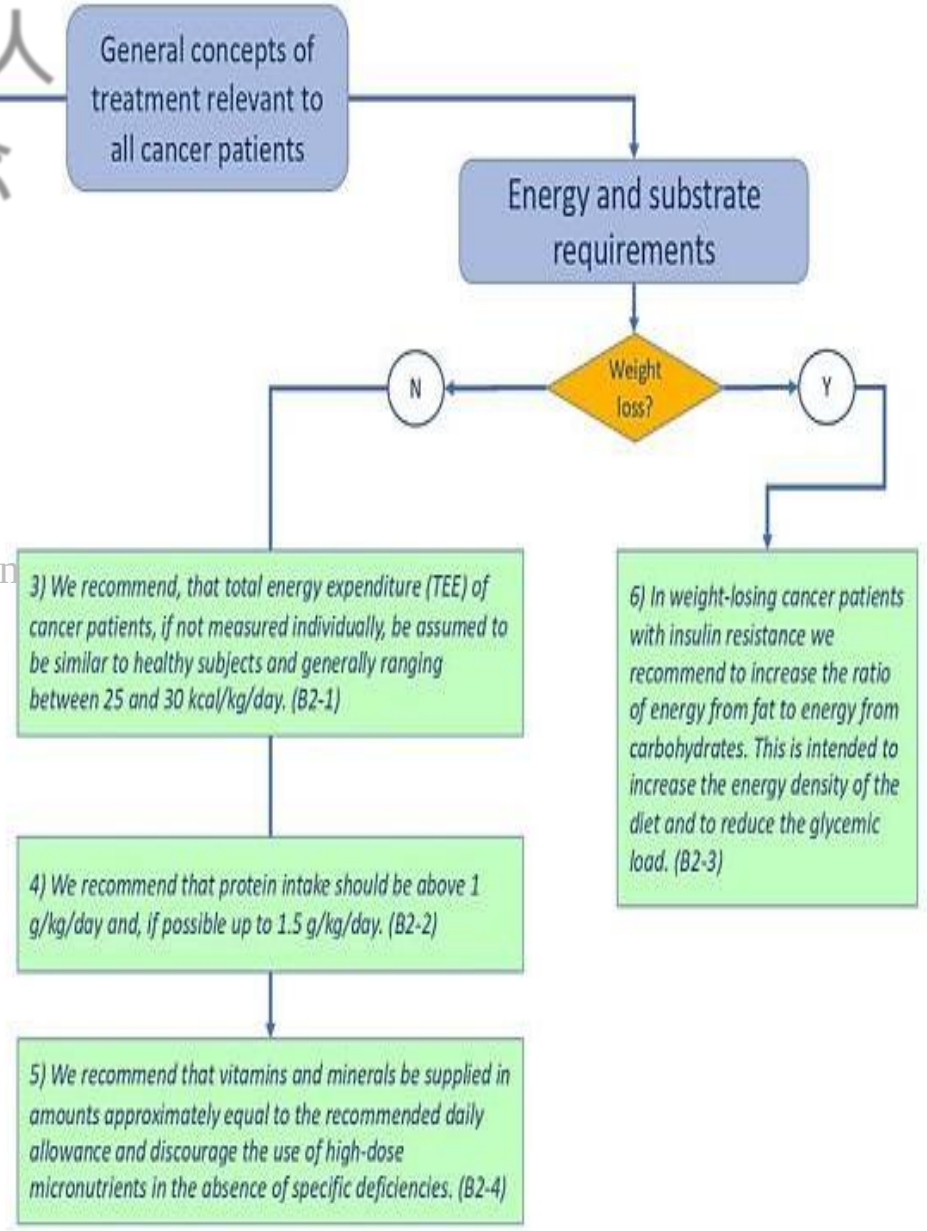
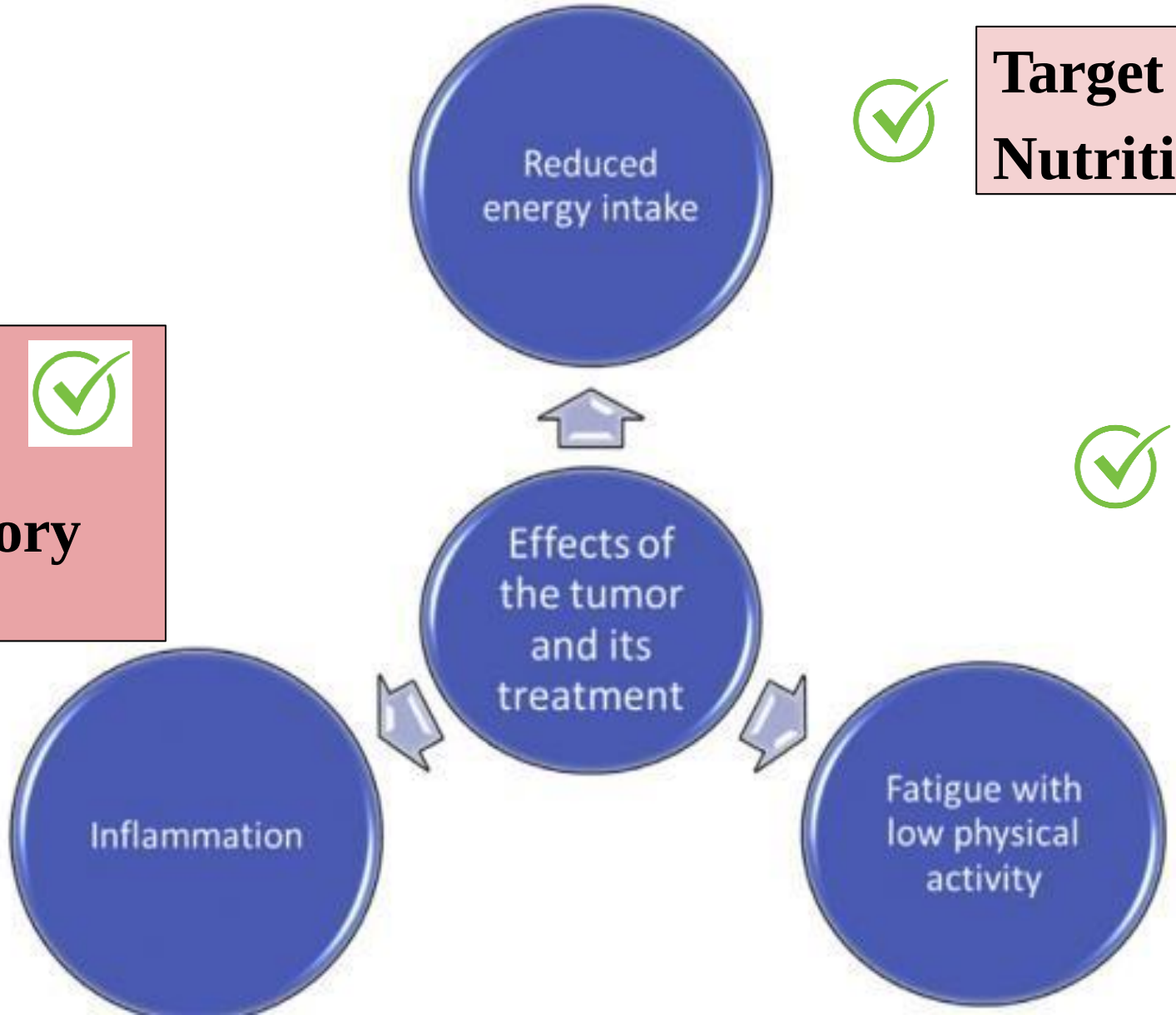


Fig. 2. General concepts of treatment relevant to all cancer patients: screening and assessment; energy and substrate requirements.

3 Major negative events for clinical intervention



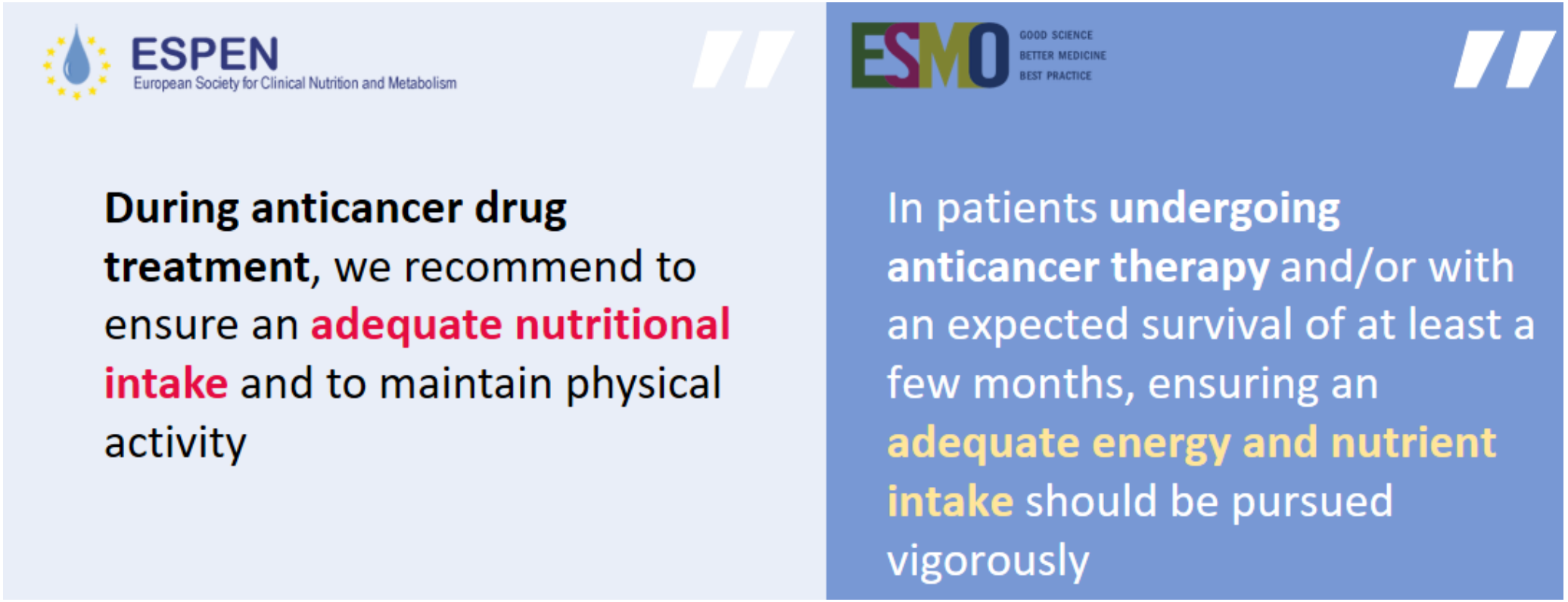
Target 1:
Nutritional therapy

Target 2:
Anti-inflammatory nutrients

Target 3:
Improve fatigue and physical rehabilitation

J Arends et al. Clin Nutr. 2017 Oct;36(5):1187-1196.

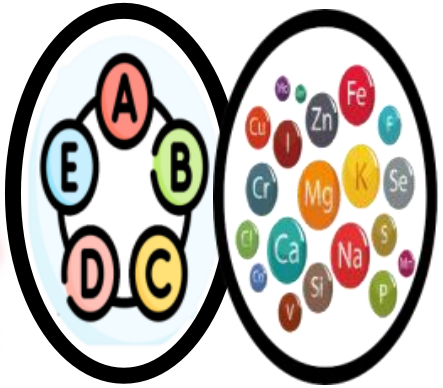
Adequate Nutrition During Anticancer Treatment - Prevent Weight / Muscle Mass Loss



J. Arends et al. ARTICLES IN PRESS, 100092, ESMO. April 29, 2021

2. M. Muscaritoli, J. Arends, P. Bachmann et al. Clin Nutr. 2021 May;40(5):2898-2913.

營養素組成



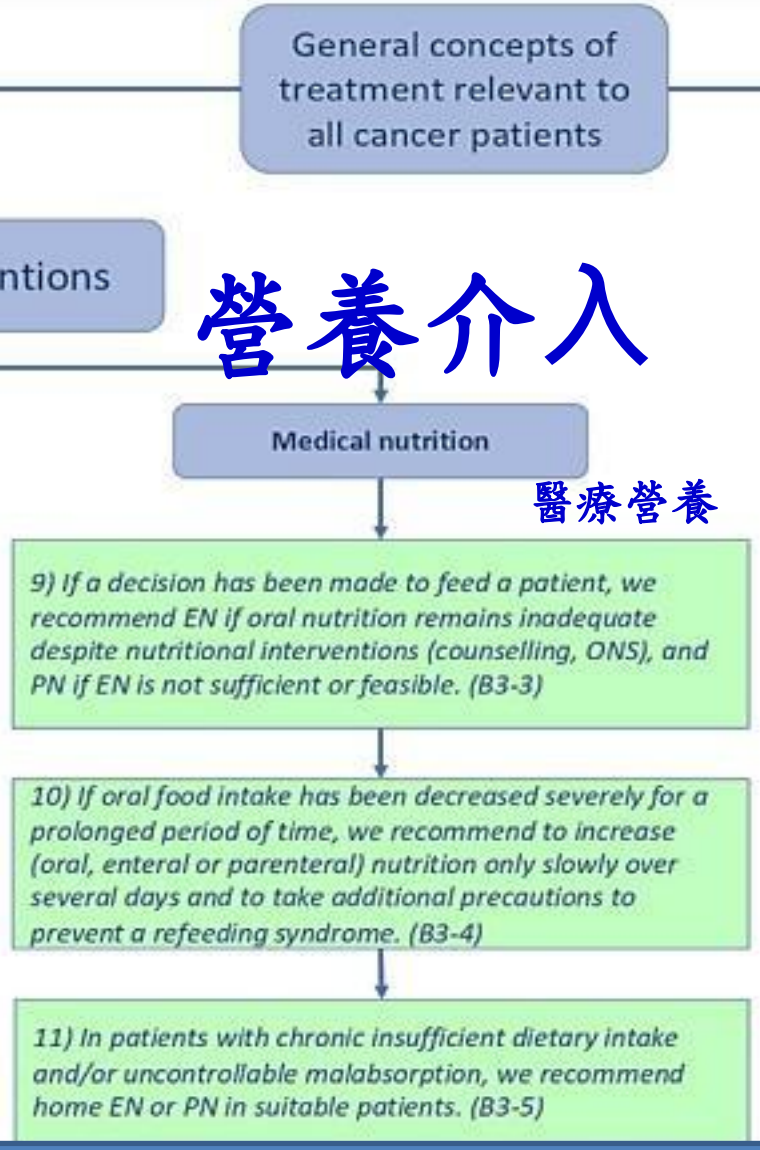
Macronutrients

- 主要能量來源
- 身體組成材料

Micronutrients

- 非能量來源
- 維持生理機能

所有癌症病人 一般性概念



- 針對已經給予營養介入（如：營養諮詢、口服營養補充品）後仍**無法由口攝取足夠營養之個案**，若決定採取餵食照護，建議使用 **EN**，若無法給予 EN 或給予 EN 仍無法獲得足夠營養者，則使用 **PN**。

(Recommendation B3-3; strength of recommendation strong e Level of evidence moderate e strong consensus)

- 若個案由口進食**攝取量嚴重減少**的情況**已持續一段時間**，則建議進行**營養介入**（含口服、EN 或 PN）的初期幾天，營養素的給予量應**緩慢地增加**並進行額外的預防措施，以預防個案發生再餵食症候群。

(Recommendation B3-4;strength of recommendation strong e Level of evidence low e consensus)

- 針對**長期飲食攝取不足和/或無法控制的吸收不良**之患者，若情況允許，建議患者使用 home EN 或 PN。

(Recommendation B3-5; strength of recommendation strong e Level of evidence low e strong consensus)

為防止再餵食症候群的發生，在營養介入之前和期間，可考慮每天給予 200-300 毫克維生素B1以及均衡的綜合微量營養素。應監測以下電解質並於必要時透過口服、EN 或 PN 補充鉀（需要量約為 24 mmol/kg/天）、磷（需要量約為 0.3-0.6 mmol/kg/天）和鎂（如果靜脈注射大約需要 0.2 mmol/kg/天，如果口服大約需要 0.4 mmol/kg/天）。

ESPEN 2021 Guidelines: Nutrition in Cancer Patients- Modes of Nutrition

ESPEN
European Society for Clinical Nutrition and Metabolism

"

If a decision has been made to feed a patient, we recommend EN if ON remains inadequate* despite nutritional interventions (counselling, ONS), and **PN if EN is not sufficient or feasible**

* Inadequate ON intake:
  - **< 50% calories** of the requirement for **> 1 week** or
  - **50 - 75% calories** of the requirement for **> 2 weeks**

M Muscaritoli et al. Clin Nutr. 2021 May;40(5):2898-2913.

Safety of PN – as safe as EN

THE LANCET
Volume 391, Issue 10116, 13–19 January 2018, Pages 133-143

	Enteral group (n=1202)	Parenteral group (n=1208)	Absolute difference estimate (95% CI)	Hazard ratio (95% CI)	p value
Primary outcome					
Day 28 mortality	443/1202 (37%)	422/1208 (35%)	2·0 (-1·9 to 5·8)	..	0·33
Secondary outcomes					
Day 90 mortality	530/1185 (45%)	507/1192 (43%)	2·2 (-1·8 to 6·2)	..	0·28
ICU mortality*	429 (33%)	405 (31%)	..	1·10 (0·96 to 1·26)	0·17
Hospital mortality*	498 (36%)	479 (34%)	..	1·08 (0·95 to 1·22)	0·25
ICU length of stay (days)	9·0 (5·0 to 16·0)	10·0 (5·0 to 17·0)	..	..	0·08
Acute-care hospital length of stay (days)	17·0 (8·0 to 32·0)	18·0 (9·0 to 33·0)	..	..	0·11
Days without vasopressor support*	20·0 (0·0 to 25·0)	21·0 (0·0 to 26·0)	..	..	0·10
Days without dialysis*	27·0 (0·0 to 28·0)	27·0 (0·0 to 28·0)	..	..	0·52
Days without mechanical ventilation*	11·0 (0·0 to 23·0)	12·0 (0·0 to 23·0)	..	..	0·54
Infections					
ICU-acquired infection*	173 (14%)	194 (16%)	..	0·89 (0·72 to 1·09)	0·25
Ventilator-associated pneumonia*	113 (9%)	118 (10%)	..	0·96 (0·74 to 1·24)	0·75
Bacteraemia*	38 (3%)	55 (5%)	..	0·69 (0·46 to 1·04)	0·08
CVC-related infection*	29 (2%)	27 (2%)	..	1·07 (0·64 to 1·81)	0·79
Urinary tract infection*	18 (2%)	16 (1%)	..	1·13 (0·58 to 2·21)	0·73
Soft-tissue infection					
Patients (n)	1/1202	6/1208	..	..	..
Other infection*	11 (1%)	21 (2%)	..	0·52 (0·25 to 1·09)	0·08

*Number of days alive and free of specified organ support up to day 28.

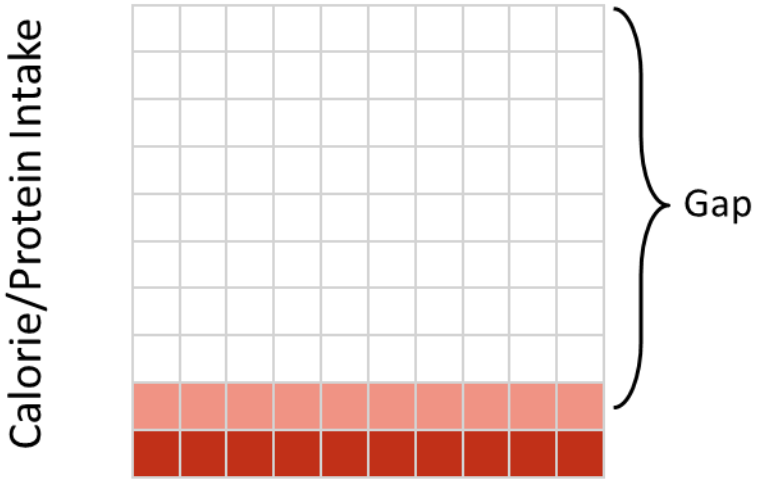
- Cumulative incidence of patients with **ICU-acquired infections did not differ** between the EN group (173 [14%]) and the PN group (194 [16%]; hazard ratio [HR] 0.89 [95% CI 0.72–1.09]; **p=0.25**)

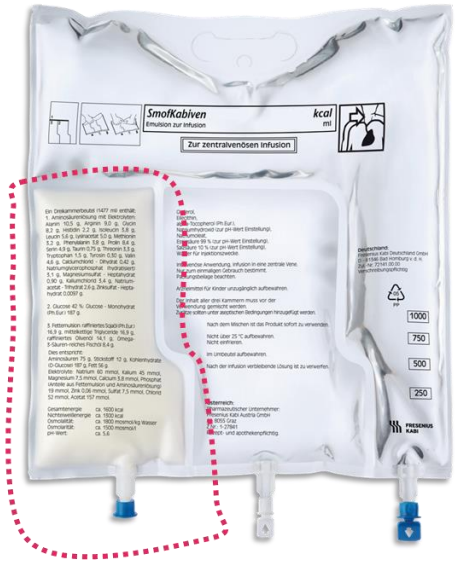
J Reignier et al. Lancet 2018; 391: 133–43.

Role of 3CB - Smofkabiven Central and Peripheral

Smofkabiven Central (中央TPN)

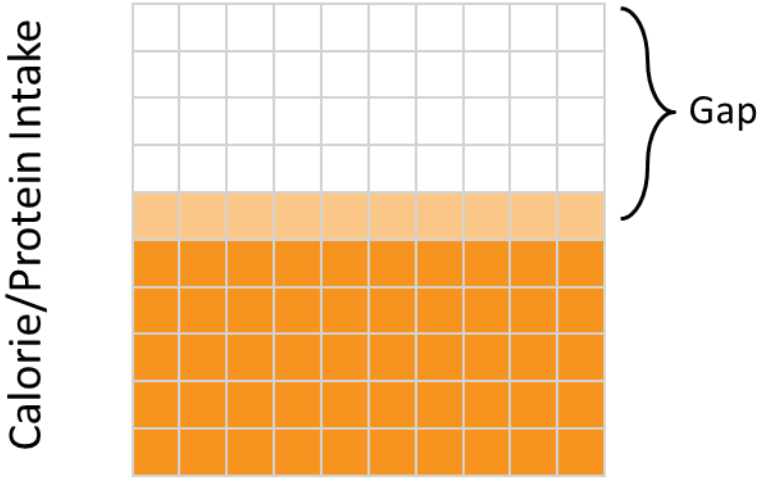
Patients who **cannot intake macro- and micronutrients through ON and EN**. TPN will be the only source of nutrition the patient is receiving to **maintain physiological function** and **avoid negative outcome from malnutrition**





Smofkabiven Peri. (周邊sPN)

PN is added to EN (upplemental parenteral nutrition (SPN) in order to meet calorie and protein needs in patients with cancer **when EN alone is insufficient**



7-day sPN Improves Body Composition and Muscle Strength in Hypophagic Cancer Patients at Nutritional Risk

N = **131**

- Cancer type : HNC, lung, upper GI, pancreas/biliary tract, colon/rectum, non-myeloid hematological disorders
- **NRS 2002 ≥ 3** and hypophagia (estimated **oral intake < 60% of estimated caloric requirements**)
- Contraindication for EN by tube (diarrhea, vomiting, nausea, mood disorders) or patient's refusal

sPN was infused via either **central or peripheral** infusion lines (as available at admission) for **12–24 hr per day**

Endpoints	Baseline Mean (SD)	Day 7 Mean (SD)	Mean change (95% CI)	*p* value
Phase angle (°)	4.12 (1.23)	4.37 (1.30)	0.25 (0.11–0.39)	0.001
Standardized phase angle	− 1.58 (1.55)	− 1.25 (1.75)	0.33 (0.13–0.53)	0.002
Body weight (kg)	57.1 (11.2)	57.8 (11.4)	0.7 (0.4–1.1)	< 0.001
Body mass index (kg m^{-2})	20.3 (3.6)	20.6 (3.6)	0.3 (0.1–0.4)	< 0.001
Handgrip strength (kg)	18.8 (9.3)	20.9 (9.3)	2.1 (1.3–2.8)	< 0.001
Prealbumin (mg/dL)	16.4 (7.5)	20.2 (10.2)	3.8 (2.1–5.6)	< 0.001

R Caccialanza et al. Support Care Cancer. 2019 Jul;27(7):2497-2506.

大綱

01

➢ 癌症營養不良的機轉與臨床意義

- 慢性發炎、代謝異常與肌肉耗損（cachexia）
- 對化放療預後與生活品質的影響

02

➢腸外營養在化放療癌症病患中的應用關鍵

- 化療/放療期間的營養挑戰
- 腸外營養的適應症與介入時機
- 實證依據與指引建議（ESPEN、ASCO）

03

➢添加微量營養素與魚油的臨床效益

- 抗氧化與抗發炎機轉
- 臨床應用及實證

營養素組成

Macronutrients

- 主要能量來源
- 身體組成材料

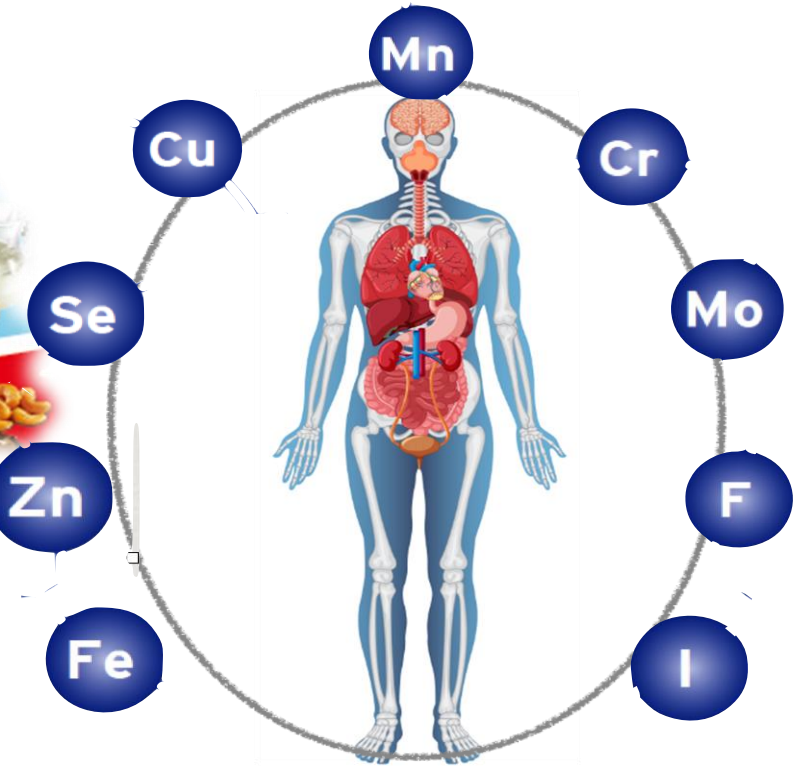
Micronutrients

- 非能量來源
- 維持生理機能

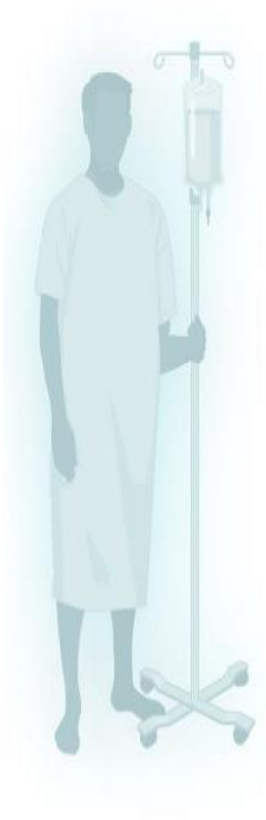
Trace elements

Cr, Cu, F, Fe, I, Mn, Mo, Se, Zn

- Trace elements are minerals present at very low concentrations in the human body - equal to or less than 0.005% of body weight
- Nine trace elements are considered essential for human metabolism



癌症病人微量元素流失原因：



機轉／因素	說明
癌症相關全身性發炎、惡病質、感染、敗血症↑	增加抗氧化物消耗（如硒、鋅）
腸道吸收受損	放射性腸炎、化療引起的腸黏膜破壞、手術治療後
進食困難	食慾下降、噁心、進食困難、口腔炎、味覺改變或NPO造成營養攝取不足(腸內營養每日攝取熱量 < 1500 kcal)
流失增加	嘔吐、腹瀉、皮膚滲出液、大量引流
代謝異常	高代謝狀態下消耗量上升，影響鋅、銅平衡

JPEN 2019 Mar;43(5):S-523

微量元素建議攝取量

微量元素(成人)						
	平均需要量	建議攝取量		足夠攝取量	上限攝取量	化療／放療情況下建議調整
鋅(Zinc)	6.8~9.4mg	男:15mg	女:12mg		35mg	口腔炎、皮膚破損、腹瀉者可增至 **15–20 mg**
硒(Selenium)	45μg		55μg		400μg	氧化壓力高者可增至 **200–300 μg／天**
銅(Copper)	700μg		900μg		10,000μg	若發炎或貧血，維持標準劑量；肝病者需小心過量
鉻(Chromium)				20~35μg		若有高血糖或胰島素抗性，建議補充
錳(Manganese)				1.8~2.3mg		長期靜脈營養使用者需避免累積中毒
鐵(Ferrum)		男:10mg	女:10mg		40mg	
氟(Fluorine)			3mg		10mg	
碘(Iodine)			150μg		1,000μg	
鉬(Molybdenum)		45μg				
**上限攝取量紅色代表國人膳食參考攝取量						
**參考美國國家科學院食品與營養委員會公告建議飲食攝取量 (RDA)						
**參考國人膳食參考攝取量(DRIs)						

1. Weimann A et al. ESPEN practical guideline: Clinical nutrition in cancer. Clin Nutr. 2022.
2. Vanek VW et al. ASPEN position paper: Recommendations for trace element supplementation in adult parenteral nutrition. JPEN. 2020.

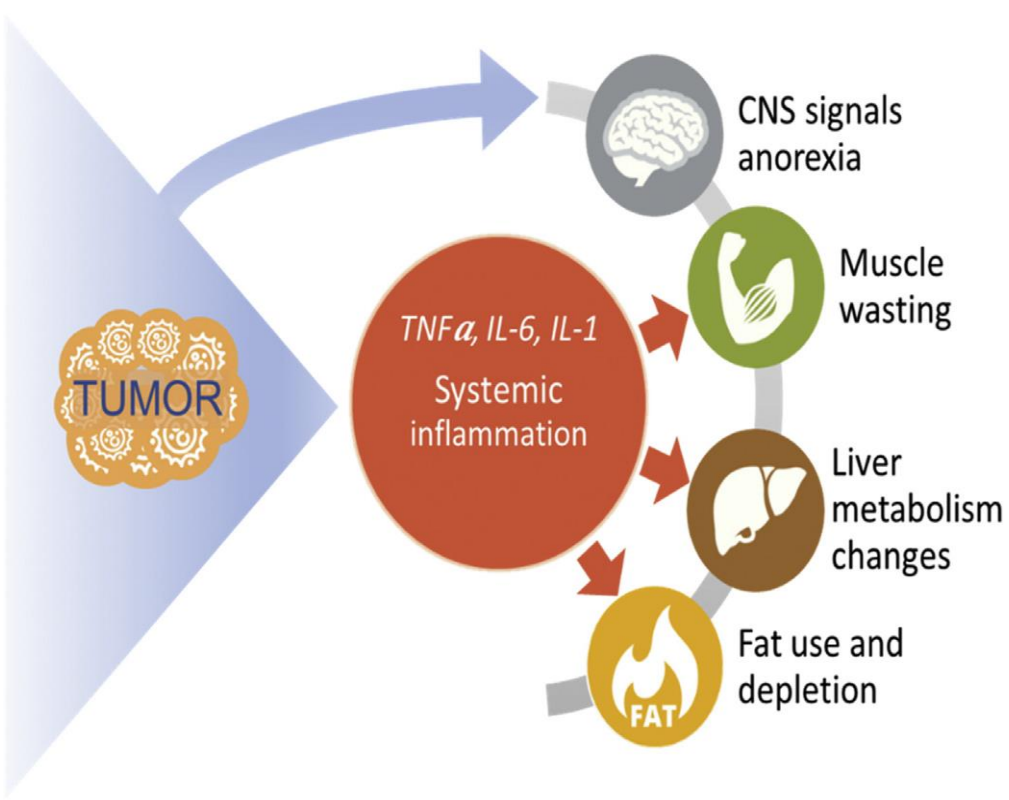
臨床指引建議

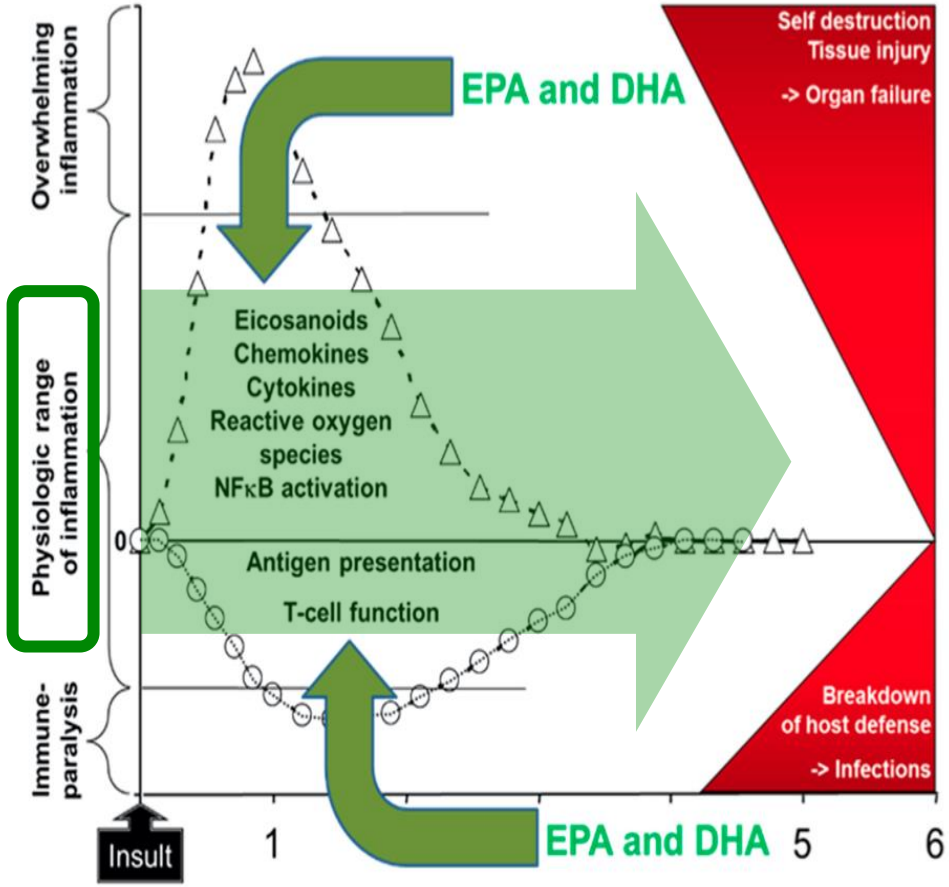
PN/元素	單位	缺乏時的症狀[1]	ESPEN 2009[1]	ASPEN 2012[1]	AuSPEN 2014[1]	ESPEN 2022[2]A	ESPEN 2022[2]B	Addaven
銅 Cu	mg/day	貧血 白血球減少	0.3–1.5	0.3–0.5	0.3–0.5	0.3–0.5	0.3–1.0	0.38
硒 Se	µg/day	心肌病變 骨骼肌病變	20–72	60–100	60–100	60–100	150–200	79
錳 Mn	µg/day	兒童矮小	165–300	55	55	55	55	55
碘 I	µg/day	甲狀腺低下 認知障礙	1.3–130	NA	130	130	130	130
氟 F	mg/day	（無特別症狀）	1	NA	NA	0-1	0-1	0.95
鋅 Zn	mg/day	傷口癒合遲緩 較易感染	2.5–6.5	3–4	3.2–6.5	3–5	12	5
鉻 Cr	µg/day	血糖升高	10–15	10–15	10–15	10–15	15	10
鉬 Mo	µg/day	心跳過速 神經/視覺異常	19.5—25.5	NA	19	19-25	19-25	19
鐵 Fe	mg/day	缺鐵性貧血 容易疲倦	1.0–1.2	NA	1.1	1.1	1.1	1.1

*這列出部分缺乏時會產生的症狀
*These figures may vary when specific clinical situations are considered

藥物仿單
Fresenius Kabi 提供資料

Omega-3 FA: Immuno-inflammatory Modulation





PC Calder. Mar Drugs 2019 May 8;17(5):274.

Authors	Cancer-Related Complication	Species	Cancer Type	Treatment Scheme	Major Outcome
Hanai et al., 2018 [103]	Cachexia-anorexia syndrome	Human	Head and neck squamous cell carcinoma	Prosure® (1056 mg EPA)	No significant difference among experimental groups
Persson et al., 2005 [104]	Cachexia-anorexia syndrome	Human	Advanced gastrointestinal cancer	30 mL/d [1] FO (4.9g EPA + 3.2 g DHA)	FO stabilized weight in 27% patients
Shirai et al., 2017 [105]	Cachexia-anorexia syndrome	Human	Advanced gastrointestinal cancer	Prosure® (1.1 g EPA + 0.5 g DHA)	Increase of body weight and lean body mass ($p = 0.002$/ $p < 0.001$)
Werner et al., 2017 [119]	Cachexia-anorexia syndrome	Human	Pancreatic cancer	6.9 g EPA/13.6 g DHA in 100 g or 8.5 g EPA/ 12.3 g DHA in 100g	No significant differences between omega-3 PUFA treatments
Solis-Martínez et al., 2018 [110]	Cachexia-anorexia syndrome	Human	Head and neck squamous cell carcinoma	2 g EPA	Weight and [2] LBM maintenance
Hajjaji et al., 2012 [117]	Chemotherapy-induced cachexia	Rat	Chemically-induced tumor + doxorubicin treatment	DHA-enriched diet (80 g/kg diet)	DHA diet avoided weight loss
Schissel et al., 2015 [118]	Cancer-associated cachexia	Rat	Breast carcinoma (Walker 256 cell line)	53.6% EPA + DHA or 54.4% ALA	ALA and EPA improved weight gain (cachectic vs. cachectic + omega-3 $p < 0.05$)
Du et al., 2015 [115]	Cancer-related cachexia	Mice	Sarcoma (S180 cell line)	42% EPA + 6.8% DHA	Decreased lipolysis and increased body weight ($p < 0.001$)
Penna et al., 2011 [116]	Cancer-related cachexia	Mice	Lewis lung carcinoma	EPA (0.5 g/kg) or EPA (0.5 g/kg) + exercise	EPA + exercise significantly improved muscle weight ($p < 0.05$)
Muzio et al., 2016 [120]	Cachexia in vitro model	Human	Lung adenocarcinoma	50 μM EPA + DHA	Myoblast formation

[1] FO: Fish oil; [2] LBM: lean body mass.

RDS Freitas et al. Nutrients.2019 Apr 26;11(5):945.

The use of omega-3 supplementation for **cancer cachexia management** in virtue of its **anti-inflammatory**, **anti-lipolytic**, and **anti-catabolic actions**

營養補充品

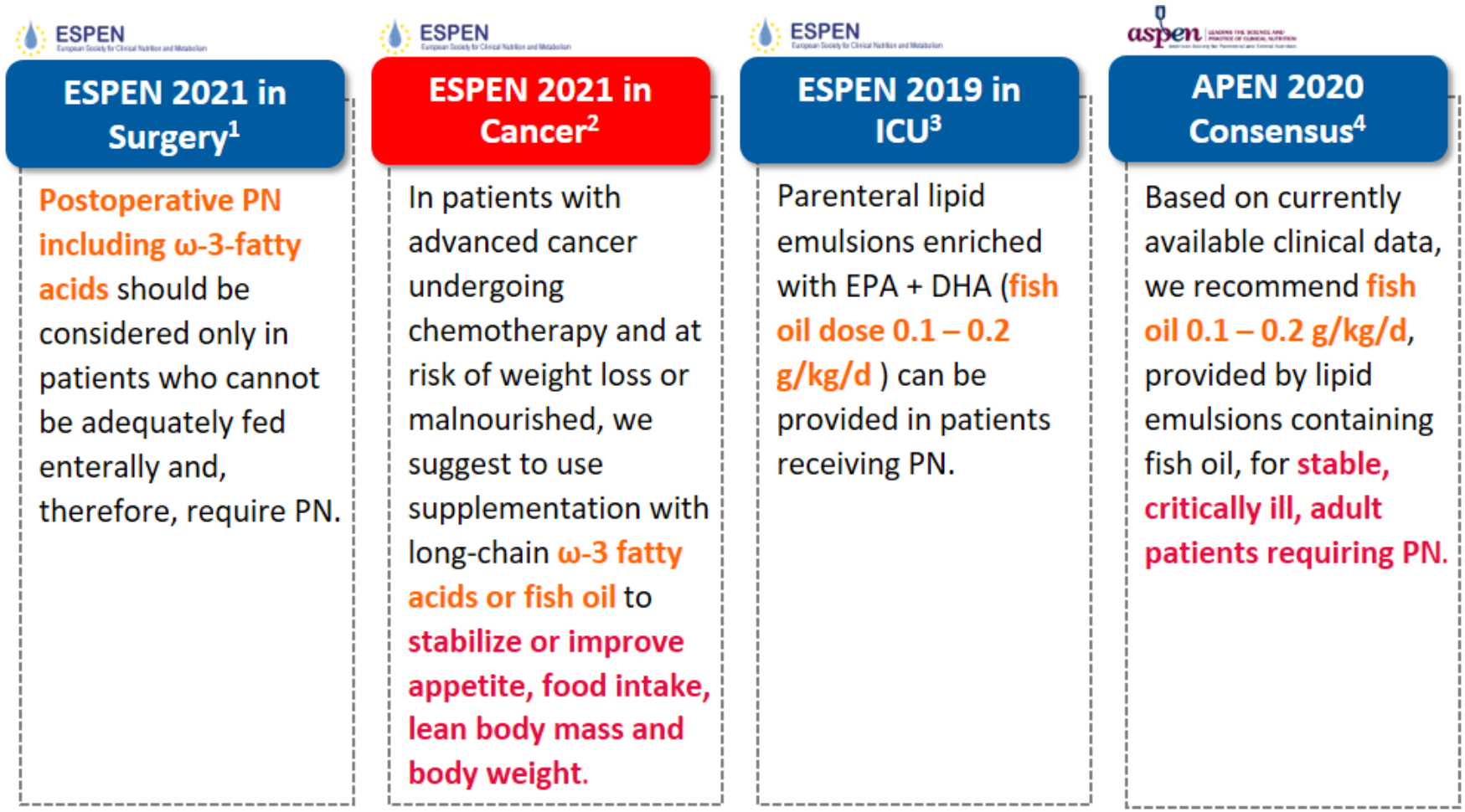
所有癌症病人
一般性概念

建議考慮使用

Fig. 4. General concepts of treatment relevant to all cancer patients: pharmaconutrients and pharmacological agents.

- 針對正在進行化學治療的晚期癌症（advanced cancer）患者，若有體重流失或營養不良的風險，建議使用**long-chain n-3 fatty acids** 或**魚油**補充品來穩定或改善食慾、食物攝取量、瘦體組織和體重。 (Recommendation B5-7; strength of recommendation weak e Level of evidence low e strong consensus)

Clinical Guidelines for ω-3 Fatty Acids



1. Clin Nutr. 2021 Jul;40(7):4745-4761.; **2.** Clin Nutr. 2021 May;40(5):2898-2913;
3. Clin Nutr. 2019 Feb;38(1):48-79.; **4.** JPEN J Parenter Enteral Nutr. 2020;44(suppl S1):S28–S38

ω6/ω3 ratio
2.5 : 1

15% **Fish oil (PUFA)**
provides omega-3 fatty acids especially **EPA** and **DHA**

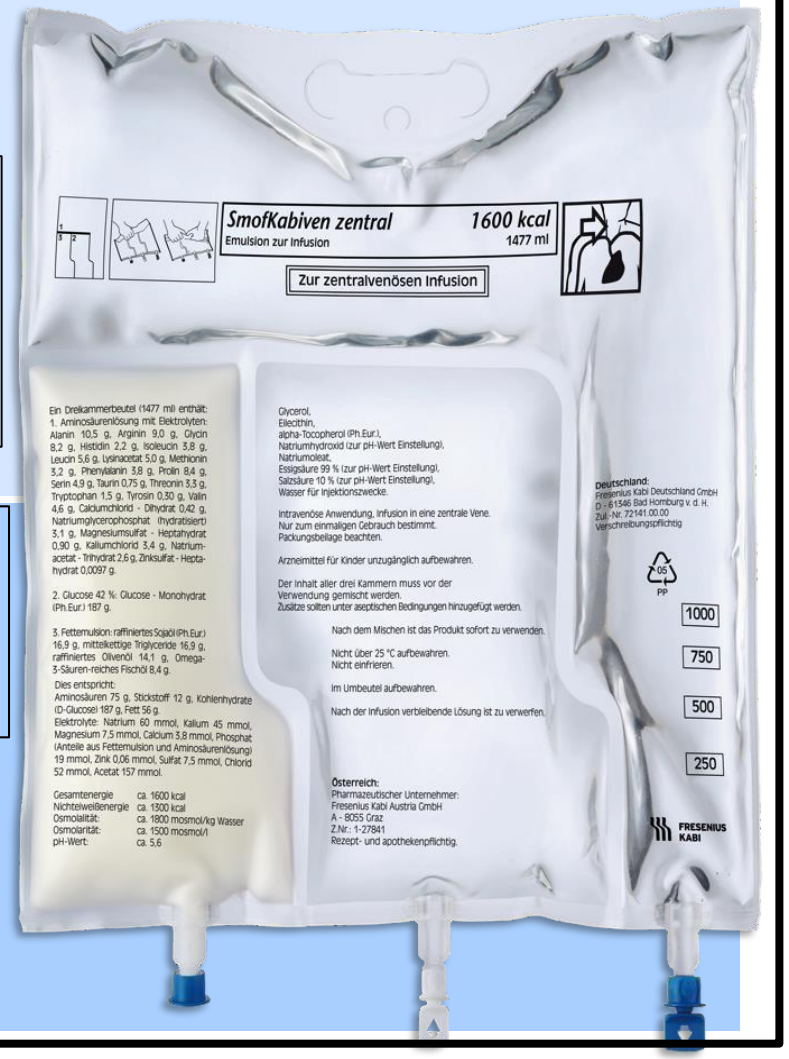
30% **Soybean oil**
covering essential fatty acid requirements

25% **Olive oil**
supply of monounsaturated fatty acids

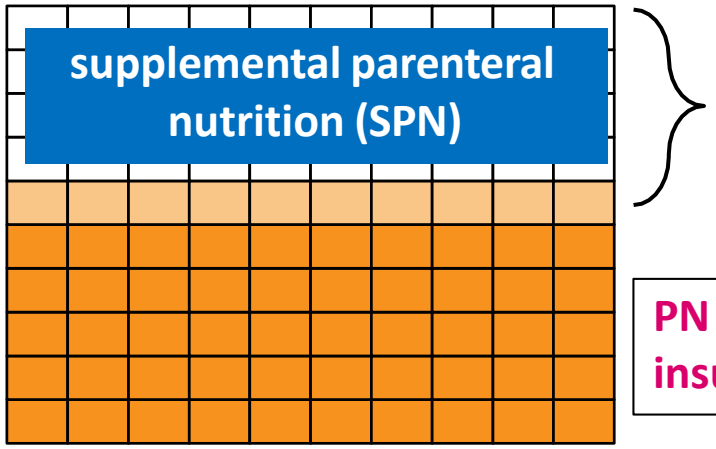
30% **Medium-chain triglycerides (MCT)**
source of rapidly available energy

FDA APPROVED

SmofKabiven® THE MIX FOR LIFE



	SmofKabiven Peri. 1448 mL
總熱量(kcal)	**1000**
胺基酸(g)	**46**
Nitrogen (g)	7.4
無水葡萄糖(g)	**103**
脂肪(g)	41

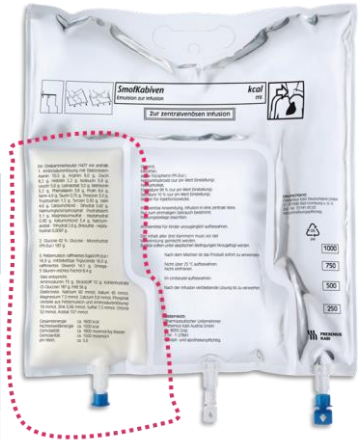


Gap Of calorie/prote in intake

PN is added with insufficient EN

+ additional α-vitamin E
(approx. 200 mg/L) to **inhibit lipid peroxidation** and oxidative stress(SMK 1448 contains 40.8 mg vit.E)

Smofkabiven Peripheral 1448 mL（周邊sPN）
補足熱量、高蛋白、含魚油



Components	%	g/1448ml	Characteristics
Soybean oil 	30%	12.3 (30%)	提供亞麻油酸(linoleic acid)、次亞麻油酸 (α-linolenic acid)等必須脂肪酸
MCT oil 	30%	12.3 (30%)	中鏈脂肪酸(MCT)可確保快速得到能量，及有效的清除血循環中的三酸甘油酯
Olive oil 	25%	10.1 (25%)	橄欖油提供單元不飽和脂肪酸 (MUFA)，降低脂肪乳劑中多元不飽和脂肪酸 (PUFA) 的含量。藉此減少動脈硬化、改善 HDL cholesterol 和降低心血管疾病 與死亡率[1]
Fish oil 	15%	**6.1** (15%) (**EPA** 0.96 g; **DHA** 0.89 g)	魚油內含ω-3 脂肪酸(EPA & DHA)，可調節免疫系統、具抗發炎反應。SMOFlipid® 內ω-6/ω-3 脂肪酸比值為2.5:1，為符合目前的建議值

Extra add vitamin E (dl-α-tocopherol): 200 mg /1000 ml

[1]Am J Clin Nutr 1998; 67:129-135
Circulation 1970; 41(Suppl 1):11-211
N Engl J Med 1985; 312:805-11
J Lipid Res 1990; 31:1149-72
Am J Clin Nutr 1986; 44:635-42

Smofkabiven Central 1477 mL
足熱量、高蛋白、含魚油

	SmofKabiven Central 1477 mL	Other 1500 mL	Guideline/Consensus Recommendation	55 kg p't Requirement
總熱量 (kcal)	1600	1800	25-30 kcal/kg/d	1375 - 1650
胺基酸 (g)	75	60	1.5 g/kg/d	82.5
Nitrogen (g)	11.9	9.9	-	-
無水葡萄糖 (g)	187	240		-
脂肪 (g)	56	60	-	-
Soy bean (g)	16.8 (30%)	12 (20%)	-	-
MCT (g)	16.8 (30%)	-	-	-
Olive oil (g)	14.0 (25%)	48 (80%)	-	-
Fish oil (g)	8.4 (15%) (EPA 1.32 g; DHA 1.23 g)	-	0.1-0.2 g/kg/d	5.5 - 11

	SmofKabiven Central 1477 mL	Other 1500 mL	Guideline/Consensus Recommendation	55 kg p't Requirement
總熱量 (kcal)	**1600**	1800	**25-30** kcal/kg/d	**1375 – 1650**
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無水葡萄糖 (g)	**187**	240		
脂肪 (g)	56	60		
Soy bean (g)	16.8 (30%)	12 (20%)		
MCT (g)	16.8 (30%)	-	-	-
Olive oil (g)	14.0 (25%)	48 (80%)	-	-
Fish oil (g)	**8.4** (15%) (**EPA** 1.32 g; **DHA** 1.23 g)	-	**0.1-0.2** g/kg/d	**5.5 – 11**

In weight-losing cancer patients with insulin resistance**, increase the ratio of energy from fat rather than carbohydrates.**
➔ Increase the energy density and to **reduce the glycemic load**

FRESENIUS KABI
caring for life

腸外營養健保給付　Q&A

Q5、腸外營養用在腫瘤科的給付規範？

A5、沒有特別明確規範在腫瘤的病人，其實只要在病歷上確實記載：1. 積極治療癌症的同時，有營養不良的風險 2.附上營養評估量表 3.體重變化，三個月大於15%，或是一個月有大於5% 4. total bilirubin及抽血等數值，一般有詳載再申報健保，原則上是不會被核刪的。

第 3 節　代謝及營養劑 Metabolic & nutrient agents

3.1.靜脈營養輸液　Parenteral nutritions

3.1.1.　Fat emulsion：或含 Fat emulsion 之靜脈營養輸液(如含 glucose、lipid、amino acid 及 electrolytes 三合一靜脈營養輸液)：(97/11/1、98/7/1、98/12/1)限

1.嚴重燒傷病人，為靜脈營養補充。

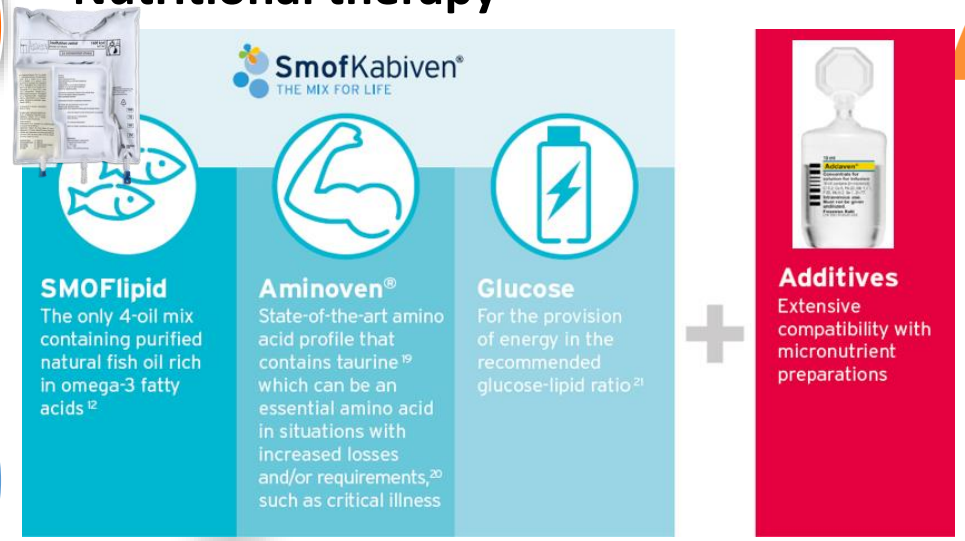
2.使用全靜脈營養者。

3.重大手術後五至七天仍不能經腸道進食者，每日不超過一瓶為原則。(98/12/1)

Summary

Target 1:

Nutritional therapy



Target 2:

Anti-inflammatory nutrients or medications

Target 3:

Physical rehabilitation 身體康復

1.J Arends et al. Clin Nutr. 2017 Oct;36(5):1187-1196.

感謝聆聽

敬請指教