

4.2d Composition of Enteral Nutrition: Fat modified

Question: Compared to standard enteral nutrition containing long-chain triglycerides (LCT), does a fat modified enteral formula result in better outcomes in the critically ill adult patient?

Summary of evidence: This is a new topic in 2018. There was 1 level 2 study that compared the effect of a fat modified EN formula to a standard formula. Qiu 2017 compared EN formulas with similar fat content, but one contained 80%/20% LCT/medium-chain triglycerides (MCT) vs a standard formula of 100% LCT.

Mortality: When the two groups in this study were compared, the fat modified diet had no effect on mortality ($p=0.7$)

Infections: Not reported.

LOS and Ventilator days: When the two groups in this study were compared, the fat modified diet had no effect on ICU LOS ($p=0.85$), hospital LOS ($p=0.42$) and ventilator-free days ($p=0.42$).

Other: The authors indicated that daily calorie and protein intake were increased in the fat modified EN group compared with the control group ($P < 0.01$). See **Table 2** for the daily enteral calorie and protein intake and percent of adequate calories and protein from days 1 to 5.

Feeding intolerance was lower in the fat modified EN group (42.3% vs 65.7%, $P = 0.005$). Feeding intolerance was defined as any of the following:

- Diarrhea: liquid stools ≥ 5 times in 24 hours or estimated volume ≥ 200 mL/day
- Vomiting: enteral formula ejected from mouth
- Gastric retention: gastric residual volume, which was checked every 6 hours, was ≥ 200 mL/day
- Abdominal distention: abdominal changes on the daily physical exam, with tympany and/or the absence of bowel sounds.

Also significant between the fat modified EN group and the control group was the incidence of feeding intolerance without abdominal distention (32.9% vs 49.3%, $P = 0.047$) and the incidence of abdominal distention (26.8% and 43.8%, $P = 0.03$).

Conclusions:

- 1) A fat modified enteral nutrition formula has no effect on mortality, LOS or ventilator days.
- 2) A fat modified enteral nutrition formula may be associated with improved feeding tolerance.

*Level 1 study: if all of the following are fulfilled: concealed randomization, blinded outcome adjudication and an intention to treat analysis.
Level 2 study: If any one of the above characteristics are unfulfilled.*

Table 1. Randomized Studies Evaluating a Fat Modified Enteral Formula in Critically ill Patients

Study	Population	Methods (score)	Intervention	Mortality # (%)		p-value	Infections # (%)		p-value
				Fat modified	standard		Fat modified	standard	
1) Qiu 2017	ICU patients with APACHE \geq 12 N=144	C. Random: no ITT: yes Blinded: single (10)	Fat modified EN (29% fat - 80/20 LCT/MCT) vs standard EN (31.8% fat - 100% LCT). Isocaloric, isonitrogenous.	Hospital 17/71 (24)	Hospital 20/73 (28)	0.7	NR	NR	NR

Table 1. Randomized Studies Evaluating a Fat Modified Enteral Formula in Critically ill Patients (Continued)

Study	Mechanical Ventilation		p-value	LOS		p-value	Other		p-value
	Fat modified	standard		Fat modified	standard		Fat modified	standard	
1) Qiu 2017	Vent free days 16.3 \pm 8.3	16.0 \pm 7.8	0.82	ICU 16.5 \pm 8.5	15.3 \pm 8.6	0.85	Diarrhea 21.71 (29.6%)	7/73 (38.4%)	0.03
				Hospital 35.8 \pm 16.2	32.1 \pm 15.3	0.42	Gastric Retention 3/71 (4.2%)	7/73 (9.6%)	
							Vomiting 2/71 (2.8%)	6/73 (8.2%)	
							Abdominal Distention 19/71 (26.8%)	32/73 (43.8%)	

C.Random: concealed randomization
ITT: Intent to treat

\pm : mean \pm standard deviation
ICU: Intensive Care Unit

NR: Not Reported
EN: Enteral nutrition

LCT: Long-chain triglyceride

MCT: medium chain triglyceride

Table 2. Daily enteral calorie and protein intake and percent of adequate calories and protein from days 1 to 5 (Qiu 2017)

Study day	Daily enteral calorie intake		Percent of adequate calories		Daily enteral protein intake		Percent of adequate protein	
	Fat modified EN group	Control group	Fat modified EN group	Control group	Fat modified EN group	Control group	Fat modified EN group	Control group
Day 1	815.5 \pm 391.1	803.3 \pm 325.4	51.8 \pm 27.2	52.1 \pm 22.1	31.4 \pm 15.0	28.5 \pm 11.5	51.0 \pm 28.0	46.0 \pm 20.0
Day 2	989.3 \pm 435.1	943.7 \pm 289.3	63.2 \pm 29.7	60.9 \pm 21.0	37.6 \pm 16.3	33.2 \pm 10.2	60.0 \pm 28.0	54.0 \pm 19.0
Day 3	1112.6 \pm 370.2	1022.9 \pm 329.5	71.5 \pm 27.0	65.1 \pm 21.8	42.9 \pm 14.3	35.9 \pm 11.5	70.0 \pm 27.0	58.0 \pm 19.0
Day 4	1202.96 \pm 393.51	1069.23 \pm 340.89	76.0 \pm 25.0	68.8 \pm 24.7	46.18 \pm 14.7	37.9 \pm 12.0	74.0 \pm 25.0	61.0 \pm 22.0
Day 5	1234.14 \pm 423.43	1078.62 \pm 326.28	78.2 \pm 27.5	69.2 \pm 22.6	47.3 \pm 15.8	38.2 \pm 11.6	76.0 \pm 27.0	61.0 \pm 20.0