### Total Parenteral Nutrition In Postoperative Patients In Intensive Care Units

### Essay

Submitted for partial fulfillment of Master Degree in *intensive* care

By

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Mahmoud Ebrahim Ahmed Azzam





# Dedication

Words stand short when they come to express my gratefulness to my father to whom this work is dedicated. Asking Allah to bless his soul.

### List of Abbreviations (cont.)

Abbreviation	Meaning
_	Negative
+	positive
<b>↑</b>	increase
$\downarrow$	decrease
μg	Microgram
$\mathbf{A}_{10}$	10% amino acids
AA	Arachidonic Acid
ACTH	Adrenocorticotropic hormone
ADH	Antidiuretic Hormone
ADP	Adenosine Di Phosphate
ALA	Alpha-Linoleic Acid
Ala-Gln	Alanine, Glutamine
ALI	Acute Lung Injury
AP	Acute Pancreatitis
APACHE	Acute Physiology and Chronic Health Evaluation
APR	Acute-phase response
ARDS	Adult Respiratory Distress Syndrome
ASPEN	American Society for Parenteral and Enteral Nutrition
ATP	Adenosine Tri Phosphate
AVP	Arginine Vasopressin
BCM	Body Cell Mass
BG	Blood Glucose
BIA	Bio-impedance analysis
BIS	Bio-impedance spectroscopy
BMI	Body mass index
BMI	Body Mass Index

BUN	Blood urea nitrogen
CCF	Chronic Cardiac Failure
CCPG	Canadian Clinical Practice Guidelines
CIPO	Chronic intestinal pseudo-obstruction
cm	Centimeter
CO <sub>2</sub>	Carbon dioxide
CoA	Co Enzyme
COPD	Chronic Obstructive Pulmonary Disease
Cr	Chromium
CRBI	Catheter-related bloodstream infections
CRP	C-reactive protein
CT	Computered Tomography
Cu	Copper
CVC	Central Venous Catheter
CVVHD	Continuous Veno-Venous Hemodialysis
d.	Day
$\mathbf{D}_{50}$	Dextrose
DHA	Docosahexanoic Acid
DTO	deodorized tincture of opium
EPA	Eicosapentaenoic Acid
ESPEN	<b>European Society for Parenteral and Enteral</b> <b>Nutrition</b>
Fe	Iron
FV	Femoral Vein
g.	Gram
G-CSF	<b>Granulocyte Colony-Stimulating Factor</b>
GH	<b>Growth Hormone</b>
GIT	<b>Gastro-Intestinal Tract</b>
GLA	Gamma linolenic acid
GLP-2	Glucagon-like peptide-2
GLUT	Glucose transporter
GPx	Glutathione peroxidase

h.	Hour
H+	Hydrogen ion
H <sub>2</sub> O	water
HPN	home parenteral nutrition
HSCT	hematopoietic stem cell transplantation
HTG	Hypertriglyceridemia
I	iodine
IBT	intestinal bacterial translocation
IBW	Ideal Body Weight
ICU	Intensive Care Unit
IF	Intestinal failure
IJV	Internal Jugular Vein
IL	Interleukin
IU	International Unit
IV	Intravenous
<b>K</b> +	Potassium
Kcal	Kilo calori
L/min/m	Liter per Minute per Meter
LCT	Long Chain Triglyceride
LMF	Tumor Lipid Mobilizing Factor
MAMC.	Mid-Arm Muscle Circumference
MCT	Medium Chain Triglyceride
Mg++	Magnesium
mmol	mille mole
MMSE	Mini-Mental State Examination
Mn	Manganese
Mo	Molybdenum
MOF	Multiple Organ Failure
MRI	Magnetic Resonance Imaging
Na <sup>+</sup>	Sodium
NG	Naso-gastric
NJ	Naso jejenal

PEG	Percutaneous endoscopic gastrostomy
PEJ	Percutaneous endoscopic Jejonostomy
PGE	prostaglandin E
PI	Prognostic Index
PICC	Peripheral Inserted Central Catheter
PIF	proteolysis inducing factor
PN	Parenteral Nutrition
PNALD	Parenteral nutrition associated liver disease
PNI	Prognostic Nutritional Indices
PO	Phosphorus
PRL	Prolactin
R	Resistance
RDA	recommended dietary allowance
REE	resting energy expenditure
RF	Renal Failure
RNI	Reference Nutrient Intake
ROI	reactive oxygen intermediates
ROS	reactive oxygen species
S-alb.	serum albumin
SBS	short bowel syndrome
SCV	Subclavian Vein
Se	Selenium
SePP-1	Selenoprotein-P
SIRS	Systemic Inflammatory Response Syndrome
SQ	Subcutaneous
T3	Thyroxin
TG	Triglyceride
TIBC	Total Iron Binding Capacity
TNF	Tumor Necrotic Factor
TPN	Total Parenteral Nutrion
TSF	Triceps skin fold
TSH	Thyroid Stimulating Hormone

U	Unit
UUN	urinary urea nitrogen
VCO2	CO2 production
VDR	vitamin D Receptor
VO2	O2 consumption
wk.	Weeks
Xc	Reactance
Zn	Zinc
α	Alpha
β receptors	Beta adrenergic receptors
γ	Gamma
ω	Omega

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#### INTRODUCTION

Malnutrition in intensive care unit (ICU) patients is common and can be present on admission or develop as a result of metabolic response to injury. This response to injury can lead to changes in substrate metabolism, causing alterations in body composition and nutrient deficiencies that become clinically evident. (*Irwin and Rippe's*, 2003).

Total Parenteral Nutrition (TPN) is an extension of nutritional care for patients who either temporarily or permanently have a condition in which the bowel is not able to absorb food properly or they are not able to swallow food. In these cases, nutrition must be achieved by giving intravenous fluids containing fat, carbohydrates, vitamins and other substances (TPN). (*Leonard*, *et al*, *2004*).

The administration of TPN is considered after careful consideration that the patient requires nutrition support, is predicted to benefit from it and he will not tolerate enteral feedings. (*Leonard*, *et al*, 2004).

Total parenteral nutrition is complementary and not competitive to enteral nutrition. The majority of patients can be managed by enteral nutrition, a few patients need parenteral nutrition for survival. Very few patients may need both enteral and parenteral nutrition for short periods. (Mohandas, et al, 2003).

Malnutrition, irrespective of the presence of injury and stress, is an independent risk factor for morbidity and mortality, therefore early identification and appropriate action is critical, and appropriate nutrition support results in decreased duration in ICU and hospital, decreased duration of ventilation, decreased complications and decreased costs. (Holmes 2007).

Surgical nutrition, TPN of the surgical patient summarize the basic nutritional knowledge that should be an integral part of the educational background of all junior and senior doctors involved in the management of complex diseases. (*Gibney*, 2005).

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Chapter 1
The Metabolic Responses
to Surgical and Traumatic
Injury