

Sep 02, 2020

# Comparison of Two Lipid Emulsions on Interleukin-1 $\beta$ , Interleukin-8 and Plasma Fatty Acid Composition in Infants Post Gastrointestinal Surgery: A Randomized Trial

DOI

[dx.doi.org/10.17504/protocols.io.bknmkvc6](https://dx.doi.org/10.17504/protocols.io.bknmkvc6)

Meta Herdiana Hanindita<sup>1</sup>

<sup>1</sup>Universitas Airlangga



metahanindita

## Create & collaborate more with a free account

Edit and publish protocols, collaborate in communities, share insights through comments, and track progress with run records.

Create free account

OPEN  ACCESS



DOI: <https://dx.doi.org/10.17504/protocols.io.bknmkvc6>

**Protocol Citation:** Meta Herdiana Hanindita 2020. Comparison of Two Lipid Emulsions on Interleukin-1 $\beta$ , Interleukin-8 and Plasma Fatty Acid Composition in Infants Post Gastrointestinal Surgery: A Randomized Trial. **protocols.io**

<https://dx.doi.org/10.17504/protocols.io.bknmkvc6>

**License:** This is an open access protocol distributed under the terms of the **[Creative Commons Attribution License](#)**, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited



**Protocol status:** Working

**We use this protocol and it's working**

**Created:** September 02, 2020

**Last Modified:** September 02, 2020

**Protocol Integer ID:** 41389

**Keywords:** enriched intravenous fat emulsion, intravenous fat emulsion, intravenous lipid emulsion, standard intravenous fat emulsion, lipid emulsion, based fat emulsion, fat emulsion, plasma fatty acid composition, fatty acid, lct fat emulsion, type of emulsion, integral part of parenteral nutrition, inflammatory eicosanoid, parenteral nutrition, generating inflammatory eicosanoid, acid composition in infant, infants post gastrointestinal surgery, emulsion, severe inflammatory response, structure modification of fatty acid, cytokine, such as prostaglandine e3, excessive cytokine secretion, postoperative sepsis, crucial role in pediatric patient, gastrointestinal surgery<sup>3</sup>, linoleic acid, long chain triglyceride, eicosapentaenoic acid, linolenic acid, severe outcomes due to immature immune system<sup>1</sup>, high levels of linoleic acid, gastrointestinal surgery<sup>9</sup>, immature immune system<sup>1</sup>, arachidonic acid, doxohexanoic acid, fluidity of cell membrane, prostaglandine e3, acid composition, gastrointestinal surgery, increased postope

## Abstract

Surgical intervention in infants is associated with postoperative sepsis and severe outcomes due to immature immune system<sup>1</sup>. Gastrointestinal surgery induces excessive cytokine secretion, which may lead to increased postoperative mortality and morbidity<sup>2</sup>.

Parenteral nutrition plays a crucial role in pediatric patients who undergo gastrointestinal surgery<sup>3</sup>. Intravenous lipid emulsion is an integral part of parenteral nutrition because it contains high energy density and low osmolality, hence becoming the main source of energy and essential fatty acids<sup>4,5</sup>. Fatty acid determines structural integrity and fluidity of cell membrane, and it has been proven that fatty acid helps to regulate expression of various genes and modulate cell-signaling pathway, which occurs during inflammation<sup>6,7</sup>. The current standard type of IVFE is a 50:50 mixture of medium chain triglyceride (MCT) and long chain triglyceride (LCT)<sup>8</sup>. This type of emulsion is rich in  $\omega$ -6 and contains high levels of linoleic acid (LA, C18:2  $\omega$ -6) and alpha-linolenic acid (ALA, C18:3  $\omega$ -3). According to several studies,  $\omega$ -6 is associated with impaired cell-mediated immunity and higher potential risk of elevated proinflammatory markers and severe inflammatory response. This mechanisms may lead to the increase in mortality, morbidity, duration of treatment, and recovery time in patients who undergo gastrointestinal surgery<sup>9-11</sup>.

Calder (2010) showed that the structure modification of fatty acids may alter their functions<sup>7</sup>. Some studies have shown that the addition of  $\omega$ -3 in soy oil-based fat emulsion may improve patients' outcome by modulating inflammatory response<sup>3,4,12</sup>.  $\omega$ -3, particularly eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), is a competitive enzyme inhibitor of arachidonic acid (AA).  $\omega$ -3 has potential anti-inflammatory properties by inhibiting AA pathway and generating inflammatory eicosanoids, such as prostaglandine E3, thromboxane A3 and leukotriene B5, which are considered less inflammatory. Up to this time, the effect of  $\omega$ -3-enriched intravenous fat emulsion compared to standard intravenous fat emulsion on the IL-1b ,IL-8 levels and plasma fatty acid composition in infants who undergo gastrointestinal surgery has yet to be elucidated.

The purpose of this study is aimed to investigate the effect of  $\omega$ -3-enriched intravenous fat emulsion compared to standard intravenous fat emulsion on the IL-1b ,IL-8 levels and plasma fatty acid composition in infants who undergo gastrointestinal surgery

### Trial Design:

Type: Parallel randomized controlled trial

Allocation ratio:1:1

Framework: Superiority

### Aim of the study:

The purpose of this study is to investigate the effect of  $\omega$ -3-enriched intravenous fat emulsion compared to standard MCT/LCT intravenous fat emulsion on the IL-1b ,IL-8 levels and plasma fatty acid composition in infants who undergo gastrointestinal surgery.

### Research Question

Will the Intravenous omega-3 enriched-fat emulsion make difference in IL-1 $\beta$ , IL-8 and fatty acid composition when compared to standard intravenous MCT/LCT fat emulsion?

PICO approach:

P: Patients underwent gastrointestinal surgery.

I:  $\omega$ -3-enriched intravenous fat emulsion

C: MCT/LCT standard intravenous fat emulsion

O:

		Outcome	Tool for Measurement	Unit of Measurement
	Primary	Inflammatory Response: IL-1b, IL-8	Blood	pg/ml
		Fatty Acid Composition	Blood	% Total Fatty Acid
	Secondary	Laboratory parameters: Hemoglobin	Blood	g/dL
		Laboratory parameters: Leukocyte	Blood	/microl
		Laboratory parameters: Albumin	Blood	g/L
		Laboratory parameters: CRP	Blood	mg/L

## Attachments





[Protocol.docx](#)

678KB

## Materials

### MATERIALS

 Interleukin-1beta **R&D Systems**

 Interleukin-8 **R&D Systems**

Reagents used in this study were FAME Standard Mix (Supelco), GLC Nonadecanoic ISTD (Supelco), N-Hexane MS grade (Merck), Chloroform (Merck), Methanol Hyper Grade (Merck), Capillary Column and Helium Gas for GCMS.

## Troubleshooting

### Before start

A-The experimental group (  $\omega$ -3-enriched intravenous fat emulsion)

1-The parents or the legal guardian of patients who fulfill the inclusion and exclusion criteria will have to sign informed consent after the investigator explains the study.

2-Before surgery, blood samples of patients will be drawn (3-4 cc) in order to examine their IL-1 $\beta$ , IL-8 levels and plasma fatty acid composition. Laboratory parameters will also be examined.

3-After surgery, patients will get  $\omega$ -3-enriched intravenous fat emulsion (SMOFlipid) for three consecutive days in 1-4 gram/kilogram/day dosing.

4-On day three after surgery, blood samples of patients will be drawn (3-4 cc) in order to examine their IL-1 $\beta$ , IL-8 levels and plasma fatty acid composition post-treatment. Laboratory parameters will also be examined.

5-All of blood samples will be sent to Prodia laboratory.

B-The control group (MCT/LCT standard intravenous fat emulsion)

1- The parents or the legal guardian of patients who fulfill the inclusion and exclusion criteria will have to sign informed consent after the investigator explains the study.

2- Before surgery, blood samples of patients will be drawn (3-4 cc) in order to examine their IL-1 $\beta$ , IL-8 levels and plasma fatty acid composition. Laboratory parameters will also be examined.

3- After surgery, patients will get  $\omega$ -3-enriched intravenous fat emulsion (SMOFlipid) for three consecutive days in 1-4 gram/kilogram/day dosing.

4- On day three after surgery, blood samples of patients will be drawn (3-4 cc) in order to examine their IL-1 $\beta$ , IL-8 levels and plasma fatty acid composition post-treatment. Laboratory parameters will also be examined.

5- All of blood samples will be sent to Prodia laboratory.

