



مرکز آموزشی، پژوهشی و درمانی  
دکتر شریعتی



# Parenteral Preparation



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**TUMS**

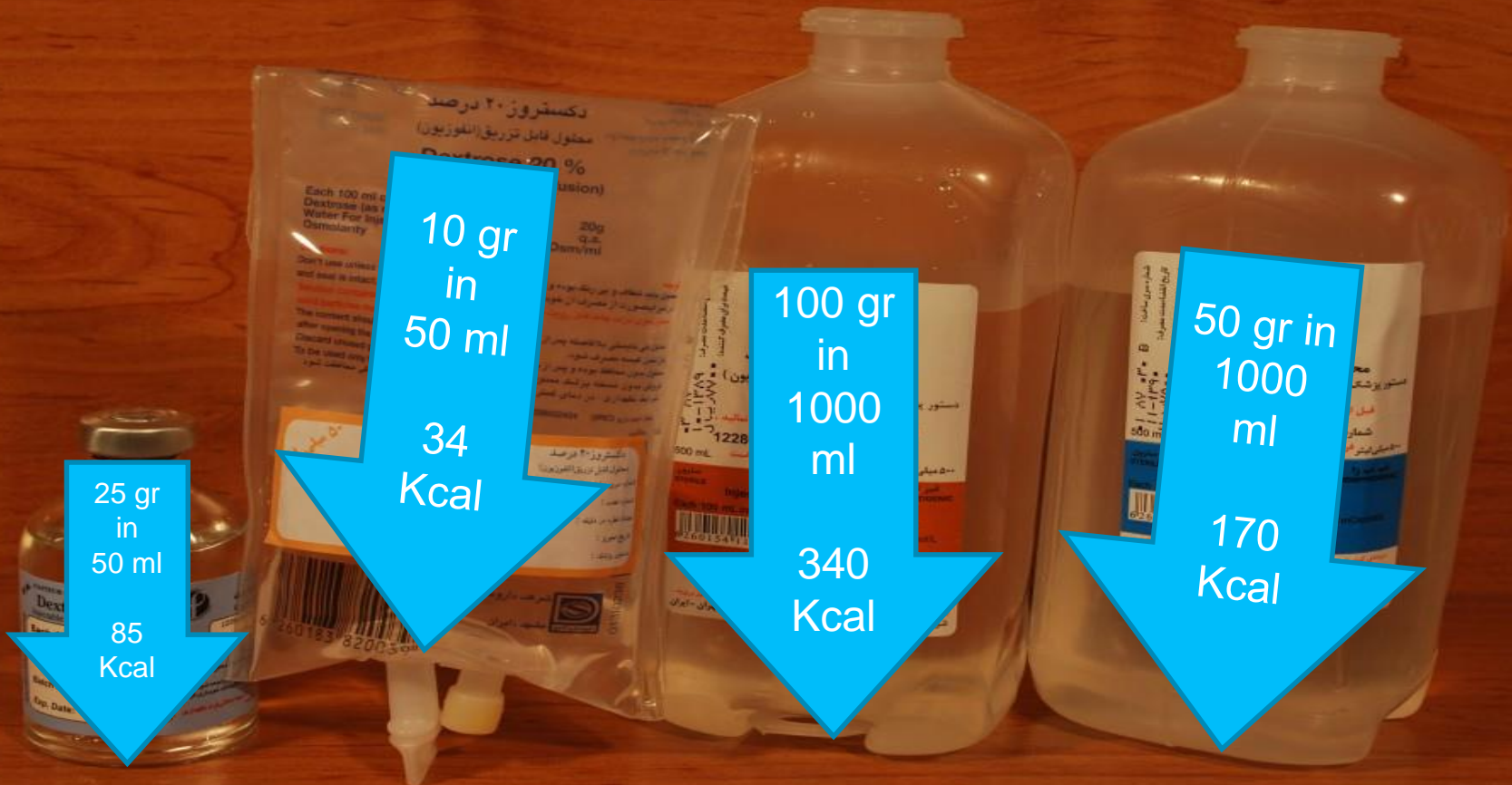
# اشکال وریدی



**Carbohydrate**  
**(60-70%)**

# Dextrose

1 g Dextrose monohydrate -----> 3.4 kcal



Dextrose 50%

250 gr in  
500 ml

850  
Kcal

Dextrose/Saline

Dextrose 5%  
NaCl 0.9%

50 gr in  
1000 ml

170  
Kcal

+

Na

154  
mEq

1/3 2/3

Dextrose 3.33%  
NaCl 0.3%

33 gr  
in 1000  
ml

112  
Kcal

+

Na

51  
mEq

## احتیاط ها

- ***Infusion Rate*** not more than 0.5g/kg/h
- ***Maximum*** :            7g/kg/d            (ICU 5gr/kg/d)
- ***Regular Insulin*** 1u for each 10gr of Dextrose
- ***First 24 hr*** of TPN Dextrose not more than 150-200gr

**Lipid**  
**(30-40%)**

# 1 gr Lipid = 9 Kcal ~ 10 Kcal

511 Kcal

345 mOsm/kg  
Phospholipid / TG

12gr/L / 100g/L

**Lipofundin® MCT/LCT**  
Emulsion for infusion

Each 1000 ml of emulsion contain:	Caloric value:	Do not use if emulsion is damaged.
Soya-bean Oil 50.0 g	4280 kJ/l $\Delta$ 1022 kcal/l	
Medium-chain Triglycerides (MCT) 50.0 g	Osmolarity (approx.): 345 mOsm/l	Do not use if the container is damaged.
Egg Lecithin 8.0 g	<b>Sterile, non-pyrogenic.</b>	Do not use if the container is damaged.
Glycerol 25.0 g	<b>For single use only, discard any unused contents.</b>	
$\alpha$ -Tocopherol 85 $\pm$ 20 mg	<b>Shake gently prior to use.</b>	
Sodium oleate		
Water for injections		

**LCT + MCT**

B. Braun Melsungen AG  
D-34209 Melsungen  
Germany

**B. BRAUN**  
**10% MCT/LCT**

540 Kcal

272 mOsm/kg  
Phospholipid / TG

6gr/L / 100g/L

**Lipovenoes® 10% PLR**  
Emulsion for infusion  
**PhosphoLipid Reduced**

Water contains:  
Glycerol 25.00 g  
Phosphatidylcholine 6.00 g  
Lecithin (egg lecithin) 8.00 g  
Soya-bean oil 100.00 g

**LCT only**

500 Kcal  
Phospholipid / TG

380 mOsm/kg  
12gr/L / 200g/L

~ 6gr/L / 100g/L

**SMOFlipid 20%**  
Emulsion for infusion

1000 ml contains: Soya-bean oil, refined 60 g, Triglycerides, medium-chain 60 g, Olive oil, refined 50 g, Fish oil, rich in omega-3-acids 30 g,  $\alpha$ -Tocopherol 163-225 mg, Glycerol (anhydrous) 25 g, Egg lecithin 12 g, Sodium hydroxide to approx. pH 8, Sodium oleate 0.3 g, Water for injections to 1000 ml.  
Energy content: 8.4 MJ/l (2000 kcal/l)  
pH: approx. 8  
Osmolality: 380 mosm/kg H<sub>2</sub>O

**SMOF**

- S**oybean oil (6%)
- M**edium-chain triglycerides (6%)
- O**live oil (5%)
- F**ish oil (3%)



- **Peripheral or CV-Line**
- **1.1 kcal/ml (10%), 2 kcal/ml (20%)**



• **Maximum:**

**3g/k/d or 0.12g/k/h or 60%  
calorie**

# Essential Fatty Acid Deficiency (EFAD)

- If Less than 100gr/week Lipid

Clinical symptoms of EFAD are *dry, thickened, scaly skin, hair loss, poor wound healing, and thrombocytopenia*

# عوارض جانبی

- Pulmonary vasoconstriction
- Platelet Dysfunction
- Parenteral Nutrition-Associated Liver Disease (PNALD)
- Hypertriglyceridemia and Pancreatitis

# MCT OIL

8.5 kcal/gr



# Intralipid or Lipofundin (MCT/LCT)

- 50% Soy bean oil (LCT) and 50% Coconut oil (MCT)
- MCT,s more rapidly cleared from the blood
- More ketogenic than LCT



*Lipid emulsions*

	Composition	Manufacturer	TG (g/L)	Soybean oil (g/l)	Olive oil (g/l)	MCT (g/L)
<b>20% emulsions</b>						
ClinOleic 20%	80% Olive oil/20% soybean oil	Baxter	200	40	160	
Intralipid 20%	Soybean oil emulsion	Fresenius Kabi#	200	200	—	
Ivelip 20%	Soybean oil emulsion	Baxter	200	200	—	
Lipofundin MCT/LCT 20%	50% Soybean/50% coconut (MCT) oil	B. Braun	200	100	—	100
Lipofundin N 20%	Soybean oil emulsion	B. Braun	200	200	—	
Lipovenoes 20%	Soybean oil emulsion	Fresenius Kabi	200	200	—	
<b>10% emulsions</b>						
Intralipid 10%	Soybean oil emulsion	Fresenius Kabi#	100	100	—	
Lipofundin MCT/LCT 10%	50% Soybean/50% coconut (MCT) oil	B. Braun	100	50	—	50
Lipofundin N 10%	Soybean oil emulsion	B. Braun	100	100	—	
Lipovenoes 10% PLR*	Soybean oil emulsion	Fresenius Kabi	100	100	—	

# Intralipid

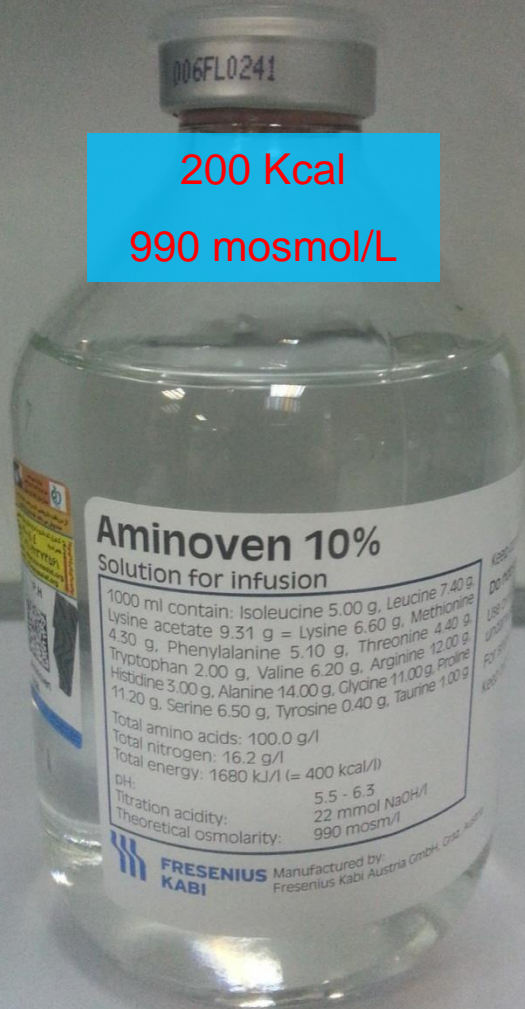
- Serum TG level must be < 400mg/dl
- Max. 3g/kg or 60% total calories
- >1gr/kg risk of cholestasis



**Protein**  
**(0%)**

# 1g Protein = 4 kcal

200 Kcal  
990 mosmol/L



## Aminoven 10% Solution for infusion

1000 ml contain: Isoleucine 5.00 g, Leucine 7.40 g, Lysine acetate 9.31 g = Lysine 6.60 g, Methionine 4.30 g, Phenylalanine 5.10 g, Threonine 12.00 g, Tryptophan 2.00 g, Valine 6.20 g, Arginine 11.00 g, Proline 11.20 g, Serine 6.50 g, Tyrosine 0.40 g, Taurine 1.00 g

Total amino acids: 100.0 g/l  
Total nitrogen: 16.2 g/l  
Total energy: 1680 kJ/l (= 400 kcal/l)

pH: 5.5 - 6.3  
Titration acidity: 22 mmol NaOH/l  
Theoretical osmolarity: 990 mosmol/l



Manufactured by  
Fresenius Kabi Austria GmbH, Graz, Austria

100 kcal  
495 mosmol/L

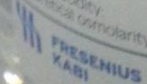


## Aminoven 5% Solution for infusion

1000 ml contain: Isoleucine 2.50 g, Leucine 3.70 g, Lysine acetate 4.655 g = Lysine 3.30 g, Methionine 2.15 g, Valine 3.10 g, Phenylalanine 2.55 g, Threonine 2.20 g, Tryptophan 1.00 g, Arginine 5.50 g, Proline 5.60 g, Serine 3.25 g, Tyrosine 0.20 g

Total amino acids: 50.0 g/l  
Total nitrogen: 8.1 g/l  
Total energy: 840 kJ/l (= 200 kcal/l)

pH: 5.5 - 6.3  
Titration acidity: 12 mmol NaOH/l  
Theoretical osmolarity: 495 mosmol/l



Manufactured by  
Fresenius Kabi Austria GmbH, Graz, Austria  
for Fresenius Kabi AB, Uppsala, Sweden

1g Protein = 4 kcal



# Amino Acid

- 5%, 10% ( from CV-line)
- Osmolarity 900 not prepheral
- Osmolarity 600, phlebitis after 12 hr
- Should not be used as a calorie source

400 Kcal/L


1030 mosmol/L



200 kcal/L

590 mosmol/L



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- 6 gr protein = 1gr Nitrogen
  - 1gr Nitrogen in anabolism needs 3mq k + 0.5 mq Mg
  - If hyperkalemia not in anabolism

## Attention that Aminofusion **With electrolytes**

- Na            43 mmol/L
- K             25 mmol/L
- Mg            2.6 mmol/L
- Acetate    59 mmol/L (useful in Acidosis)
- Cl             57 mmol/L
- H<sub>2</sub>Po<sub>4</sub>       9 mmol/L

Na	21 mEq
K	12 mEq
Mg	2.6 mEq
Acetate	30 mEq
Cl	28 mEq
Po4	4 mmol

# عوارض جانبی

- کلستاز
- ازوتمی
- هایپرامونمی
- اسیدوز متابولیک



# Electrolytes

Na	60-100 mEq	1-2 mEq/kg
K	60-100 mEq	1-2 mEq/kg
Mg	10-20 mEq	
Ca*	0-15 mEq	
PO4	20-45 mmol	

\* Always monitor corrected Calcium

# Sodium

Na

60-100 mEq/d

1-2 mEq/kg/d

NaCl 0.45%

75 mEq / L

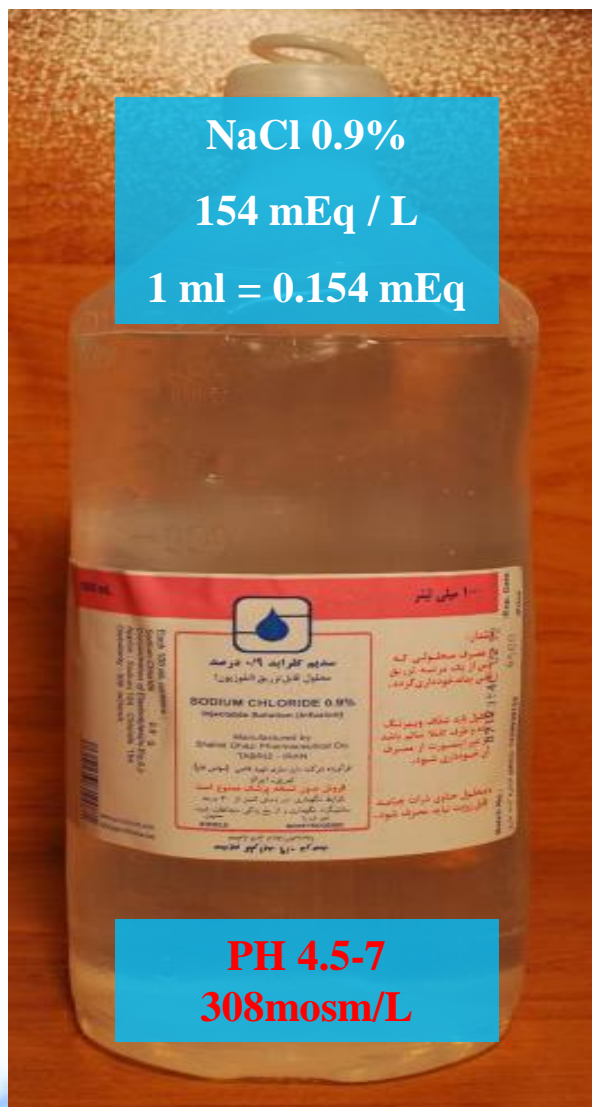
1 ml = 0.075 mEq



NaCl 0.9%

154 mEq / L

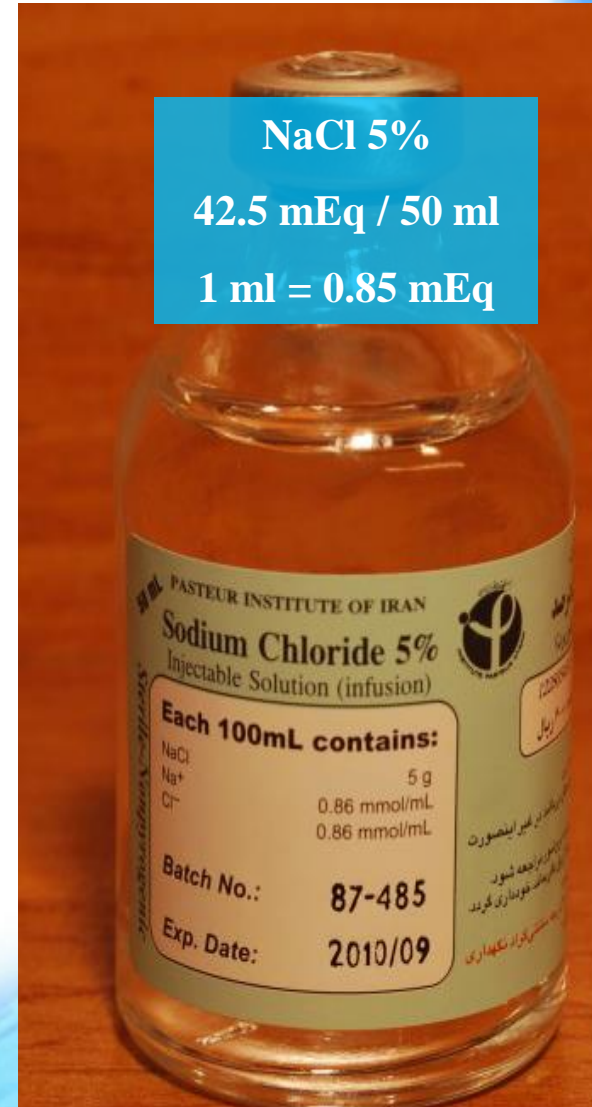
1 ml = 0.154 mEq



NaCl 5%

42.5 mEq / 50 ml

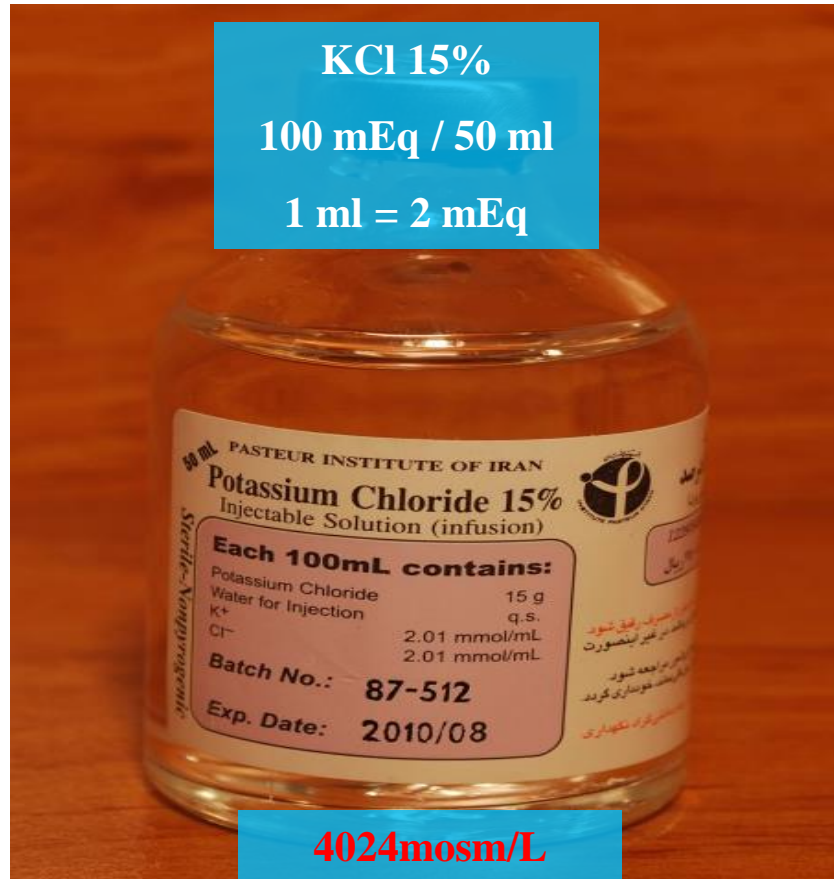
1 ml = 0.85 mEq



PH 4.5-7  
308mosm/L

# Potassium

<b>K</b>	<b>60-100 mEq/d</b>	<b>1-2 mEq/kg/d</b>
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# Magnesium

<b>Mg</b>	<b>10-20 mEq/d</b>
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**MgSo4 20%**

**80 mEq / 50 ml**

**1 ml = 1.6 mEq**

**MgSo4 50%**

**200 mEq / 50 ml**

**1 ml = 4 mEq**

# Calcium

Ca\*

0-15 mEq/d

\* Always monitor  
corrected Calcium

Calcium Gluconate 10%

4.65 mEq / 10 ml

1 ml = 0.465 mEq



# Phosphate

<b>PO4</b>	<b>20-4</b>
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## Glycophos

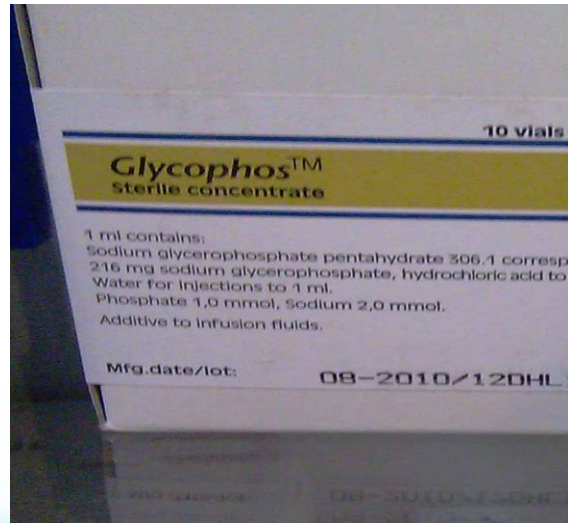
306.1mg/mL ات

Each 20 ml contain:

**Phosphate 20 mmol**

**Sodium 40 Eq**

- 2760 mosm/kg water
- pH : 7.4









**Thank you for your attention**