

D.B. Steien's – Green Peds Nutrition Sheet 7/2020

1. Fluids (Water needs)

Weight	mL/kg	Max mL/h	mL/kg	Max mL/day
1-10 kg	x 4	40	x 100	1000
10-20kg	x 2	20	x 50	500
> 20kg	x 1		x 20	

2. Calories-Enteral (Parenteral 10-15% less)

a.RDA* (DRI)

Age	Kcal/kg	gm pro/kg
0-6 months	108	1.52 (AI)
7-12 months	98	1.2 (RDA)
1-3yo	102	1.05 (RDA)
4-6 yo	90	(4-8yo) 0.95 (RDA)
7-10 yo	70	(9-13yo) 0.95 (RDA)
Males		
11-14 yo	55	(14-18yo) 0.85 (RDA)
15-18 yo	45	
Females		
11-14 yo	47	(14-18yo) 0.85 (RDA)
15-18 yo	40	

b. WHO Equation (for REE*)

Gender/Age	Wt=Kg (Kcal/day)
Males	
M 0-3 yo	60.9*Wt -54
M 3-10 yo	22.7*Wt + 495
M 10-18 yo	17.5*Wt + 651
M 18-30 yo	15.3*Wt + 679
Females	
F 0-3 yo	61.0*Wt -54
F 3-10 yo	22.5*Wt + 499
F 10-18 yo	12.2*Wt + 746
F 18-30 yo	14.7*Wt + 496

REE* x Activity/Stress Factor

- REE x 1.3: for well-nourished child at bedrest with mild-moderate stress
- REE x 1.5: For a normally active child with mild to moderate stress; an inactive child with severe stress (trauma, sepsis, cancer) or a child with minimal activity an dmalnutrition requiring catch-up growth
- REE x 1.7: For an active child requiring catch-up growth or an active child with severe stress who does not need catch-up

c. Harris Benedict Equation

Males: $66.47 + 13.75*(wt \text{ in kg}) + 5*(ht \text{ in cm}) - 6.7*(age \text{ in yr})$
 Females: $65.1 + 9.6*(wt \text{ in kg}) + 1.85*(ht \text{ in cm}) - 4.68*(age \text{ in yr})$

d. Schofield Equations

Males

<3yo: $0.167(Wt \text{ in kg}) + 1517.4(Ht \text{ in cm}) - 617.6$
 3-10yo: $19.59(Wt \text{ in kg}) + 130.3(Ht \text{ in cm}) + 414.9$
 10-18yo: $16.25(Wt \text{ in kg}) + 137.2(Ht \text{ in cm}) + 515.5$

Females

<3yo: $16.252(Wt \text{ in kg}) + 1023.2(Ht \text{ in cm}) - 413.5$
 3-10yo: $16.969(Wt \text{ in kg}) + 161.8(Ht \text{ in cm}) + 371.2$
 10-18yo: $8.365(Wt \text{ in kg}) + 465(Ht \text{ in cm}) - 617.6$

Catch-up Growth

$Kcal/kg = RDA \times IBW \text{ for Ht}$
 Current Wt (in kg)

$Gm \text{ pro} = RDA \text{ for protein} \times IBW \text{ for Ht}$
 Current Wt (in kg)

Ideal Body Weight (IBW)

<2yo: 50th% for Wt-for-Length
 >2yo: BMI at 50th% x ht(meters)²

Adjusted Body Weight (ABW)

ABW = Ideal body wt +
 $0.25(\text{Actual wt} - \text{Ideal body wt})$

Modular Macronutrient Supplements

Benecalorie = 330 kcal/package & 7 gm proBenefiber = 3gm fiber/TBSP; 16 kcal/TBSP

Beneprotein = 25 kcal/scoop; 6 gm pro/scoop (1scoop=1.5 TBSP)

Cereal-Infant = 10 kcal/TBSP; 0.3 gm/TBSP & 3 gm pro/TBSP

Coconut milk canned = 30 kcal/TBSP

Cornstarch = 30 kcal/TBSP

Corn oil= 122 kcal/TBSP

Duocal = 42 kcal/TBSP

Flax-ground = 37 kcal/TBSP & 1.3 gm pro/TBSP

HMF =3.5 kcal/pkt; 0.175 gm pro/pkt

Heavy Cream = 50 kcal/TBSP

Half&Half = 20 kcal/TBSP

Hershey Syrup = 45 kcal/TBSP

Infant cereal = 10 kcal/TBSP; 0.3 gm prot/TBSP

Liquigen (emulsified MCT) = 4.5 kcal/mL; 67.5 kcal/TBSP

MCT oil = 7.7 kcal/mL (start with 0.5mL qo-feed)

Microlipid = 4.5 kcal/mL (start with 0.5mL/30mL; inc to 1mL/30mL)

NFDM (non-fat dried milk) = 27 kcal/TBSP; 3 gm pro/TBSP

Ovaltine = 20kcal/1TBSP

Peanut Butter = 70-100 kcal/TBSP

Pedialyte= 3 kcal/oz; 100 kcal/L; Na 45mEq/L; K 20mEq/L, Cl 35mEq/L

Vegetable oil = 9 kcal/mL

Whole Milk = 19 kcal/oz; 2%=15 kcal/oz; 1%=12kcal/oz; FF=10 kcal/oz

Measurements

1 tsp = 5mL

1TBSP = 15mL

1 cup = 16 TBSP = 8oz =240mL

1 oz. = 30 mL = 2 TBSP

30 grams ~ 1 oz

3. Growth

Correct for Prematurity: Everything (wt, ht, HC, formula, development) except immunizations, until 24 mo of age; if SGA or IUGR consider correcting until 3yo.

Growth Charts

WHO before 2yo, CDC after 2yo

Down syndrome

Turner-height @ 2yo; Noonan-height @ 2yo

Cerebral Palsy @2yo (Google "Growth charts - Life Expectancy" click "New")

Pediatrics: BMI or Wt-for-Length

Underweight $\leq 5^{\text{th}}$ ile

Healthy weight = 5thile to <85thile

Overweight = 85thile to < 95thile

Obese = $\geq 95^{\text{th}}$ ile

Adult: BMI

Underweight: BMI < 18.5

Normal weight: BMI 18.5 – 24.9

Overweight: BMI 25 – 29.9

Obese: BMI ≥ 30

Weight and length gain recommendations...for HEALTHY children

	Weight (g/day)	Length (cm/mo)
< 3 mo	25-35	2.6-3.5
3-6 mo	15-21	1.6-2.5
6-12 mo	10-13	1.2-1.7
1-3 yo	4-10	0.7-1.1
4-6 yo	5-8	0.5-0.8
7-10 yo	5-12	0.4-0.6

Adopted from Fomon SJ, Haschke F, et al.: Body Composition of reference children from birth to age 10 years. Am J Clin Nutr 1982;35:1169.

Estimates	3 rd %ile (g/day)	97 th %ile (g/day)
0-2 mo	21	31
2-4 mo	16.7	28
4-6 mo	11.7	16.7
6-9 mo	8.8	13
9-12 mo	6	9.9

Significant weight loss in teen (depends on age)

2% in 1 week

5% in 1 mo

7.5% in 3mo

10% in 6mo or less

* **DRI** (Dietary Reference Intakes)

-**RDA** (Recommended Dietary Allowance): Avg daily level of intake sufficient to meet the nutrient requirement of nearly all (97-98%) healthy people.

-**AI** (adequate intake): established when evidence is insufficient to develop an RDA and is set at a level assumed to ensure nutritional adequacy

-**UL** (Tolerable upper intake level): maximum daily intake unlikely to cause adverse health effects

REE (Resting energy expenditure): kcal used in 24-hours by a body in a completely restful state

4. Macronutrients

Macronutrient	Kcal/gram	
Carbohydrates	3.4	
Proteins	4	
Fats	9-10	

Essential Fatty Acid Deficiency (EFAD)

Mead Acid (MA) is created from Oleic Acid, when there is insufficient EFA

- MA is produced more, in states of EFAD

- Arachidonic Acid (ARA) decreases with EFAD

Triene (MA):Tetraene (ARA) = **T:T ratio** increases

ALA = alpha-linolenic acid (omega 3) an essential fatty acid

LA = linoleic acid (omega 6) an essential fatty acid

EPA

DHA

5. Electrolytes (I/Os)

IV Fluids

Fluid Per L	Osmol	pH	Na mEq	K mEq	Cl mEq	HCO ₃ mEq	Ca+ mEq	Glu g/L	Cal
NS 0.9%	308	6	154	0	154	0	0	0	0
LR	273	6.5	130	4	156	28	2.7	0	0
D5W	252	4.5	0	0	0	0	0	50	170
D5LR	525	5	130	4	156	25	2.7	50	170
Alb 25%		6.4-7.4	100-160	0	120	0	0	0	1000

Electrolyte Supplements

Table Salt = 100 mEq NaCl / 1tsp

Baking Soda = 60 mEq NaCO₂ / 1tsp

Phos-Na-K = (1 pack in 2.5oz or 75mL)

(280mg/160mg/250mg) or (8mMol/13mEq/1.1mEq)

(taken with Mag, Ca, Al, Zinc, Iron--binds Phos, decreases abs)

Electrolyte Conversions

Element	Mg	MEq	
Na	23	1	
K	39.1	1	
Cl	35.5	1	
Ca	20	1	
Phos	31	1.47	
Mg	12.1	1	

LOSSES of Fluid contents

Fluid LOSSES	Sodium (mEq/L)	Potassium (mEq/L)	Chloride (mEq/L)	Bicarbonate (mEq/L) Or other*
Gastric	20-80	5-20	100-150	-
Bile	120-140	5-15	80-120	
Pancreatic	120-140	5-15	90-120	
Small bowel	100-140	5-15	90-130	
Ileostomy	80-140	15	115	40
Colostomy	50-80	10-30	40	20-25
Secretory-D	60-120			
Osmotic-D	30-40	10-80	10-110	30
Nml Stool	5	10	10	minimal
Burns	140	5	110	*Pro 3-5 g/dL
Sweat-nml	10-30	3-10	10-35	
Sweat-CF	50-130	5-25	50-110	
NML Saline	154		154	

Wessel et al. *Semin Perinatol.* 2007;31(2):104-11

The Harriet Lane Handbook 18th ed. Electrolyte composition of various fluids