Alimentazione finalizzata agli sport di potenza

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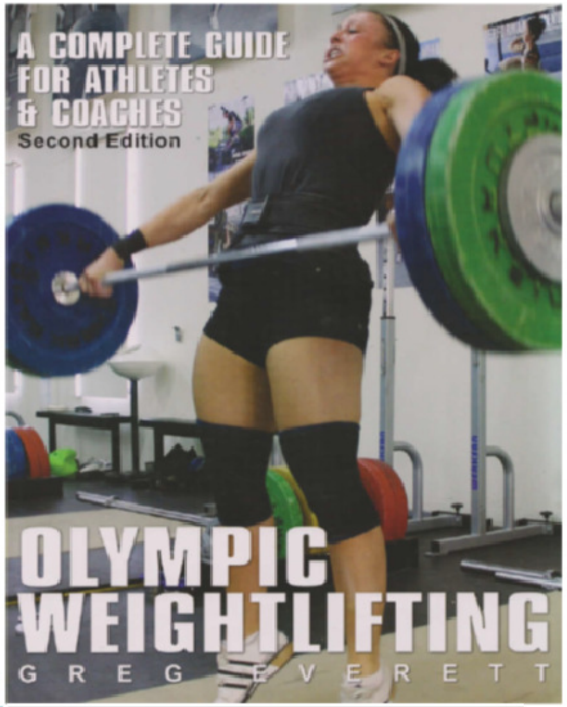
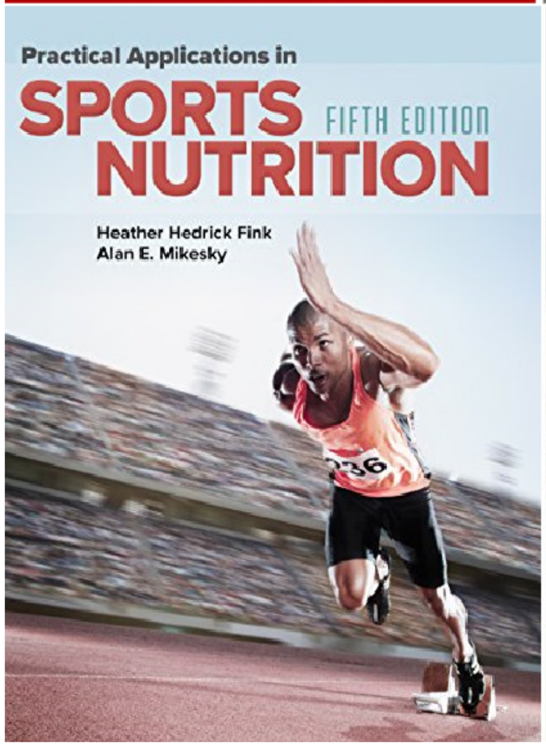
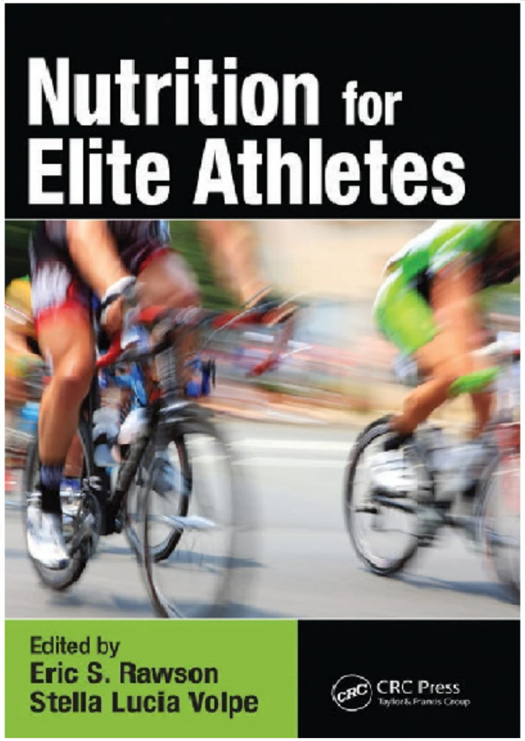
BODYBUILDING
Nicholas Bjorn
4TH EDITION
Meal Plans, Recipes and Bodybuilding Nutrition: Know How to Eat For: Strength, Muscle and Fitness
4TH EDITION
STRENGTH TRAINING
THE ULTIMATE GUIDE TO STRENGTH TRAINING
Essential Lifts for Muscle Building, Size and Strength
NICHOLAS BJORN


A COMPLETE GUIDE FOR ATHLETES & COACHES
Second Edition
OLYMPIC WEIGHTLIFTING
GREG EVERETT


Practical Applications in
SPORTS NUTRITION
FIFTH EDITION
Heather Hedrick Fink
Alan E. Mikesky


Nutrition for Elite Athletes
Edited by
Eric S. Rawson
Stella Lucia Volpe
CRC Press

Il fabbisogno energetico

Il fabbisogno energetico giornaliero si misura in chilocalorie (kcal) e varia secondo il sesso, l'età e l'attività svolta. Queste chilocalorie ci vengono fornite in quantità diverse, da protidi, lipidi e glucidi:

1 grammo di protidi fornisce 4 Kcal

1 grammo di glucidi fornisce 4 kcal

1 grammo di lipidi fornisce 9 kcal

IL FABBISOGNO ENERGETICO

- **L'età**: in base all'età un individuo ha bisogno di una differente quantità di energia (un bambino consuma più di un anziano)
- **Il sesso**: a parità di età e tipo di attività svolta, una donna consuma meno di un uomo
- **Il clima**: quando è più freddo l' organismo ha bisogno di una maggiore quantità di energia per mantenere il corpo sui 37°C
- **L'attività svolta**

fabbisogno energetico

empiricamente

1 chilocaloria (Kcal)
energia necessaria ad un uomo
di 70 Kg per salire una scala di 6 m

fabbisogno energetico medio

1 Kcal/kg di peso/ora

esempio: 70 kg = 1680 Kcal/giorno

stima del fabbisogno energetico sotto sforzo

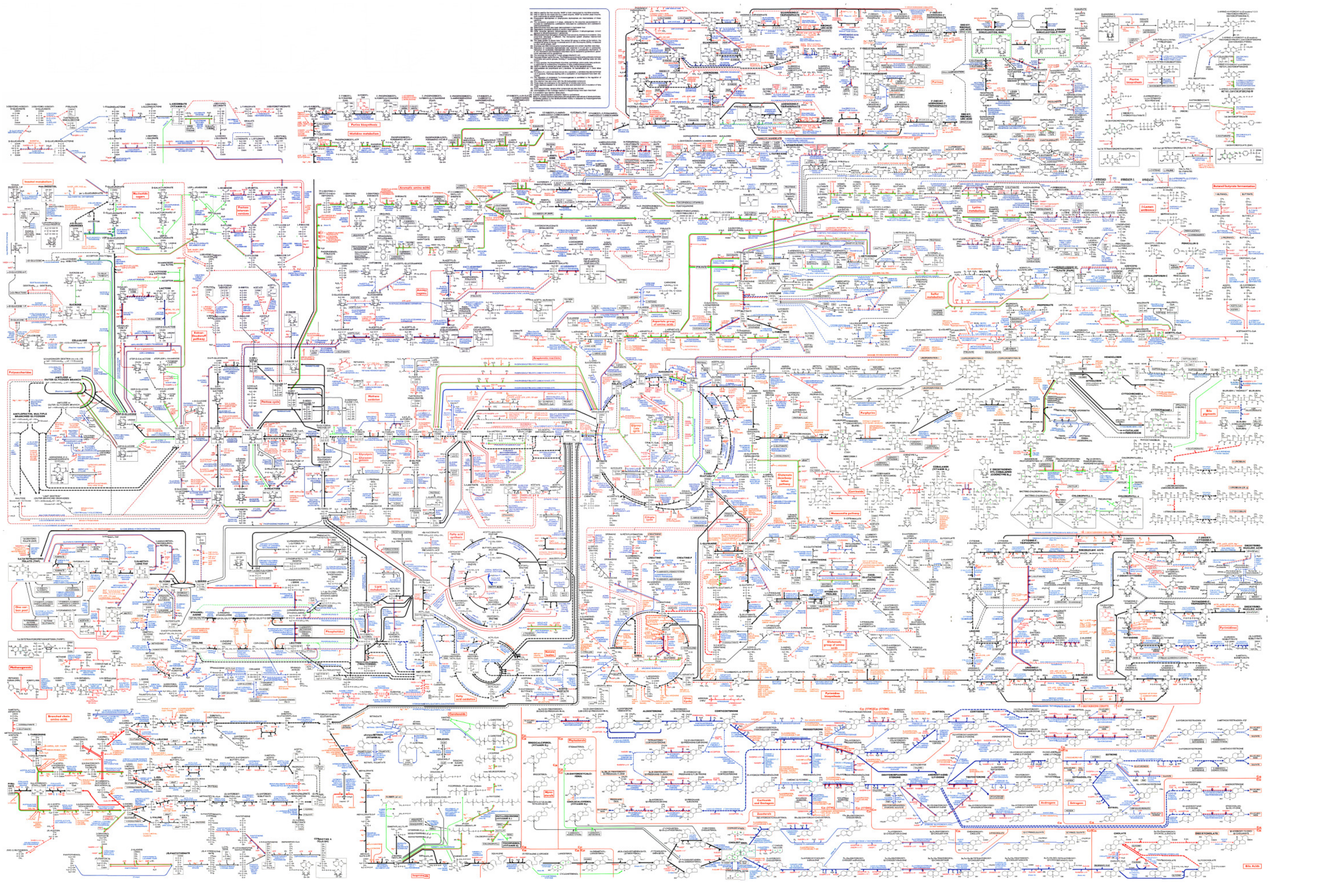
da 6 Kcal/kg di peso/ora senza zaino

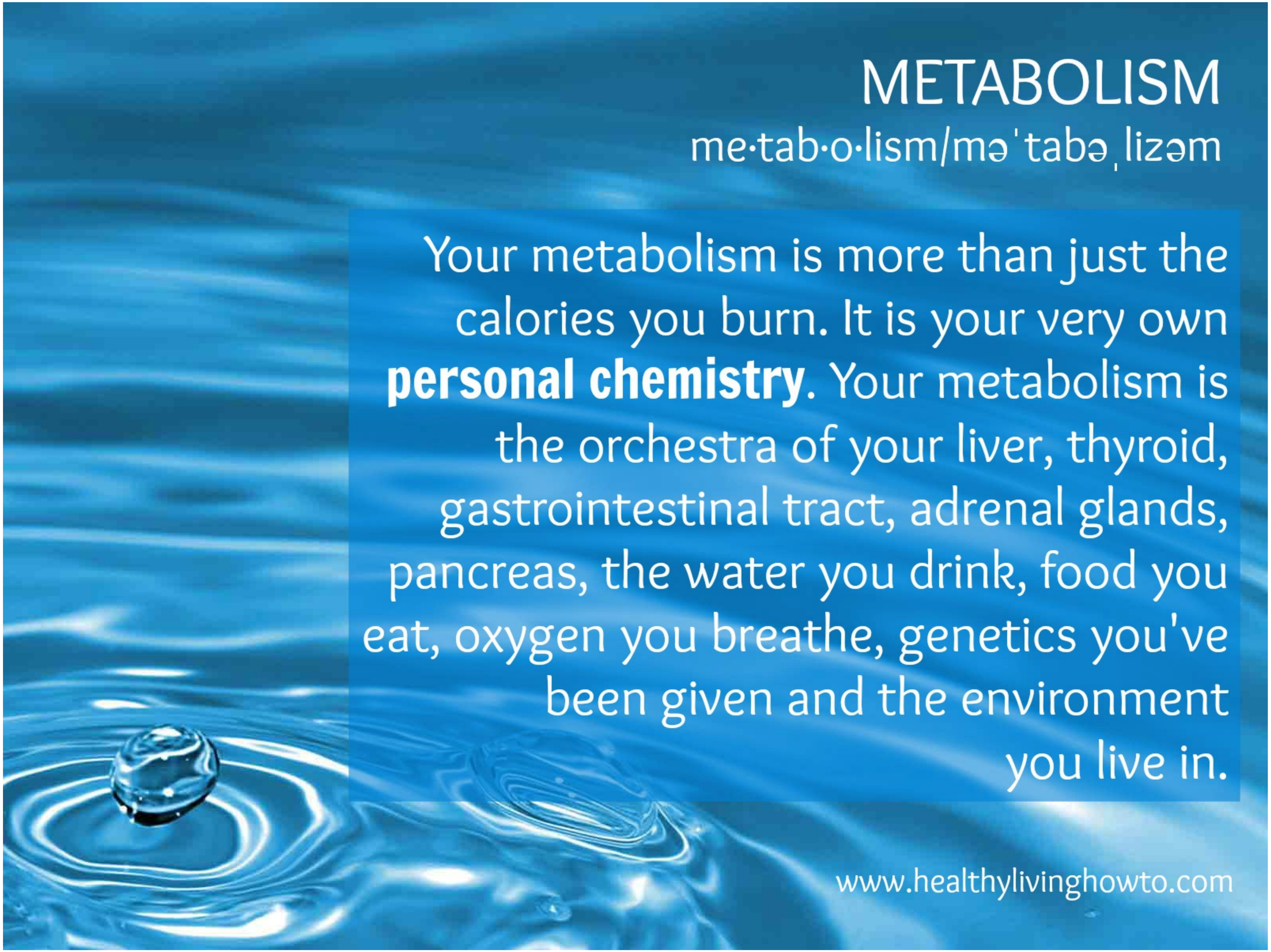
a 9 Kcal/kg di peso/ora con zaino da 20 kg

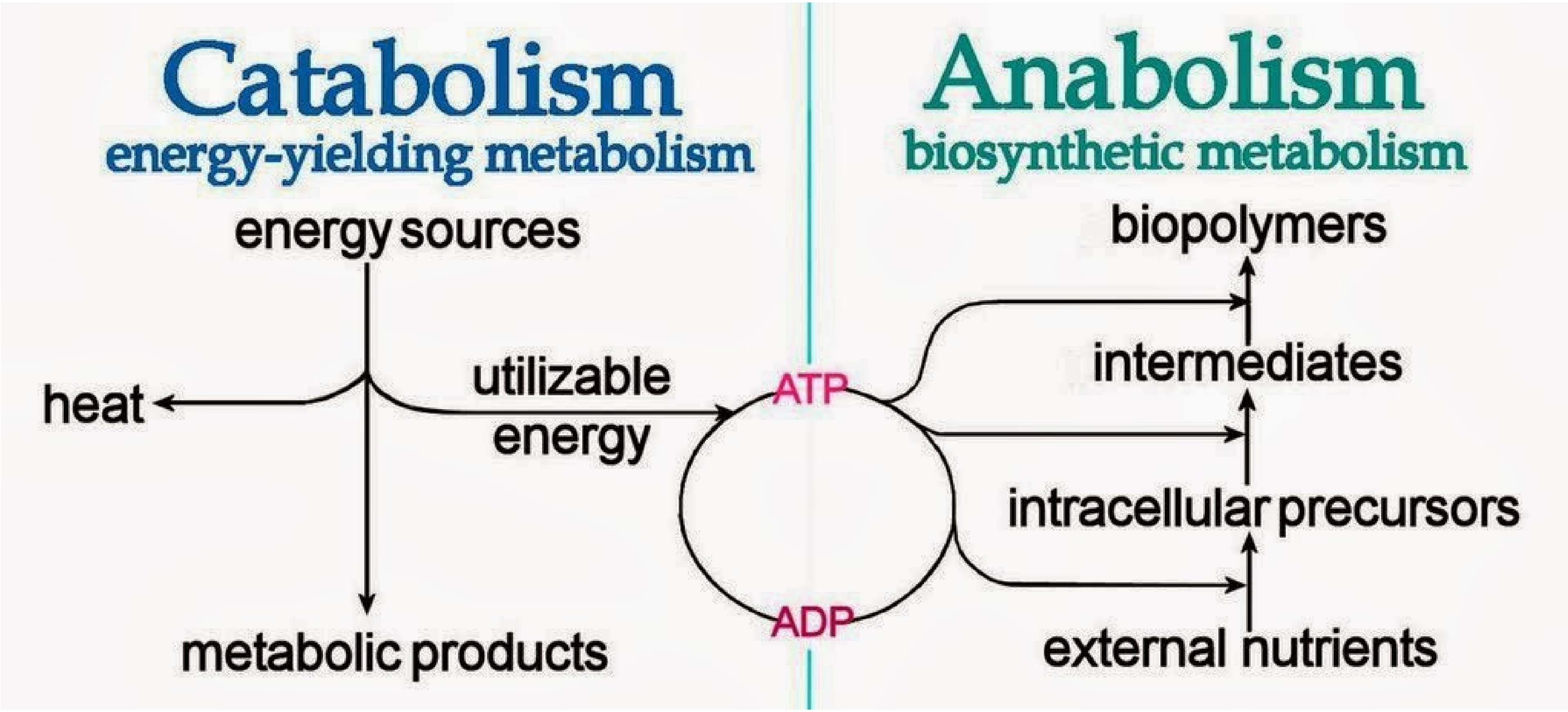
THE INTERNATIONAL MOUNTAINEERING AND CLIMBING FEDERATION

alimento	Kcal x 100 g	carboidrati (g / 100)	grassi (g / 100)	proteine (g / 100)
cioccolato normale	510	26	53	12
salsiccia	493	3	44	21
biscotti al cioccolato	429	66	21	5
parmigiano	391	3	26	35
latte condensato	334	55	8	8
miele	309	75	0	1
uvetta	300	80	0	3
pane bianco	268	49	4	8
frutta secca mista	243	64	0	3
panino integrale con prosciutto cotto e formaggio	236	20	11	15
marmellata zuccherata	230	55	0	1
panino con fesa di tacchino	218	24	8	14
uovo sodo	141	1	10	12
spaghetti al ragù	134	16	5	8
riso	110	24	0	2
minestrone	53	9	1	2

valori approssimati



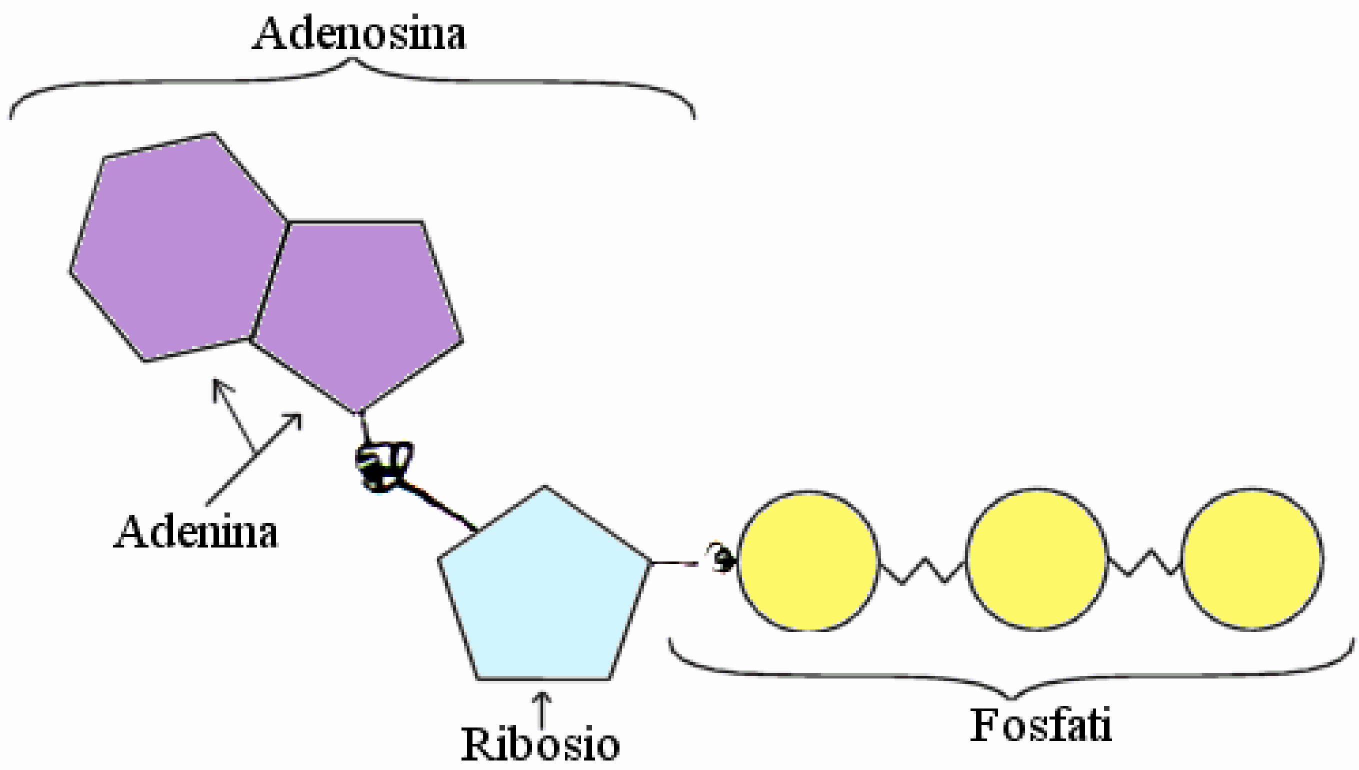

METABOLISM
me·tab·o·lism/məˈtabəˌlizəm
Your metabolism is more than just the calories you burn. It is your very own **personal chemistry**. Your metabolism is the orchestra of your liver, thyroid, gastrointestinal tract, adrenal glands, pancreas, the water you drink, food you eat, oxygen you breathe, genetics you've been given and the environment you live in.
www.healthylivinghowto.com

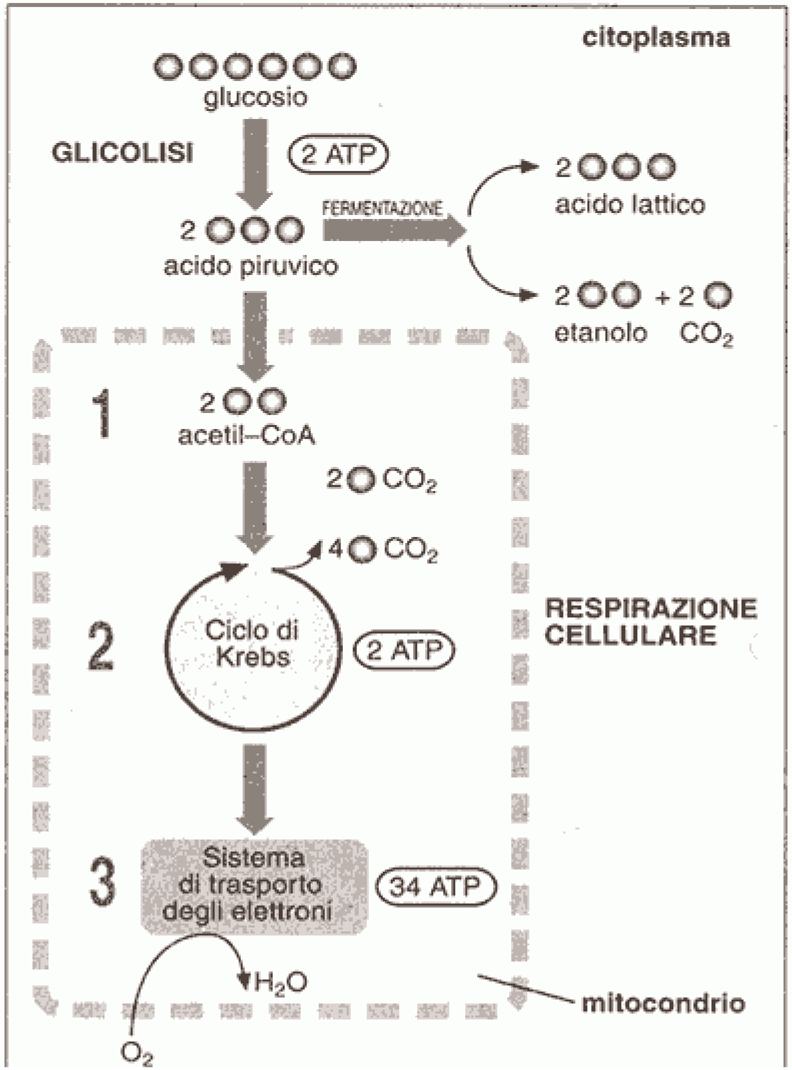

Catabolism
energy-yielding metabolism
Anabolism
biosynthetic metabolism
energy sources
heat
utilizable
energy
metabolic products
ATP
ADP
biopolymers
intermediates
intracellular precursors
external nutrients

becomes oxidized

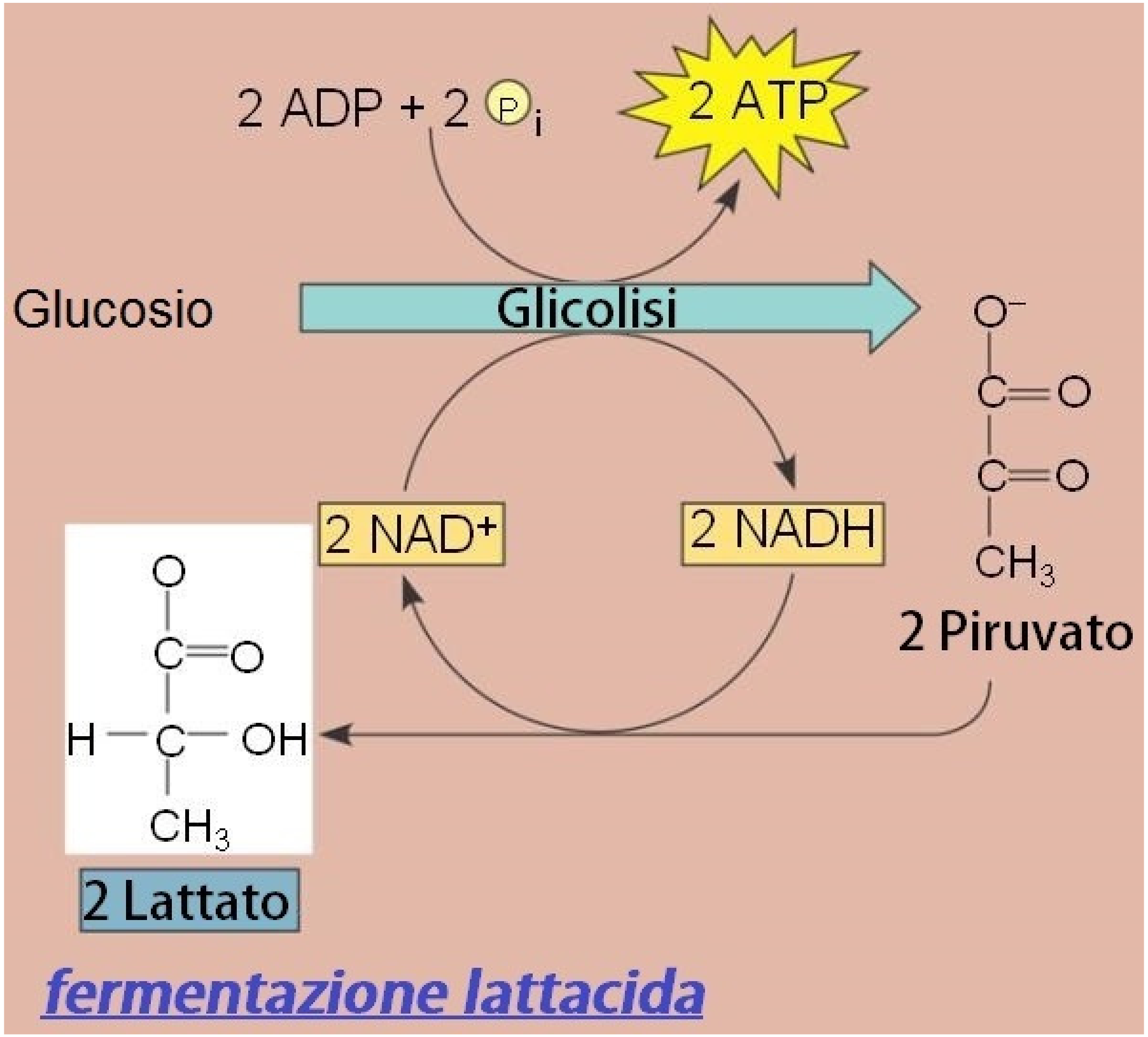
$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{Energy}$$

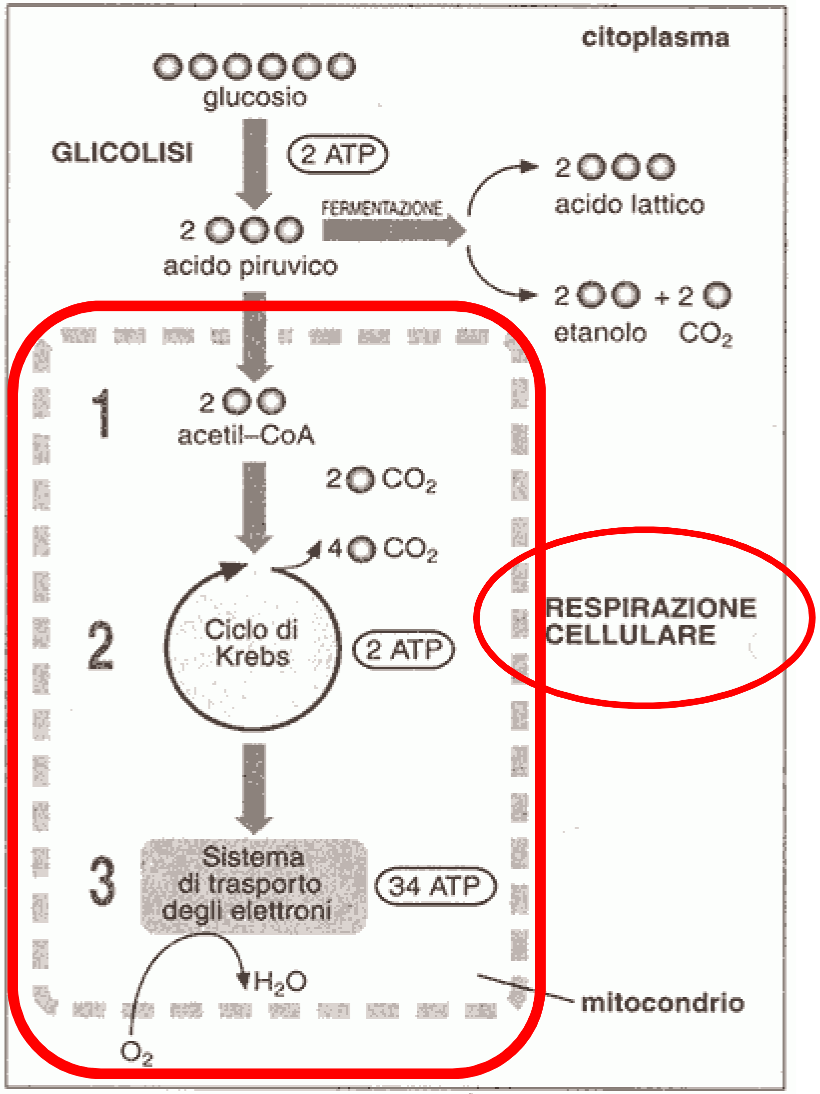
becomes reduced


Adenosina
Adenina
Ribosio
Fosfati

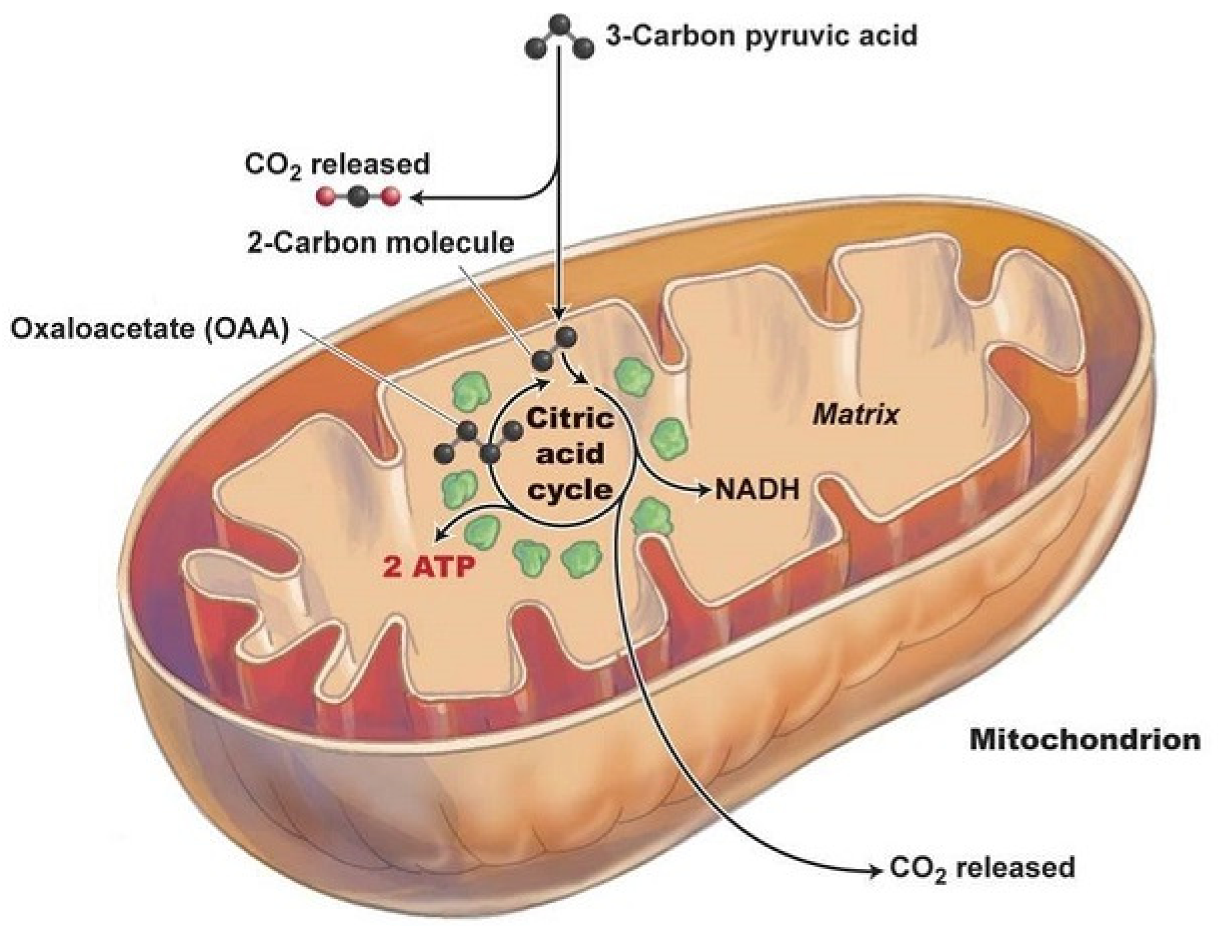


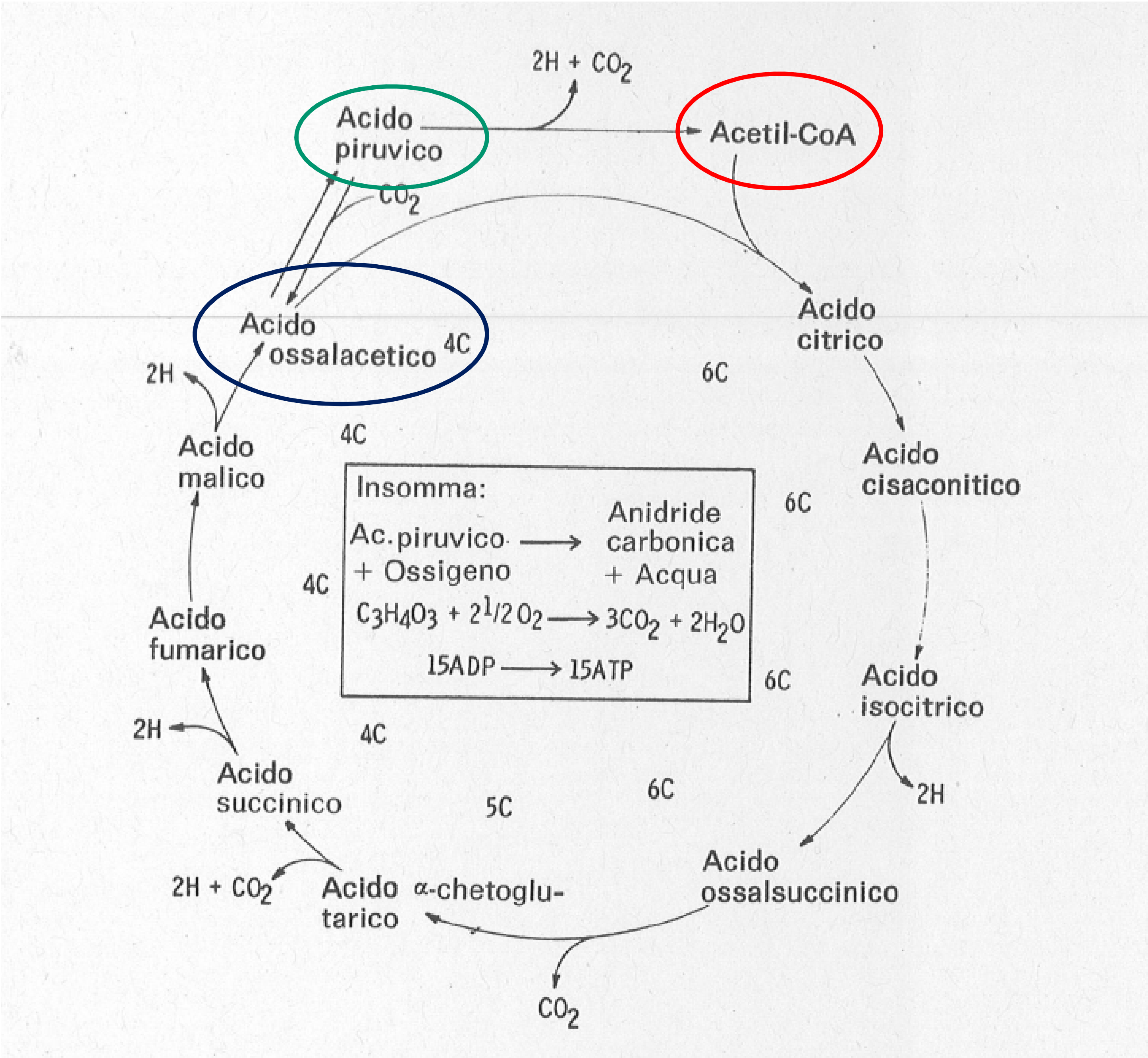
$$C_6H_{12}O_6 + 6\ O_2 \dashrightarrow 6CO_2 + 6\ H_2O + 38\ ATP$$

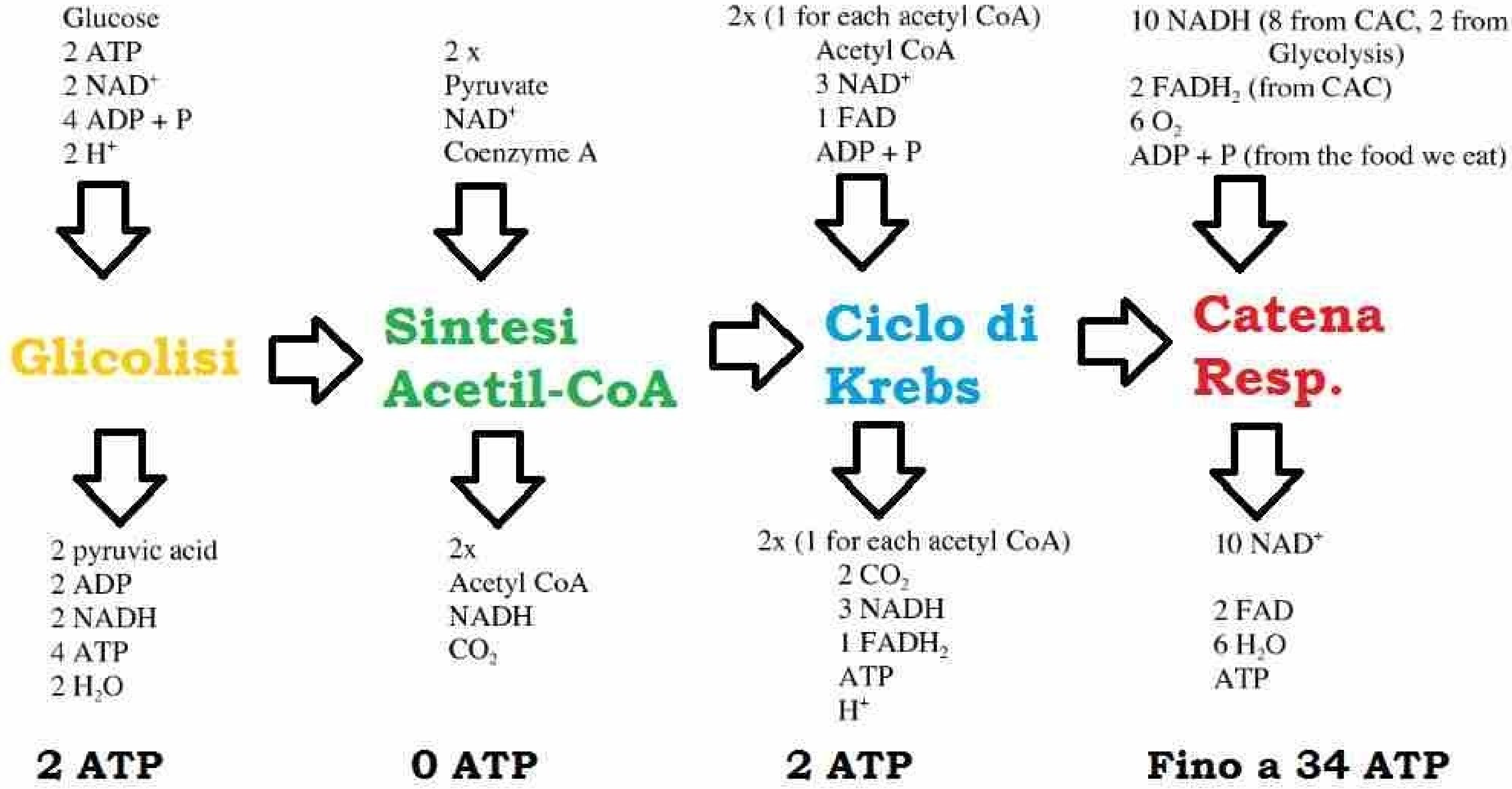

2 ADP + 2 Pi
2 ATP
Glucosio
Glicolisi
2 NAD+
2 NADH
2 Piruvato
2 Lattato
fermentazione lattacida



citoplasma
glucosio
GLICOLISI
2 ATP
2
acido piruvico
FERMENTAZIONE
2
acido lattico
2 + 2
etanolo
CO_2
1
2
acetil–CoA
2 CO_2
4 CO_2
2
Ciclo di Krebs
2 ATP
3
Sistema di trasporto degli elettroni
34 ATP
H_2O
O_2
mitocondrio
RESPIRAZIONE CELLULARE


3-Carbon pyruvic acid
CO2 released
2-Carbon molecule
Oxaloacetate (OAA)
Citric acid cycle
Matrix
NADH
2 ATP
Mitochondrion
CO2 released


2H + CO2
Acido piruvico
Acetil-CoA
CO2
Acido ossalacetico
4C
Acido citrico
6C
2H
Acido malico
4C
Acido cisaconitico
6C
Insomma:
Ac. piruvico + Ossigeno → Anidride carbonica + Acqua
C3H4O3 + 2 1/2 O2 → 3CO2 + 2H2O
15ADP → 15ATP
4C
Acido fumarico
6C
Acido isocitrico
2H
4C
2H
Acido succinico
6C
5C
2H + CO2
Acido α-chetoglutarico
Acido ossalsuccinico
CO2


Glucose
2 ATP
$2\ NAD^+$
4 ADP + P
$2\ H^+$
Glicolisi
2 pyruvic acid
2 ADP
2 NADH
4 ATP
$2\ H_2O$
2 ATP
2 x
Pyruvate
NAD^+
Coenzyme A
Sintesi Acetil-CoA
2x
Acetyl CoA
NADH
CO_2
0 ATP
2x (1 for each acetyl CoA)
Acetyl CoA
$3\ NAD^+$
1 FAD
ADP + P
Ciclo di Krebs
2x (1 for each acetyl CoA)
$2\ CO_2$
3 NADH
$1\ FADH_2$
ATP
H^+
2 ATP
10 NADH (8 from CAC, 2 from Glycolysis)
$2\ FADH_2$ (from CAC)
$6\ O_2$
ADP + P (from the food we eat)
Catena Resp.
$10\ NAD^+$
2 FAD
$6\ H_2O$
ATP
Fino a 34 ATP

Principi Nutritivi

MICRONUTRIENTI:
l'organismo ne richiede
PICCOLE quantità

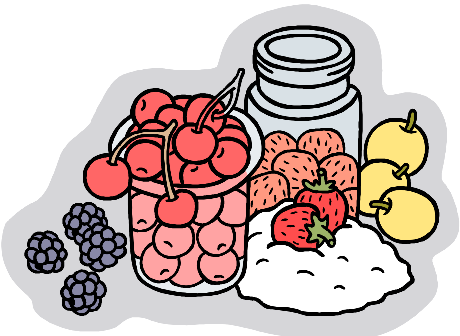
- VITAMINE
- SALI MINERALI

MACRONUTRIENTI:
l'organismo ne richiede
GRANDI quantità

- PROTEINE
- CARBOIDRATI
- LIPIDI

ACQUA

I Glucidi



- I glucidi forniscono all'organismo energia.
- Provengono **prevalentemente** dal mondo vegetale (fa eccezione il latte).
- Si trovano: nei cereali e derivati, nei legumi, nel latte, nella frutta e negli ortaggi.
- Le calorie provenienti dai glucidi devono coprire il 55-65% delle calorie totali.

CARBOIDRATI

COMPLESSI

SEMPLICI

GLUCIDI
(carboidrati o zuccheri)

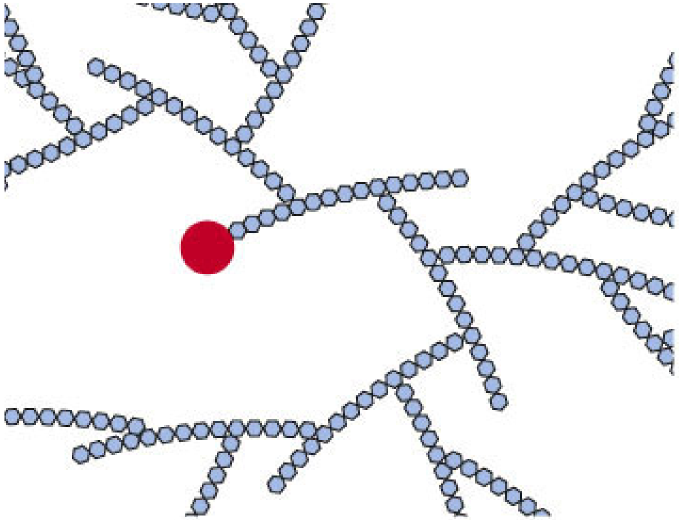
FUNZIONE ENERGETICA

I Glucidi vengono classificati in:

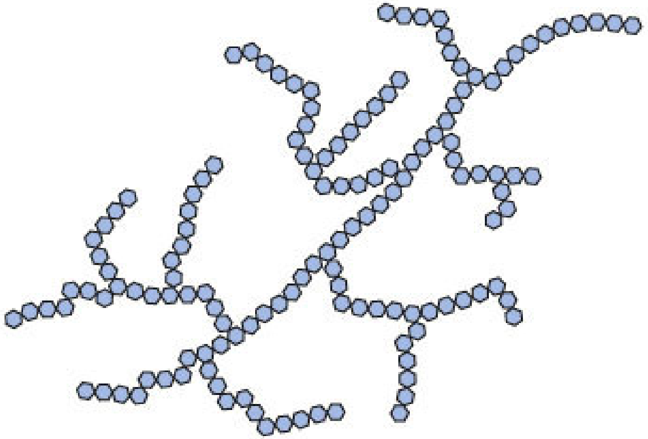
Monosaccaridi
(glucosio, fruttosio)

Disaccaridi
(saccarosio, lattosio)

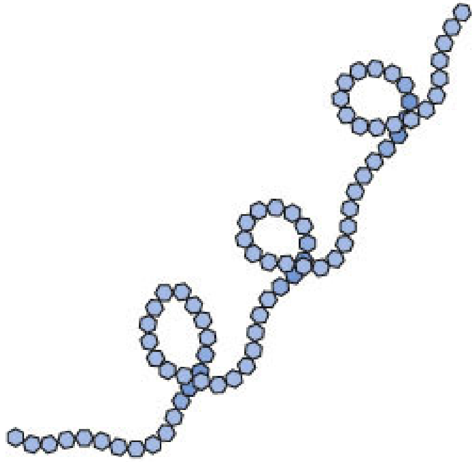
Polisaccaridi
(amido, cellulosa, glicogeno)



Glycogen



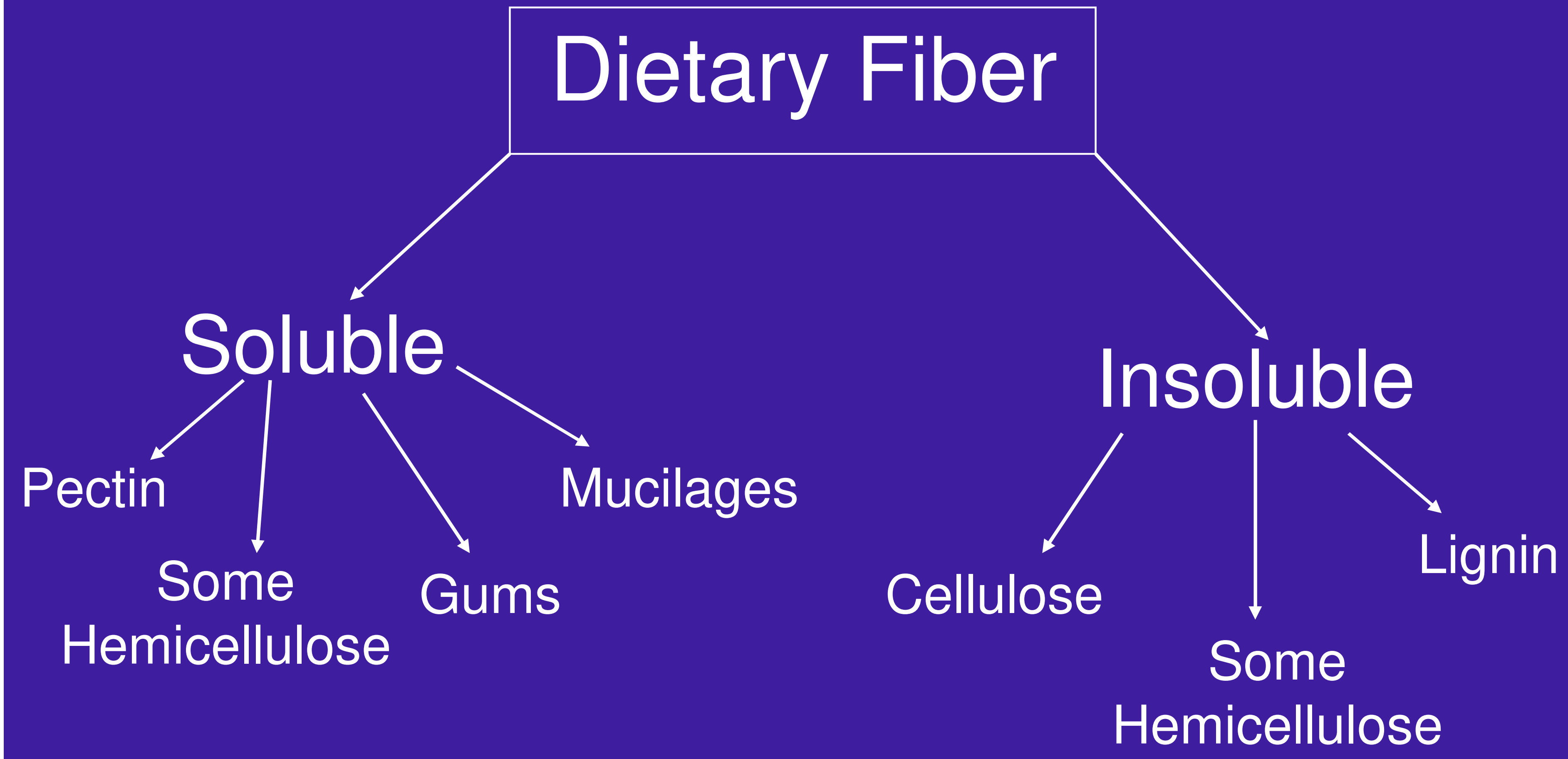
Starch (amylopectin)



Starch (amylose)

A glycogen molecule contains hundreds of glucose units in highly branched chains. Each new glycogen molecule needs a special protein for the attachment of the first glucose (shown here in red).

A starch molecule contains hundreds of glucose molecules in either occasionally branched chains (amylopectin) or unbranched chains (amylose).


Dietary Fiber
Soluble
Pectin
Some Hemicellulose
Gums
Mucilages
Insoluble
Cellulose
Some Hemicellulose
Lignin

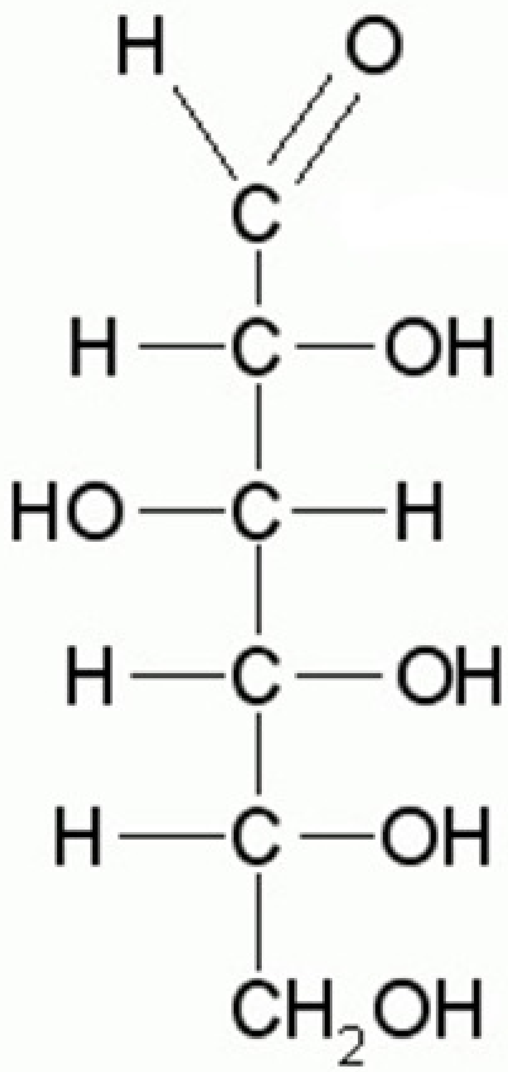
Insolable & soluble Fibers

↑ Water-holding capacity

↑Fecal volume

↓Colon Transit Time
(speed movemn’t thru gut)

↑Defecation Frequency
(↓ constipation)


H
O
C
H
C
OH
HO
C
H
H
C
OH
H
C
OH
CH2OH

Fates of Blood Glucose

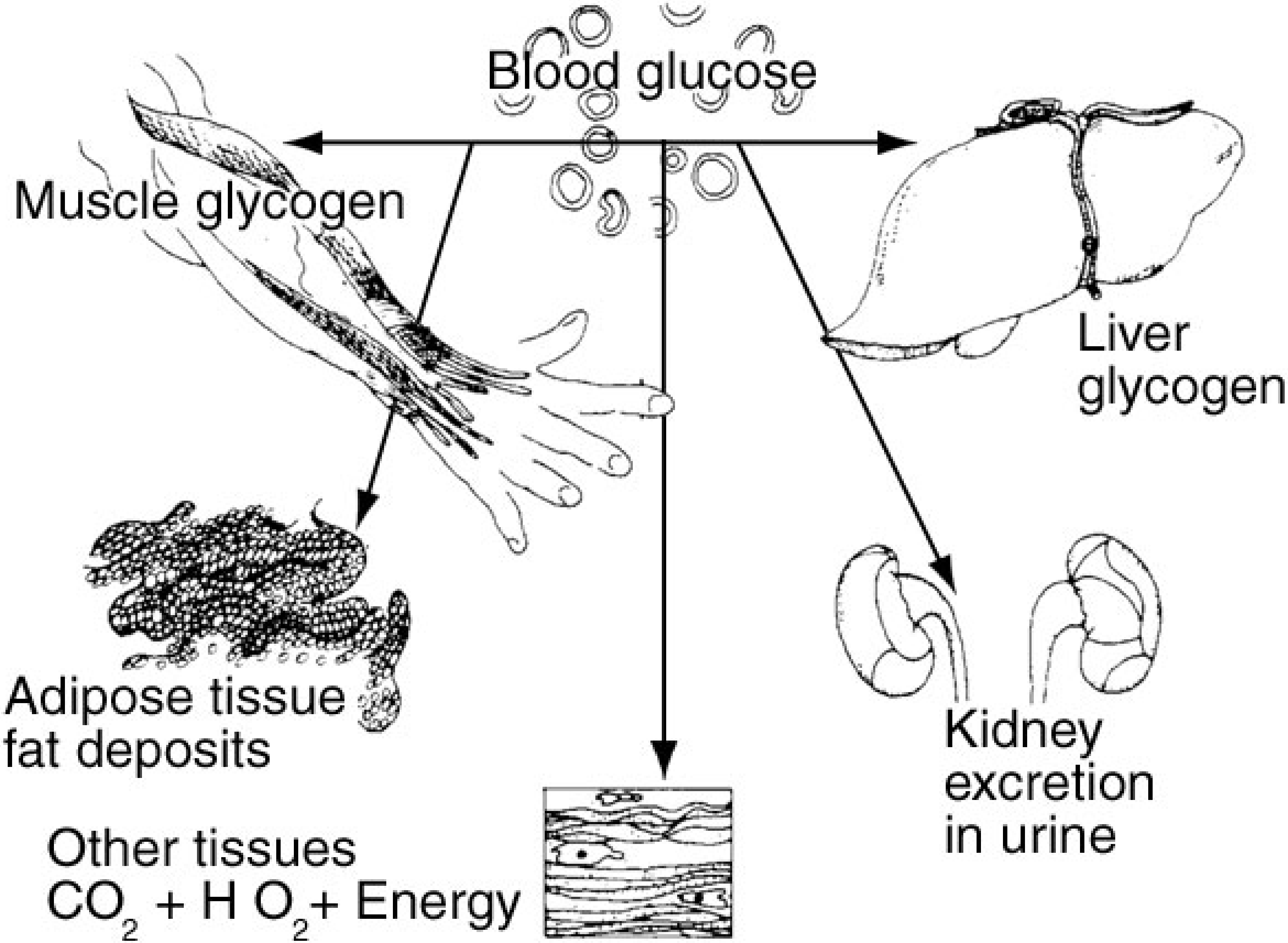


TABLE 4.7 Major hormones involved in regulation of blood glucose levels

Hormone	Gland	Stimulus	Action
Insulin	Pancreas	Increase in blood glucose	Helps transport glucose into cells; decreases blood glucose levels.
Glucagon	Pancreas	Decrease in blood glucose; Exercise stress	Promotes gluconeogenesis in liver; helps increase blood glucose levels.
Epinephrine	Adrenal	Exercise stress; decrease in blood glucose	Promotes glycogen breakdown and glucose release from the liver: helps increase blood glucose levels
Cortisol	Adrenal	Exercise stress; decrease in blood glucose	Promotes breakdown of protein and resultant gluconeogenesis; helps increase blood glucose levels

WHAT IS "GI" ?

Not all carbohydrates are equal! **Glycemic Index (GI)** is a useful tool to help us choose the **right type / quality of carbohydrates** that will positively influence our health.

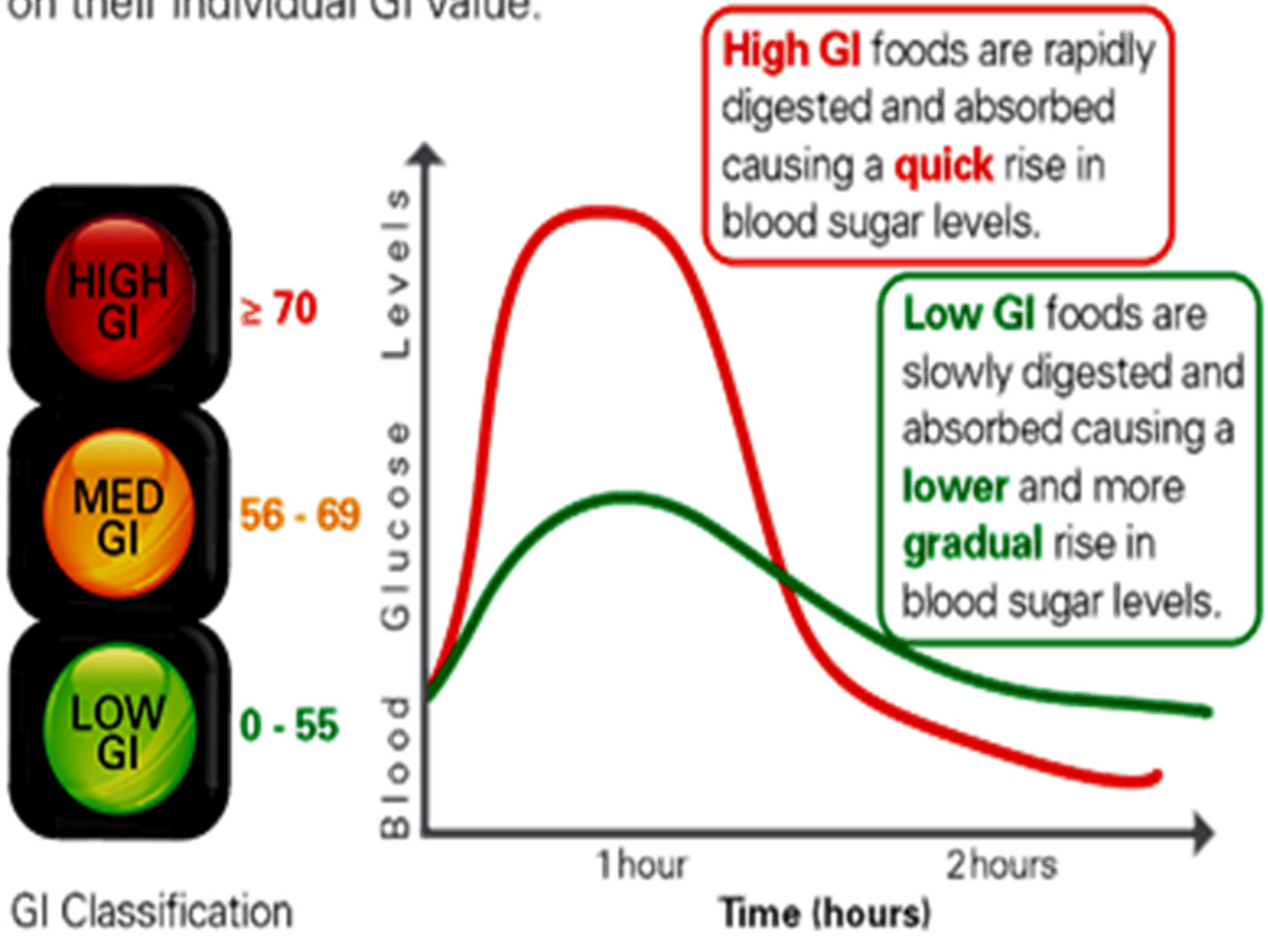
GI is a ranking of carbohydrate foods from 0 to 100 based on how quickly they raise our blood sugar levels.

Developed By: Glycemic Index Research Unit

Temasek Polytechnic | Centre for Applied Nutrition Services

GI CLASSIFICATION

Foods are classified as **LOW**, **MEDIUM** or **HIGH** GI based on their individual GI value.



Developed By: Glycemic Index Research Unit

Temasek Polytechnic | Centre for Applied Nutrition Services

Qualche esempio di indice glicemico

	IG basso (inf a 50)	IG medio (da 50 a 70)	IG alto (sup. a 70)
CEREALI E ALIMENTI CON FECOLA	• Soia 14 • Pasta all'uovo 32 • Pasta integrale 40 • Legumi secchi 30-50 • Mais 52 • Piselli 50	• Pasta di farina di grano 50-55 • semola couscous 55 • Riso basmati 60 • Patate bollite 62	• Patatine frite 75 • Riso a cottura rapida 76 • Puré di patate 80 • Patate al forno 85 • Riso bianco 87
PANE	• Pane ai cereali 45	• Croissant o brioche 67 • Pane bianco 70 • Biscotti 70	• Pane svedese 81 • Baguette 95
LATTICINI	• Yogourt 30 • Latte scremato 30		
VERDURE	• In generale 20	• Barbabietole cotte 64	• Carote cotte 90
FRUTTA	• Ciliegie 23 • Prugne 24 • Pompelmi 25 • Mele 29 • Pesche 30 • Arancie 43	• Banane 55 • Albicocche 57 • Melone 65 • Ananas 66	• Anguria 72
BEVANDE	• Acqua 0		• Bvande gasate 80-100

WHAT INCREASES THE GI OF FOODS

Read The Food Labels And Choose The Food Products Carefully!

Developed By: Glycemic Index Research Unit

Temasek Polytechnic | Centre for Applied Nutrition Services

GI vs. GL

Glycemic Index: ranks carbohydrates based on their immediate blood glucose response.

GI = glycemic quality

Glycemic Load: helps predict blood glucose response to specific amount of specific carbohydrate food.

GL = glycemic → *quality*
→ *quantity*

Use Of GI In Sports Nutrition

- Before Exercise: A low-GL CHO should be eaten, particularly before prolonged exercise, to promote sustained CHO availability
- During Exercise: Moderate to High-GL CHO foods or drinks are most appropriate
- After Exercise: High-GL CHO for glycogen resynthesis

1. Carbohydrates are a primary form of energy. The carbohydrates stored in the muscles as glycogen are what allow you to do heavy and intense weight training.

2. Muscle size is increased when the body stores glycogen and water in the individual muscle cells.

3. Carbohydrates in the body have a "protein-sparing" effect, keeping the body from burning up excessive protein for energy. More about this important aspect of carbs later.

4. The carbohydrate glucose is the main source of energy that fuels the functioning of the brain, and deprivation can have severe effects on mood, personality, and mental ability.

I GRASSI

I grassi nel nostro organismo svolgono diverse funzioni:

✓garantiscono una **riserva di energia**,

✓agiscono come **isolanti termici**

✓ **proteggono gli organi interni**

- Provengono sia dal mondo vegetale che dal mondo animale nonchè dall'industria (margarine).

- Le calorie provenienti dai lipidi devono coprire il 25-30% delle calorie totali.

- energetica
- di termoregolazione
- veicolo per sostanze essenziali come le vitamine liposolubili
- sostanze di partenza per la sintesi di membrane cellulari, ormoni…
- supporto per gli organi interni come reni, globi oculari…
- come condimento migliorano l’appetibilità degli alimenti svolgendo un ruolo fondamentale nella digestione

LIPIDI o GRASSI

FUNZIONE ENERGETICA

FUNZIONE PLASTICA

I Lipidi vengono distinti in:

Semplici

Costituiti solo da idrogeno, ossigeno e carbonio

(trigliceridi, cere)

saturi — insaturi

Complessi

Costituiti anche da azoto, fosforo e zolfo

(fosfolipidi)

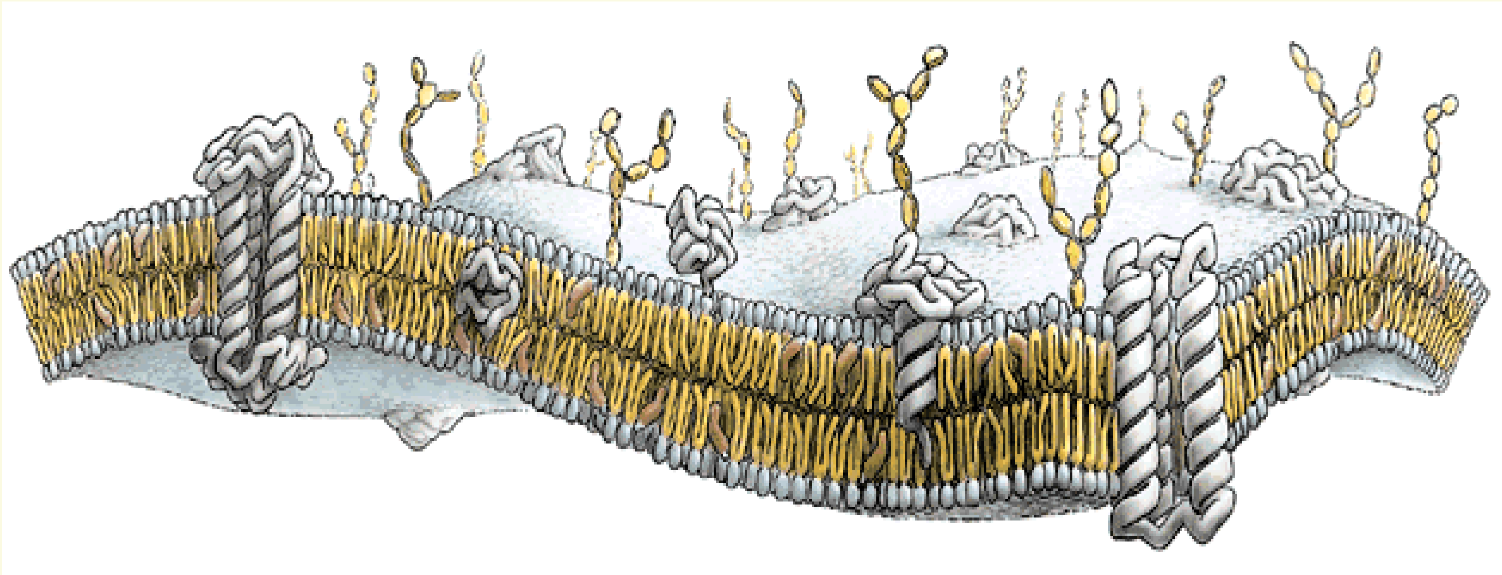
LIPIDI o GRASSI

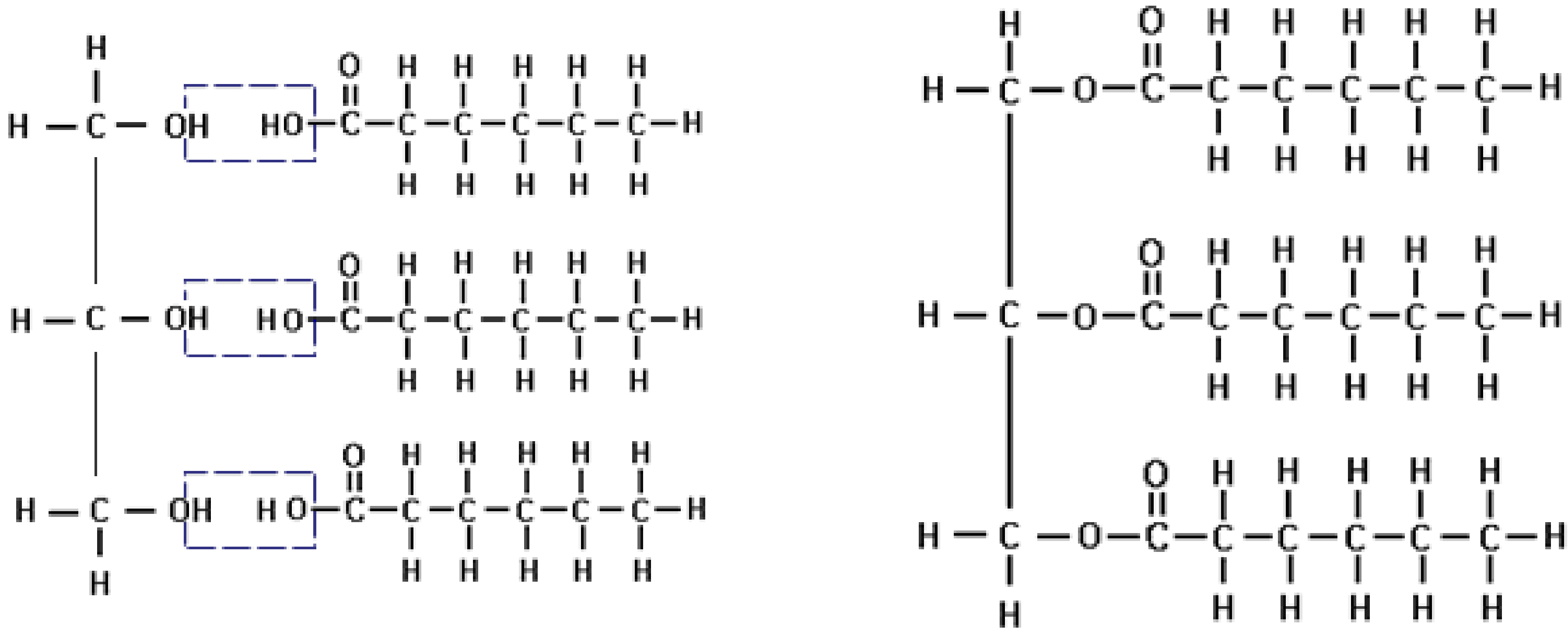
I grassi possono essere di origine:

<u>Vegetale</u>
(olio di oliva, di semi di girasole)

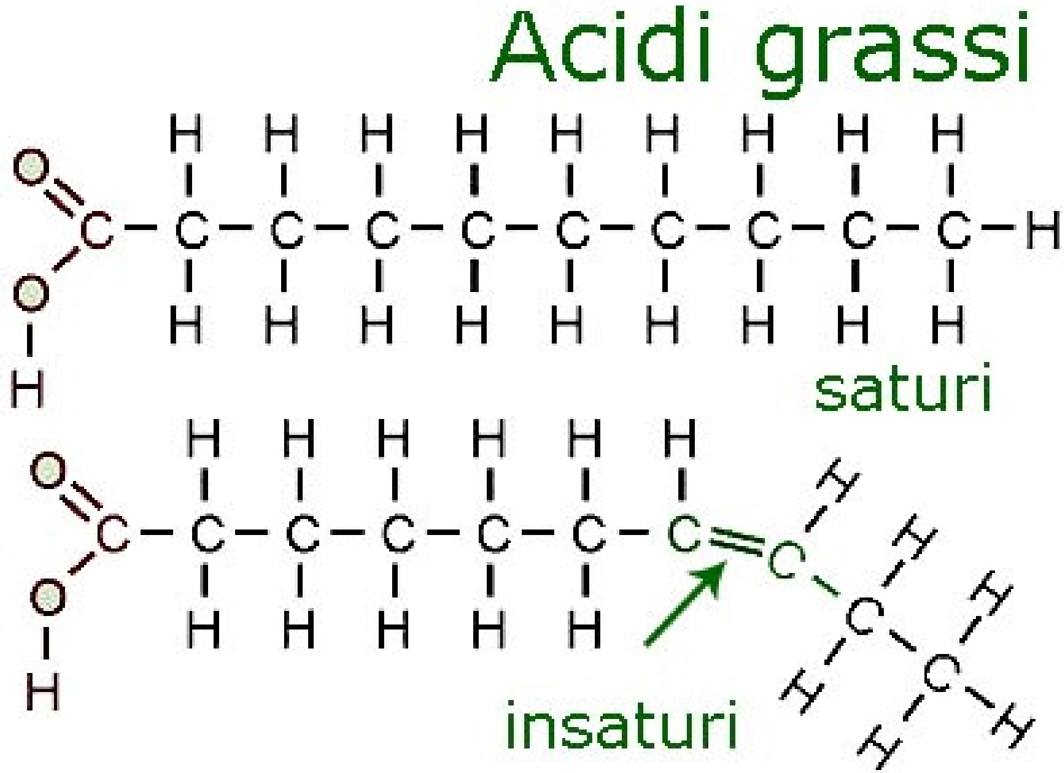
<u>Animale</u>
(lardo, grasso di carne)

Cell membrane- Phospholipid bilayer

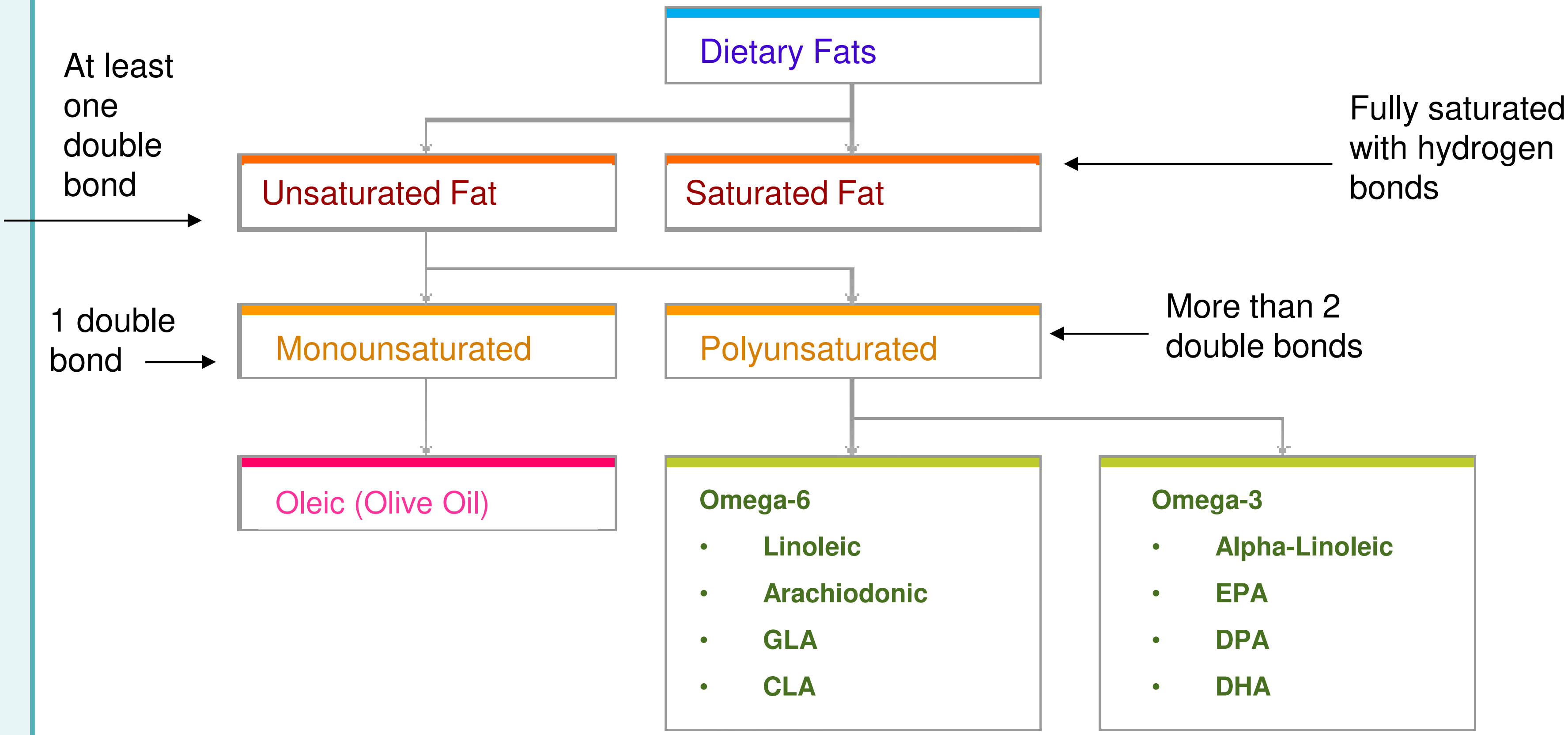




Glicerolo + Tre acidi grassi - $3H_2O$ = TRIGLICERIDE


Acidi grassi
saturi
insaturi

Types of Dietary Fat



Saturated
Peanut oil, coconut oil, animal fat, and butterfat

Monounsaturated
Nuts, avocados, tea sea oil, and olive oil

Polyunsaturated
Fish, grains such as flaxseed and cereal

Trans
Partially hydrogenised fats like margarine and baking shortening

ACIDI GRASSI

- **GRASSI SATURI**: derivati dei latticini e della carne rossa; vanno assunti con moderazione

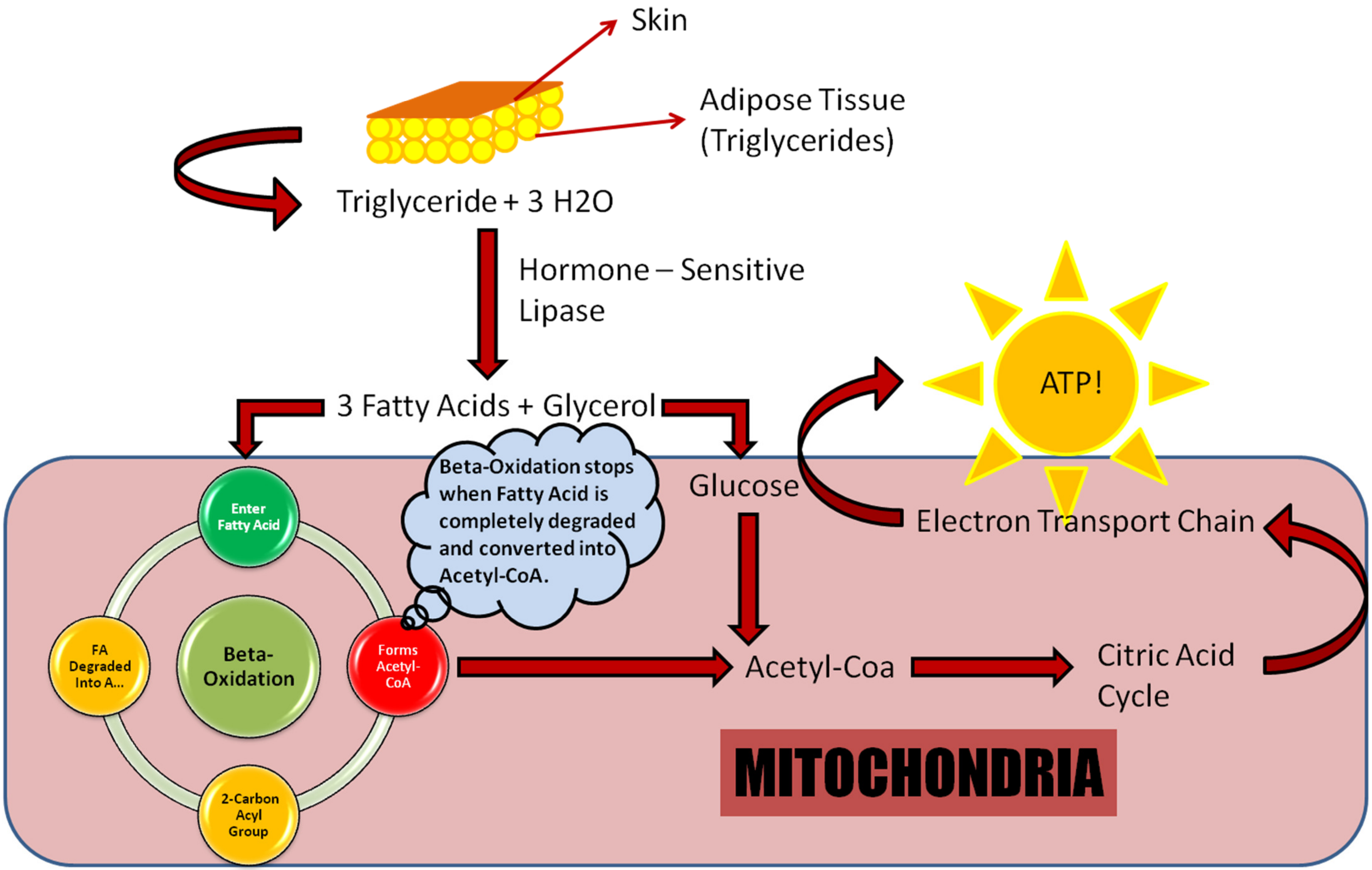
ACIDI GRASSI

- **GRASSI INSATURI**:
- effetti benefici sull'organismo: sono contenuti negli oli vegetali, nei grassi del pesce, nelle noci e nelle nocciole

ACIDI GRASSI

- GRASSI POLINSATURI: Omega-3 e gli Omega-6.
- Gli olii vegetali sono ricchi di acidi grassi Omega-6.
- Gli acidi grassi Omega-3 generalmente mancano nella nostra dieta.
- Si trovano nel pesce, nei crostacei, nel tofu, nelle mandorle e nelle noci, come anche in alcuni olii vegetali come l'olio di semi di lino, l'olio di nocciole e l'olio di colza.

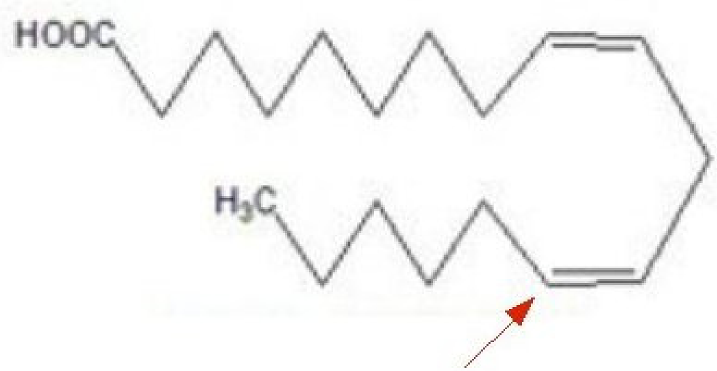
Fat Metabolism



What are Essential Fatty Acids?

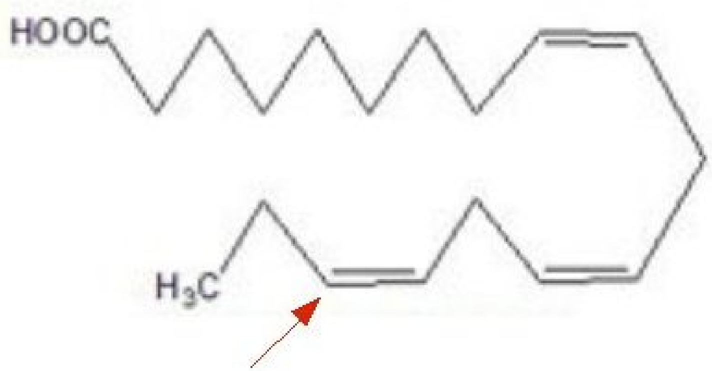
GLI ACIDI GRASSI ESSENZIALI

Acido Linoleico



SERIE OMEGA-6
(primo doppio legame a livello del 6° carbonio)

Acido Linolenico



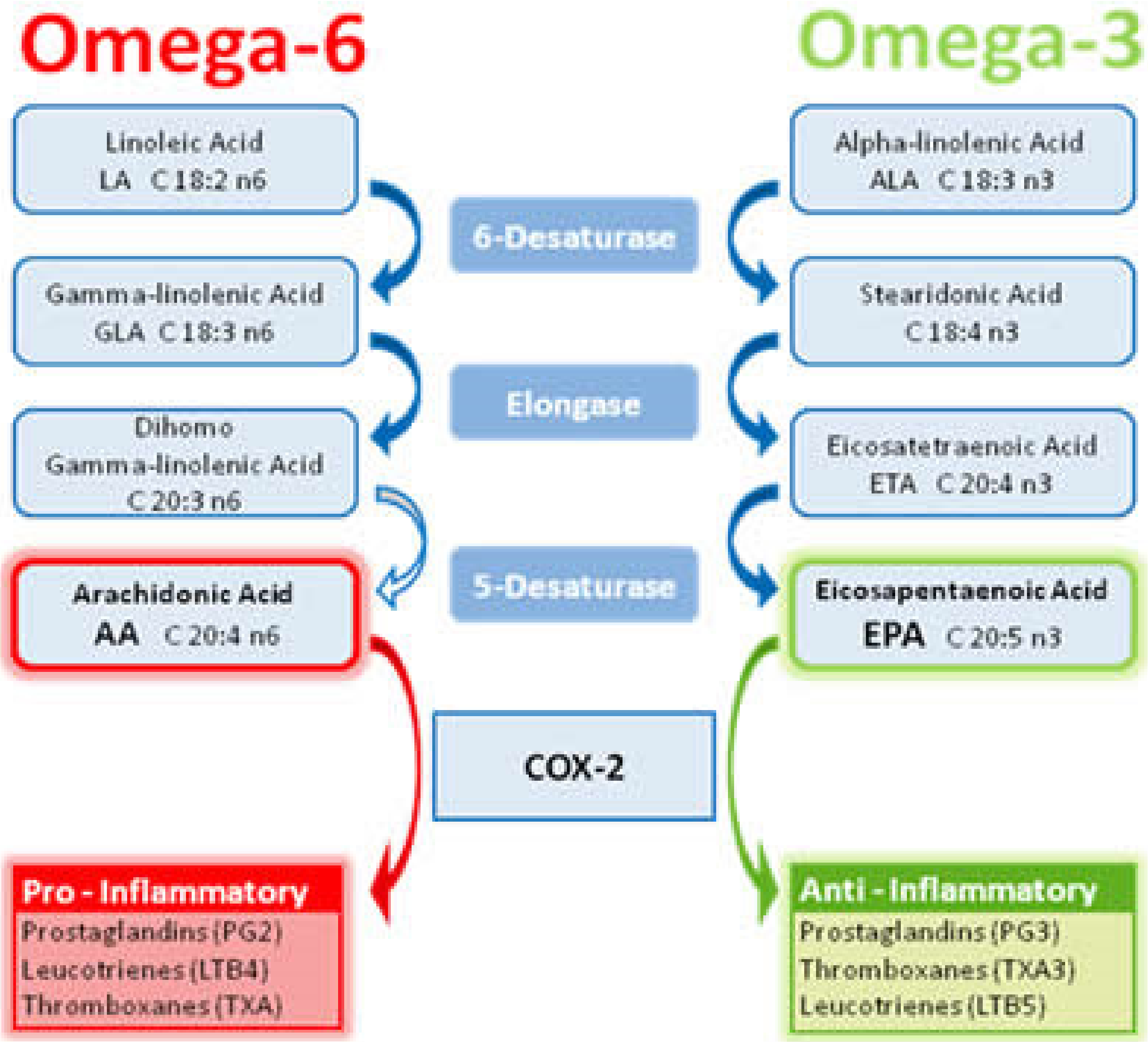
SERIE OMEGA-3
(primo doppio legame a livello del 3° carbonio)

Acidi grassi Omega 3 e Omega 6

- Gli **omega 3** e gli **omega 6** sono grassi insaturi, essenziali per il benessere e devono essere assunti attraverso la dieta perché il corpo non è in grado di produrli

- Essi fanno parte della struttura di ogni cellula del nostro corpo. Ne abbiamo bisogno per il **mantenimento del benessere cardiovascolare, del cervello e della funzionalità degli occhi**

- Gli acidi grassi sono benefici anche per la **pressione sanguigna, il colesterolo, le articolazioni e le difese antinfiammatorie**



Omega-6
Omega-3
Linoleic Acid
LA C 18:2 n6
Alpha-linolenic Acid
ALA C 18:3 n3
6-Desaturase
Gamma-linolenic Acid
GLA C 18:3 n6
Stearidonic Acid
C 18:4 n3
Elongase
Dihomo
Gamma-linolenic Acid
C 20:3 n6
Eicosatetraenoic Acid
ETA C 20:4 n3
5-Desaturase
Arachidonic Acid
AA C 20:4 n6
Eicosapentaenoic Acid
EPA C 20:5 n3
COX-2
Pro - Inflammatory
Prostaglandins (PG2)
Leucotrienes (LTB4)
Thromboxanes (TXA)
Anti - Inflammatory
Prostaglandins (PG3)
Thromboxanes (TXA3)
Leucotrienes (LTB5)

Omega-3 Fatty Acids and Cardiovascular Disease

USDA

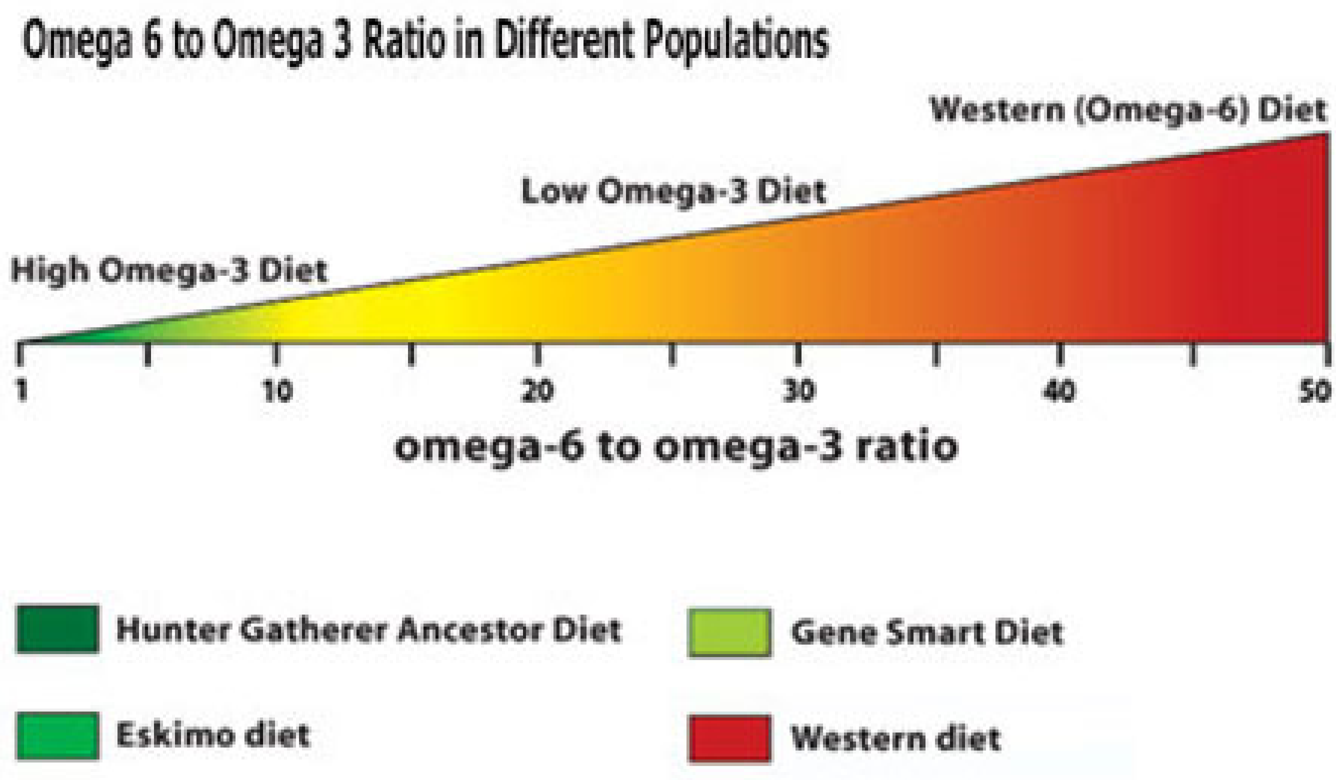
"…evidence suggests an association between consumption of fatty acids in fish and reduced risk of mortality from cardiovascular disease for the general population." *2005 Dietary Guidelines for Americans*

American Heart Association

"Omega-3 fatty acids have been shown in epidemiological and clinical trials to reduce the incidence of cardiovascular disease." Kris Etherton, P

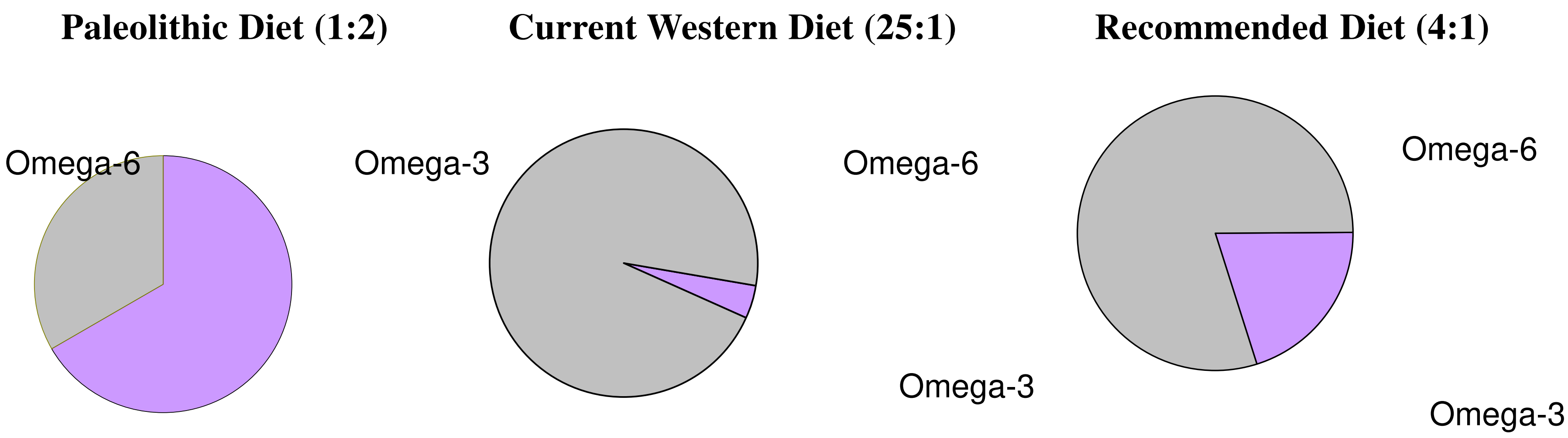
- **Number 1 killer of Americans today**
- **2 out of 5 American deaths caused by cardiovascular disease**

Kris Etherton, P. et al. Fish Consumption, Fish Oil, Omega-3 Fatty Acids, and Cardiovascular Disease. Circulation, 2002; 106:2747.


Omega 6 to Omega 3 Ratio in Different Populations
Western (Omega-6) Diet
Low Omega-3 Diet
High Omega-3 Diet
1
10
20
30
40
50
omega-6 to omega-3 ratio
Hunter Gatherer Ancestor Diet
Gene Smart Diet
Eskimo diet
Western diet

Imbalance of Omega-6 to Omega-3 in the Western Diet

- Current Western Diet 25:1, but could reach 50:1 in individuals consuming mostly processed foods.
- Omega-6 promotes inflammation and heart conditions.

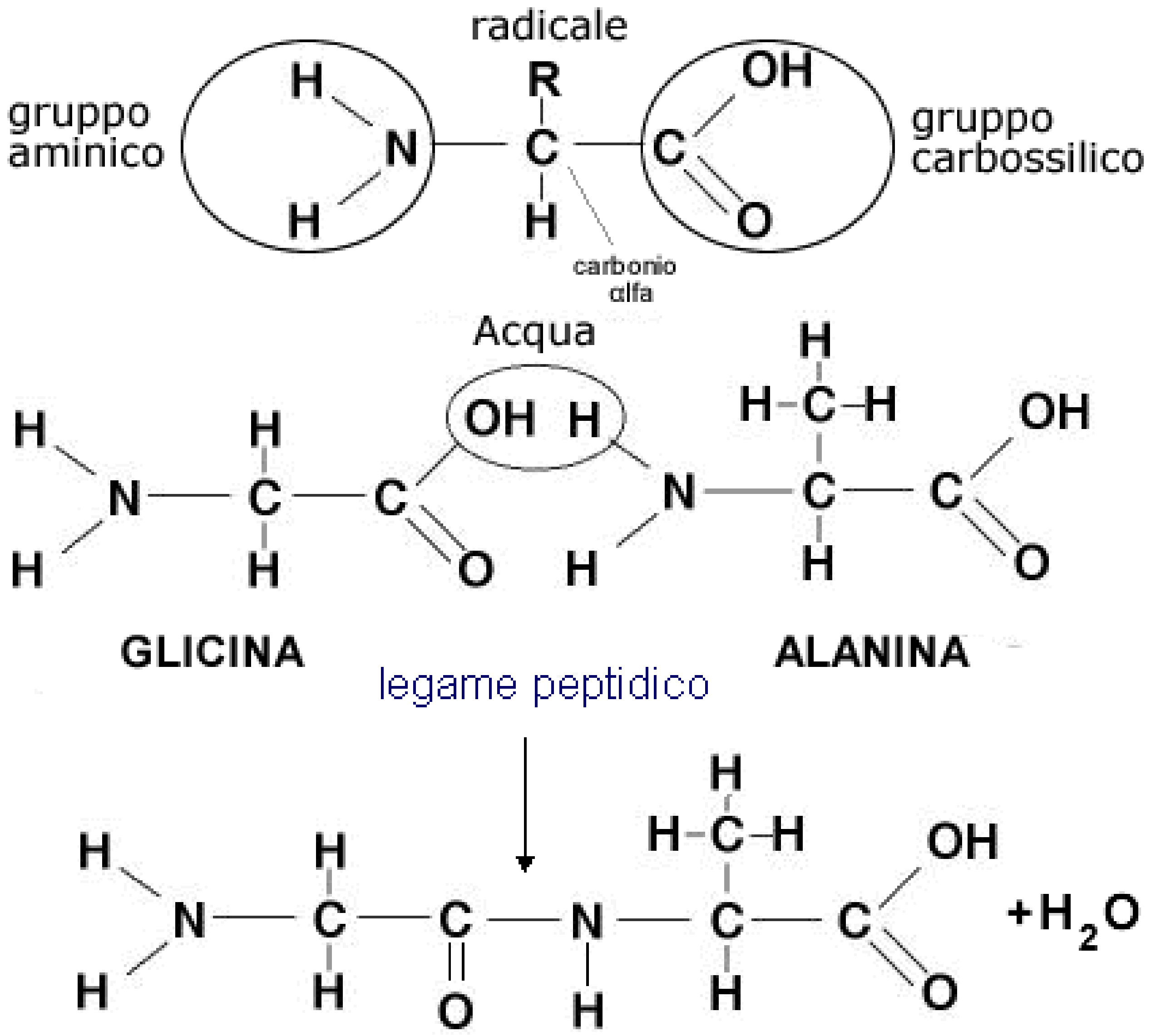


Bourre JM, Dumont O, Piciotti M, Clement M, et al. "Essentiality of n-3 fatty acids for brain structure and function". World Rev Nutr Diet 66(1991) 103-17; Holub BJ. "Omega-3 fatty acids in cardiovascular care". CMAJ 166(2002) 608-15

Alimento	*Omega 3*
1 porzione di Alici fresche	0,8 g
1 scatola di Alici sott'olio 50 g	0,8 g
1 cucchiaio di olio di Colza/canula	0,8 g
1 cucchiaio di olio di Soia	0,7 g
1 porzione di cozze al vapore 100 g	0,7 g
1 porzione di Pescespada cotto 100g	0.7 g
1 porzione di Orata fresca 100g	0,6 g
1 Sogliola, platessa cotti al forno/alla piastra	0.4 g
Capasanta cotta al forno/alla piastra 100g	0.3 g
Gamberetti cotti a vapore 100g	0.3 g
Valeriana insalata 100g	0,3 g

Le proteine

Le proteine o protidi svolgono la funzione plastica o costruttrice: sono necessarie per la crescita, per riparare i tessuti del nostro organismo e per costruire enzimi, ormoni, anticorpi. Le proteine provengono da: carni, pesci, crostacei, uova, latte, formaggi, cereali e legumi.

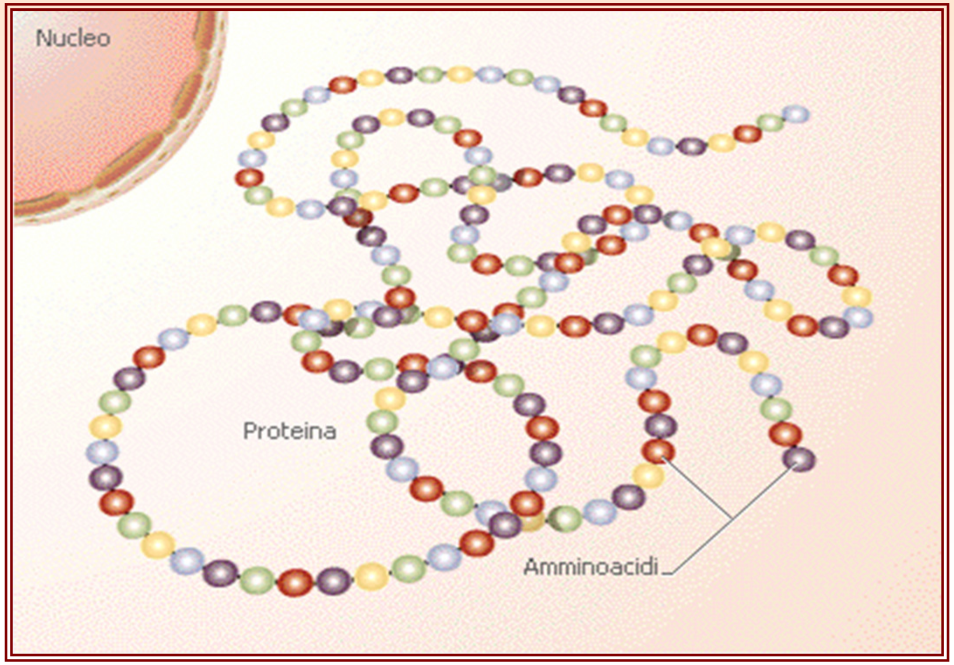

radicale
gruppo aminico
gruppo carbossilico
carbonio alfa
Acqua
GLICINA
ALANINA
legame peptidico
+H2O

Gli aminoacidi

- Si tratta delle unità strutturali primarie delle proteine. In pratica si tratta delle singole perle che formano la collana (proteina)
- Il legame che unisce i singoli amminoacidi è detto legame peptidico
- Durante la digestione è soprattutto nello stomaco che i singoli legami peptidici vengono rotti, liberando gli amminoacidi liberi
- La struttura complessiva dell'amminoacido si ripete tra i diversi peptidi, con un gruppo amminico, un gruppo carbossilico e un atomo di idrogeno, tutti legati ad un atomo di carbonio centrale. Ciò che differenzia i differenti amminoacidi è il gruppo radicale: 20 possibili gruppi radicali danno origine a 20 amminoacidi differenti

PROTIDI o PROTEINE

- costituite da **aminoacidi** (20) legati insieme a formare catene peptidiche
- **8 aminoacidi** non possono essere sintetizzati dal nostro organismo, pertanto vengono detti "**essenziali**" e devono essere assunti esclusivamente con gli alimenti
- La **scarsità o la mancanza di un aminoacido essenziale** impedisce la formazione della proteina stessa



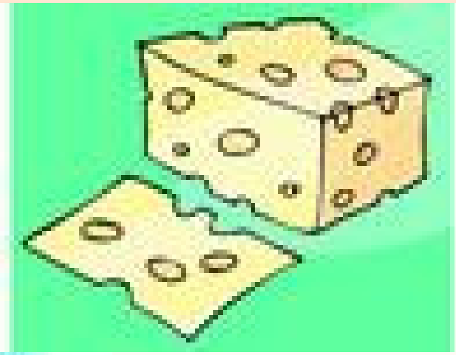
Classificazione degli amminoacidi

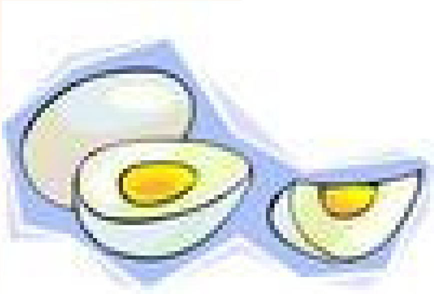
AMMINOACIDI ESSENZIALI	AMMINOACIDI SEMI-ESSENZIALI	AMMINOACIDI NON ESSENZIALI
Isoleucina	Cisteina	Glicina
Leucina	Tirosina	Alanina
Lisina	Istidina	Serina
Metionina		Prolina
Fenilalanina		Acido Glutammico
Treonina		Glutammina
Triptofano		Acido Aspartico
Valina		Asparagina
		Arginina

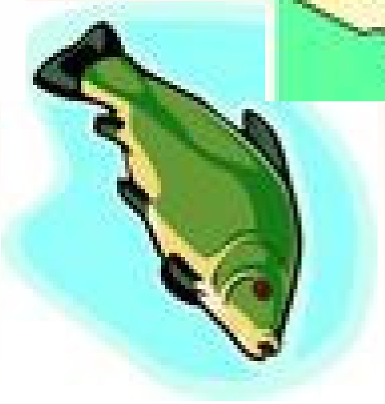
PROTIDI o PROTEINE

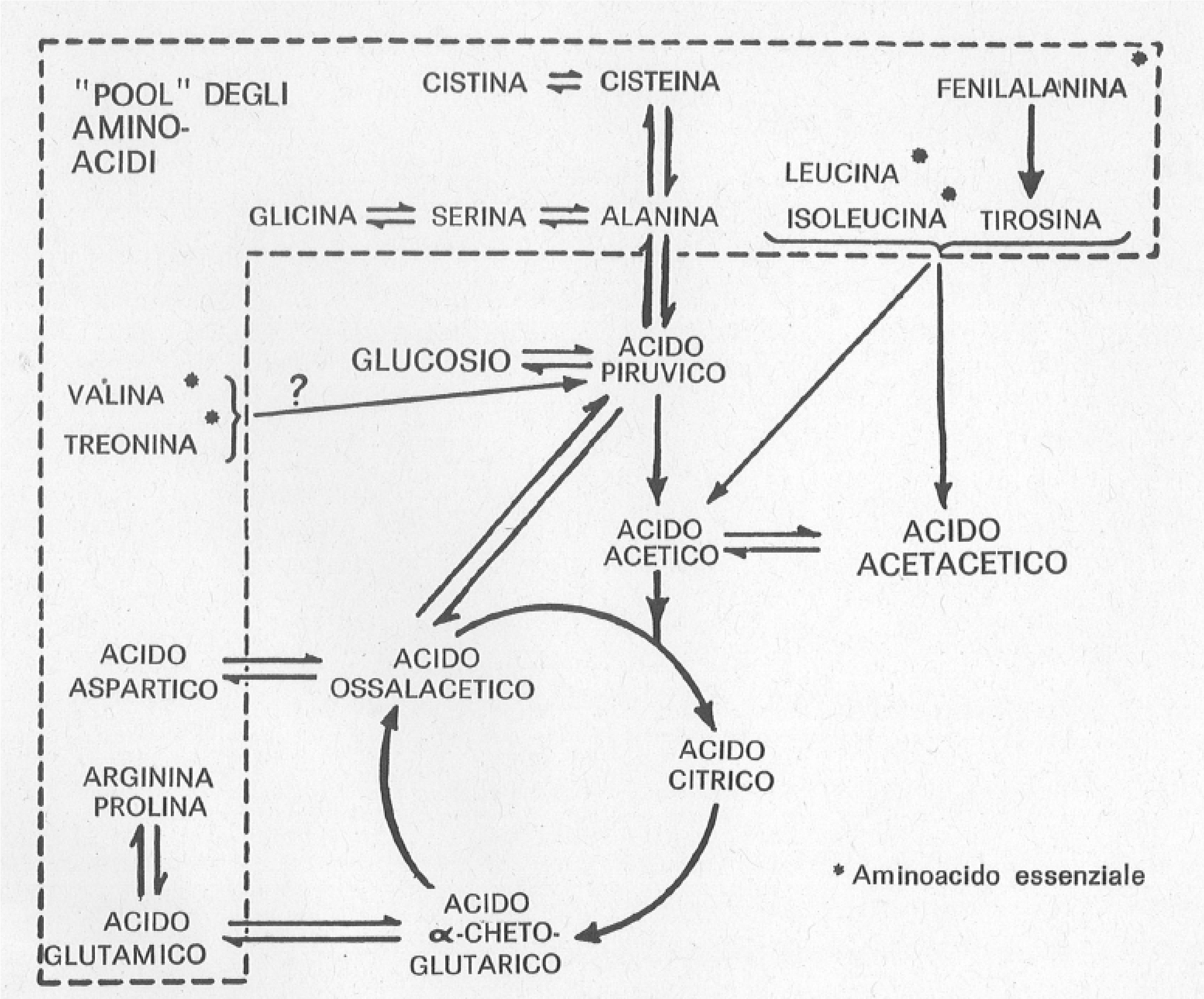
Vegetale
(cereali, legumi)

Animale
(carne, latte, formaggi)

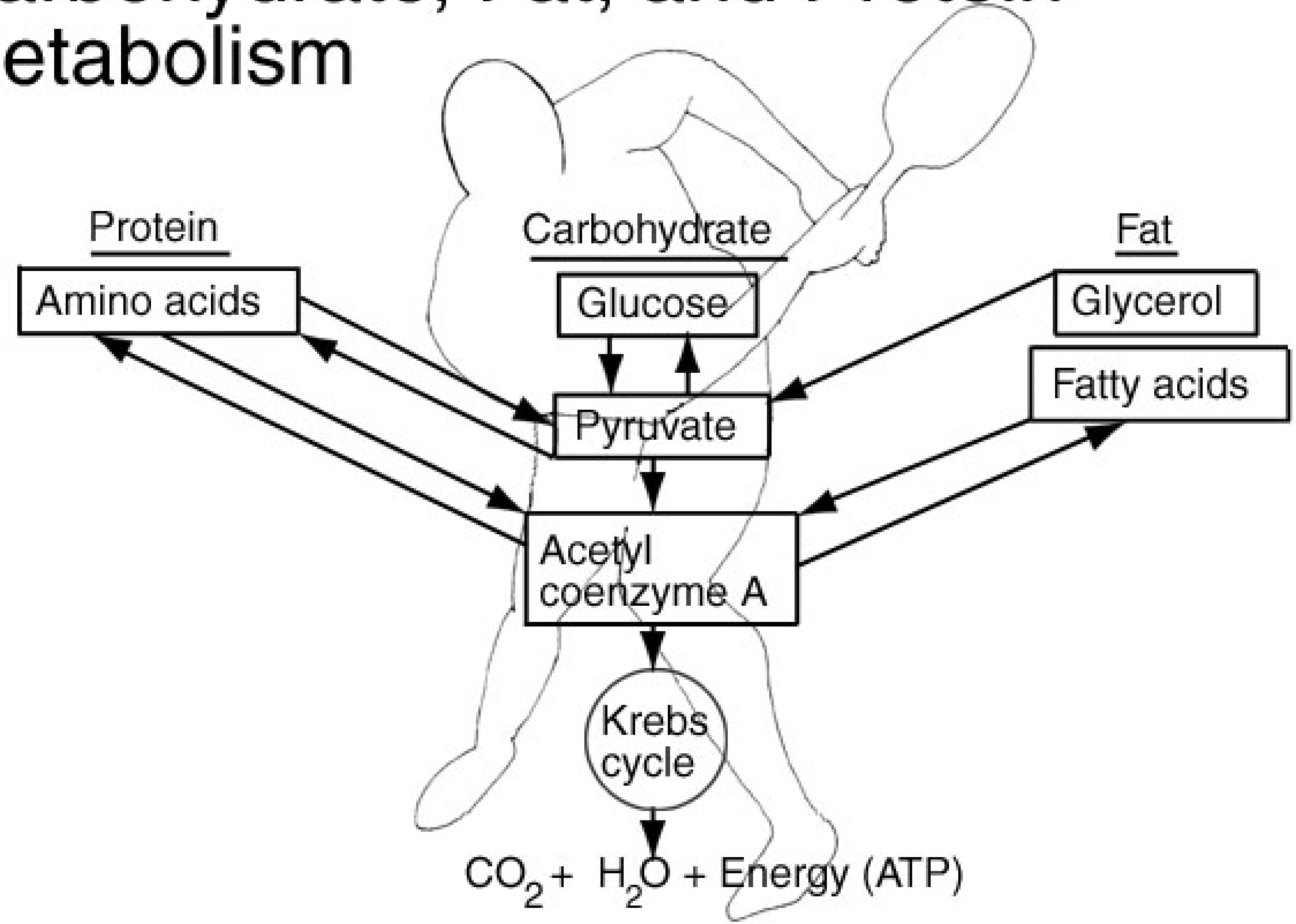


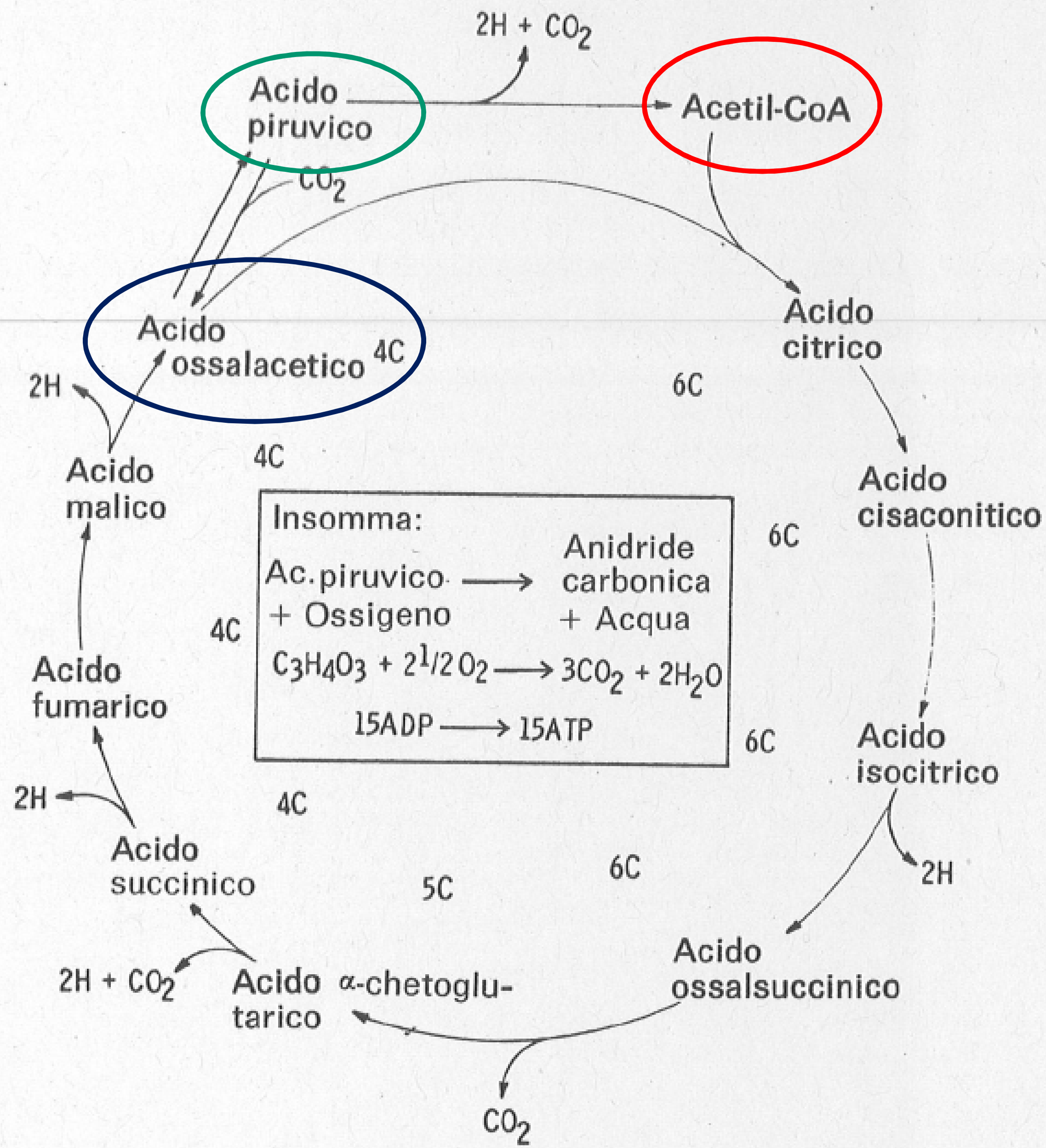




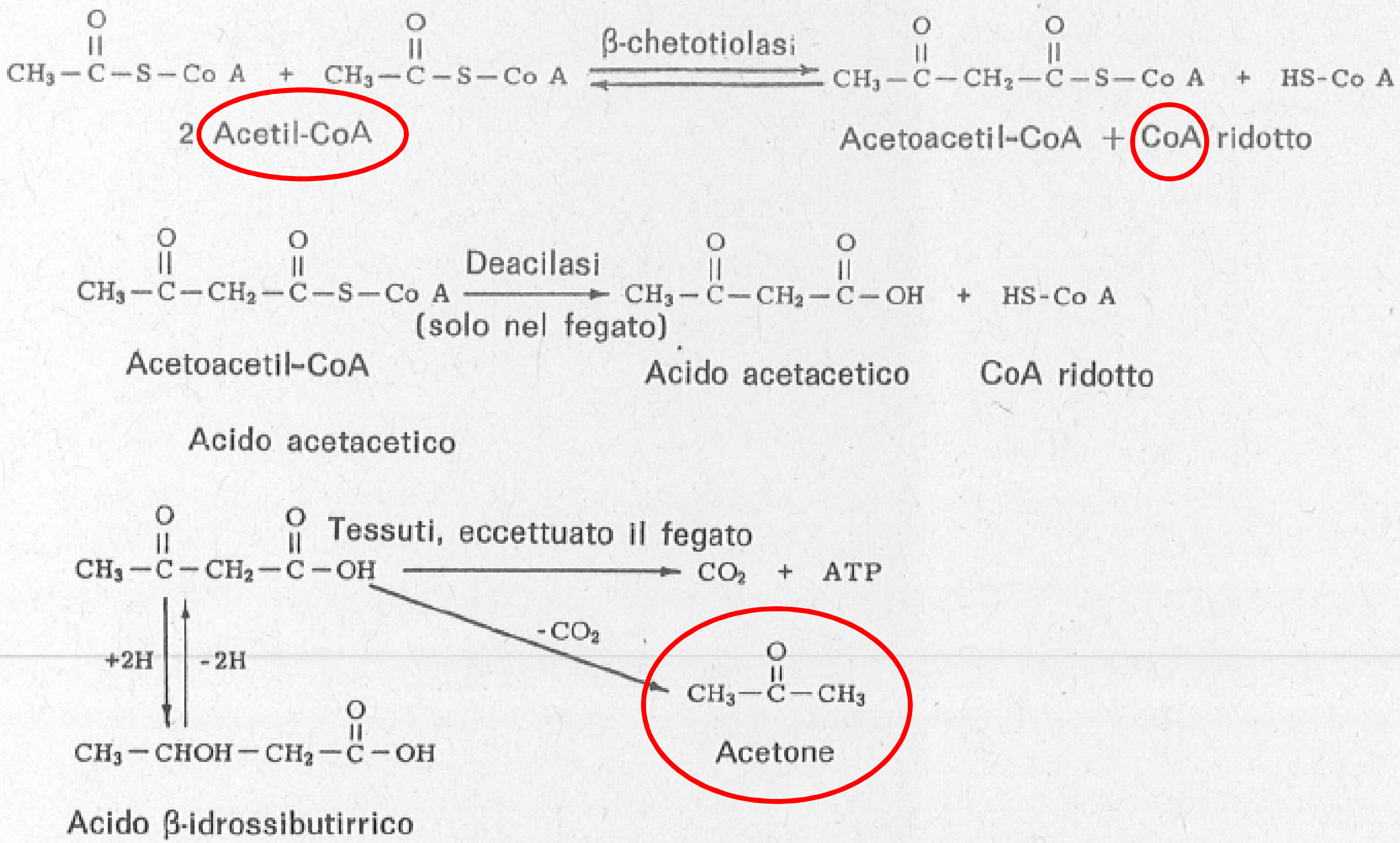

"POOL" DEGLI AMINO-ACIDI
CISTINA
CISTEINA
FENILALANINA *
LEUCINA *
ISOLEUCINA *
TIROSINA
GLICINA
SERINA
ALANINA
GLUCOSIO
ACIDO PIRUVICO
VALINA *
TREONINA *
?
ACIDO ACETICO
ACIDO ACETACETICO
ACIDO ASPARTICO
ACIDO OSSALACETICO
ACIDO CITRICO
ARGININA
PROLINA
ACIDO GLUTAMICO
ACIDO α-CHETO-GLUTARICO
* Aminoacido essenziale

Interrelationships among Carbohydrate, Fat, and Protein Metabolism





2H + CO2
Acido piruvico
Acetil-CoA
CO2
Acido ossalacetico
4C
Acido citrico
6C
2H
Acido malico
4C
Acido cisaconitico
6C
Insomma:
Ac.piruvico + Ossigeno → Anidride carbonica + Acqua
C3H4O3 + 2 1/2 O2 → 3CO2 + 2H2O
15ADP → 15ATP
4C
Acido fumarico
6C
Acido isocitrico
2H
4C
2H
Acido succinico
5C
6C
Acido ossalsuccinico
2H + CO2
Acido α-chetoglutarico
CO2


β-chetotiolasi
2 Acetil-CoA
Acetoacetil-CoA + CoA ridotto
Deacilasi
(solo nel fegato)
Acetoacetil-CoA
Acido acetacetico
CoA ridotto
Acido acetacetico
Tessuti, eccettuato il fegato
CO_2 + ATP
$-CO_2$
+2H
-2H
Acetone
Acido β-idrossibutirrico

KETOSIS

Ketosis is the result of carbohydrate deprivation. Your body requires adequate amounts of carbohydrates in order to properly metabolize body fat. As the saying goes, "fat is burned in the furnace of carbohydrate." When there is not enough carbohydrate in the body for this process to take place (usually as a result of an overly strict weight-loss diet), the body has to take emergency measures. The primary symptom of ketosis is ketonemia, the appearance of ketone bodies in the blood. Ketone bodies are the product of the incomplete burning of fats. These ketones can be used in place of glycogen for energy production, and they can also be used as energy to fuel brain and nervous system function (which otherwise rely entirely on glycogen).

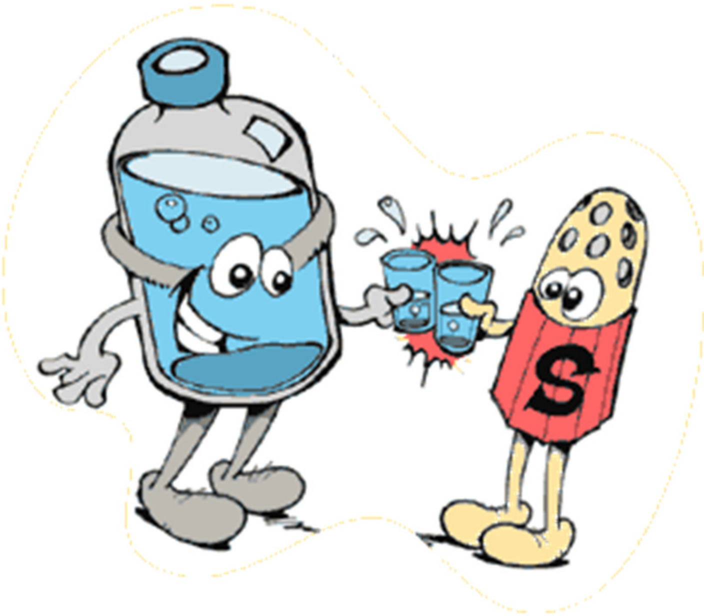
The problem is that ketone bodies are not nearly as efficient in fueling exercise as glycogen. In a prolonged state of ketosis, you tend to be sluggish, your mental processes suffer, and your body gradually becomes dehydrated. Worse, in the absence of carbohydrates your body begins to metabolize larger and larger amounts of amino acids (protein) for additional energy. This is obviously highly counterproductive for anyone trying to build and maintain a solid foundation of muscle mass.

L'ACQUA

- È il composto più diffuso sulla terra.
- Circa l'80% di un organismo adulto è costituito da acqua.
- L'acqua è coinvolta in tutte le reazioni chimiche che avvengono nell'organismo, agisce come mezzo di trasporto dei nutrienti e come lubrificante. La introduciamo sia con le bevande che con i cibi e la eliminiamo per mezzo delle urine, della respirazione, del sudore.
- Il fabbisogno giornaliero in acqua è di circa 1 grammo per kcal ingerita.

ACQUA

ACQUA INGERITA	1000 ml
ACQUA DEGLI ALIMENTI	1200 ml
ACQUA METABOLICA	300 ml
TOTALE	2500 ml



ACQUA

ACQUA ELIMINATA

URINE	1500 ml
FECI	100 ml
EVAPORAZIONE CUTANEA	500 ml
EVAPORAZIONE VIE AEREE	400 ml
TOTALE	2500 ml

LE VITAMINE

Le vitamine svolgono funzione regolatrice; stimolano, infatti, lo sviluppo dell'organismo, lo proteggono dalle malattie e favoriscono l'utilizzazione degli altri principi nutritivi.

Si suddividono in 2 gruppi:

- Vitamine idrosolubili
- Vitamine liposolubili

13 vitamine sono essenziali per l'uomo

LIPOSOLUBILI

Vitamina A - retinolo
Vitamina D - colecalciferolo *(malattia da carenza: rachitismo)*
Vitamina E - tocoferolo
Vitamina K - fillochinone

IDROSOLUBILI

Vitamina C - acido ascorbico (*malattia da carenza: scorbuto*)

Vitamina B1 - tiamina (*malattia da carenza: beri-beri*)
Vitamina B2 - riboflavina
Vitamina B3 - niacina (acido nicotinico ed ammide) (*carenza: pellagra*)
Vitamina B5 - acido pantotenico
Vitamina B6 - piridossina, piridossale, piridossammina
Vitamina B7 - biotina
Folati
Vitamina B12 - cobalammina *(malattia da carenza: anemia perniciosa)*

Vitamine del complesso B: sintetizzate dai vegetali tranne la B12 sintetizzata solo da batteri

FUNZIONI DELLE VITAMINE ed ATTIVITÀ SPORTIVA

- Metabolismo energetico ➧ **B1, B2, B6, B3, B5, B12, biotina, vit C**
- Sintesi proteica ➧ **Acido folico, B6, B12**
- Azione antiossidante ➧ **Vit C, E, ubichinone, Beta-carotene (A)**
- Funzione muscolare e met. osseo ➧ **Vit D, K**

I SALI MINERALI

- I sali minerali non forniscono energia, ma svolgono funzione plastica e regolatrice;
- L'organismo li elimina e li rinnova in continuazione e, quindi, devono essere introdotti regolarmente con la dieta;
- Si classificano in:
  - ✓ macroelementi → fabbisogno > 100 mg/die
  - ✓ microelementi → fabbisogno < 100 mg/die
- Frutta e verdura ne sono particolarmente ricchi

SALI MINERALI

CALCIO → OSSA

FOSFORO → OSSA

FLUORO → DENTI

FERRO → SANGUE, FEGATO

SALI MINERALI

IODIO → TIROIDE

SODIO → LIQUIDI EXTRACELLULARI

POTASSIO → LIQUIDI INTRACELLULARI

- il **Sodio** (Na) ed il **Potassio** (K) insieme al **Cloro** (CI) ed al **Calcio** (Ca), mantengono i potenziali elettrici alla base della trasmissione di impulsi nervosi;
- il **Calcio** è coinvolto in molteplici funzioni, quali la mineralizzazione dell' osso, la coagulazione del sangue, la contrazione muscolare;
- il **Selenio** (Se) contribuisce alla protezione delle cellule dagli agenti ossidanti che ne provocano l'invecchiamento;
- il **Ferro** (Fe) è un essenziale costituente dell'emoglobina dei globuli rossi e della mioglobina, che nel muscolo capta l'ossigeno

Gli alimenti di origine vegetale quali frutta e verdura, contengono importanti composti organici chiamati **fitonutrienti**. Nei vegetali questi componenti hanno il compito di proteggere la pianta e di darle colore e sapore.

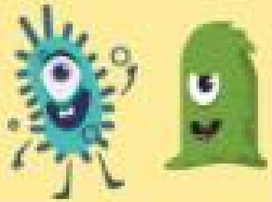
Consumando regolarmente frutta e verdura, l'uomo ha la possibilità di ottenere i benefici che i **fitonutrienti** offrono tra cui: azione **antiossidanti** e **protettive**, rafforzamento del sistema immunitario e prevenzione di numerose patologie.

A differenze di vitamine e minerali, i **fitonutrienti** non sono indispensabili per la vita dell'uomo, ma sono molto utili per mantenere l'organismo in buona salute e per combattere i **radicali liberi**, responsabili dei danni cellulari.

PROBIOTICS & PREBIOTICS

PROBIOTICS

Microorganisms that live in the GUT



Probiotic foods contain beneficial organisms that help colonise and populate your GUT

PREBIOTICS

Food for the microorganisms

Help the healthy population of microbes by eating prebiotic foods which feed them and promote a healthy and robust microbiome

FOODS THAT CONTAIN

PROBIOTICS

Yogurt, Kefir, Sauerkraut, Miso, Fermented Foods, Tempeh, Kimchi

PREBIOTICS

Leeks, Onions, Garlic, Dandelion Greens, Jeruslaem Artichoke, Legumes, Chicory, Yacon Root, Potato Starch (Raw)

Gli antiossidanti vengono classificati secondo una particolare scala, definita **tabella ORAC** (Oxygen Radical Absorbance Capacity) e utilizzata per **misurare l'azione antiossidante di alimenti e integratori**.

Questa tecnica è stata messa a punto negli Stati Uniti da un'équipe di ricercatori del Centro di Ricerca sulla Nutrizione Umana e l'Invecchiamento presso l'Università di Tufts, a Boston.

> Gli studi hanno evidenziato che il consumo di frutta e verdura, antiossidanti per eccellenza, innalza notevolmente – fino al 25% in più – il tasso di ORAC presente nell'organismo.

La dose giornaliera raccomandata di antiossidanti dovrebbe raggiungere le **5000 unità ORAC al giorno**.

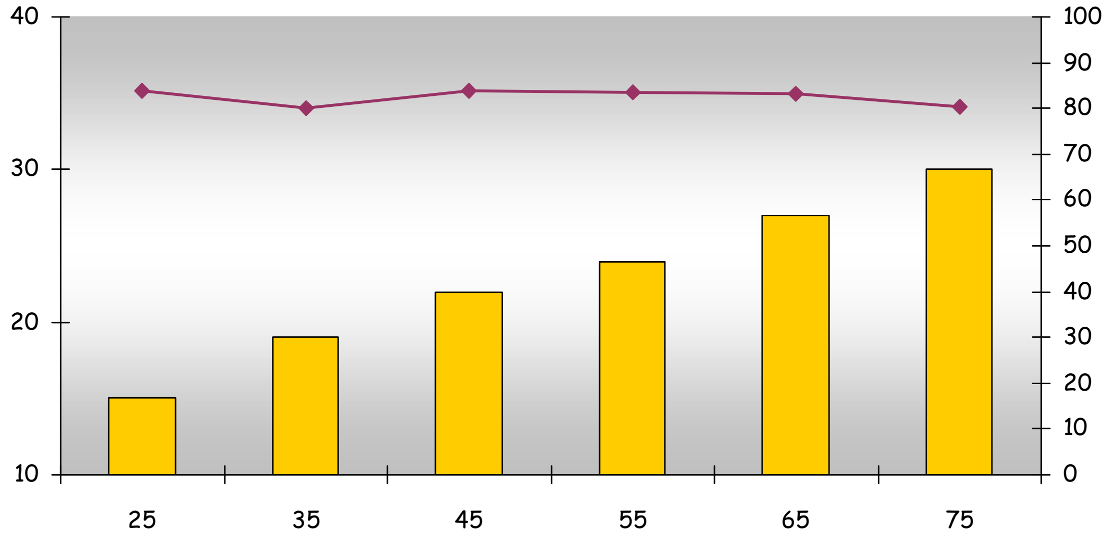
PRAL significa letteralmente *Potential Renal Acid Load*, ovvero *potenziale di carico acido renale*.
Il PRAL è un metodo scientificamente validato, proposto da Remer e Manz, frequentemente utilizzato per calcolare il bilancio chimico delle molecole acidificanti e alcalinizzanti di un alimento o di un integratore. Il PRAL non stabilisce semplicemente il pH di un composto (peraltro facilmente misurabile con altri metodi), ma stima la relativa capacità di interazione con il sangue umano (del range pH compatibile con la vita: 7,38-7,42).
Semplificando, il PRAL determina l'effetto chimico acido-base di un composto sull'organismo umano, naturalmente assorbibile e metabolizzabile dall'apparato digerente sano e funzionante.

Rappresentazione dei principali alimenti acidificanti, neutri ed alcalinizzanti.

Fonte immagine: http://www.mindbodygreen.com

CLASSIFICAZIONE	*DONNE (% di grasso)*	*UOMINI (% di grasso)*
Grasso essenziale	**10/13 %**	**05/12 %**
Atleti	**14/20 %**	**06/13 %**
Benessere	**21/24 %**	**14/17 %**
Accettabile	**25/31 %**	**14/24 %**
Obesità	**>31 %**	**>24 %**

Aumento età correlato del grasso corporeo in maschi sani con body mass index (BMI) costante



Prentice AM & Jebb SA, 2001 (mod)

FABBISOGNO ENERGETICO

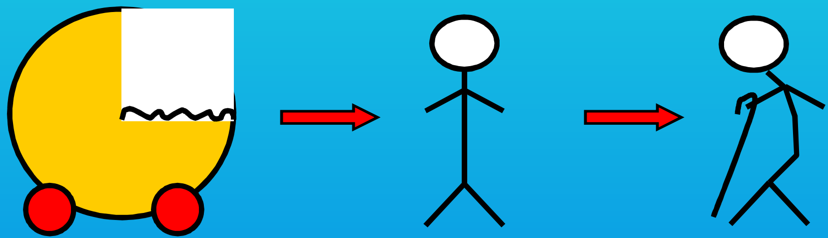
L'organismo umano, per vivere e muoversi, ha bisogno di energia che viene tratta dalla scissione chimica degli alimenti. La quantità di energia consumata tutti i giorni viene detta
DISPENDIO CALORICO QUOTIDIANO, dato dalla somma di:

- METABOLISMO BASALE (60-75%)
- TERMOGENESI INDOTTA (10%)
- ATTIVITA' FISICA (15-30%)

METABOLISMO BASALE:

Consumo energetico minimo di base, necessario per sostenere le funzioni vitali di un organismo a riposo. E'influenzato da:

età



genere

massa corporea

TERMOGENESI INDOTTA o effetto termogenico degli alimenti:

Spesa energetica necessaria per digerire, assorbire ed immagazzinare gli alimenti.

Questo fa si che il 10-35% dell'energia chimica contenuta negli alimenti vada persa nel loro assorbimento.

Il **coefficiente di utilizzazione degli alimenti:**

Calorie introdotte

Calorie effettivamente disponibili

Dipende dal corretto funzionamento dell'apparto digerente e può subire notevoli riduzioni in rapporto alla situazione in cui avviene la digestione (durante attività fisica)

Normalmente:
- 0.98 glucidi
- 0.95 lipidi
- 0.92 protidi

ATTIVITA' FISICA:

Spesa energetica necessaria per sostenere la contrazione muscolare.

Varia in rapporto a:

- tipo di attività
- intensità
- durata
- massa corporea

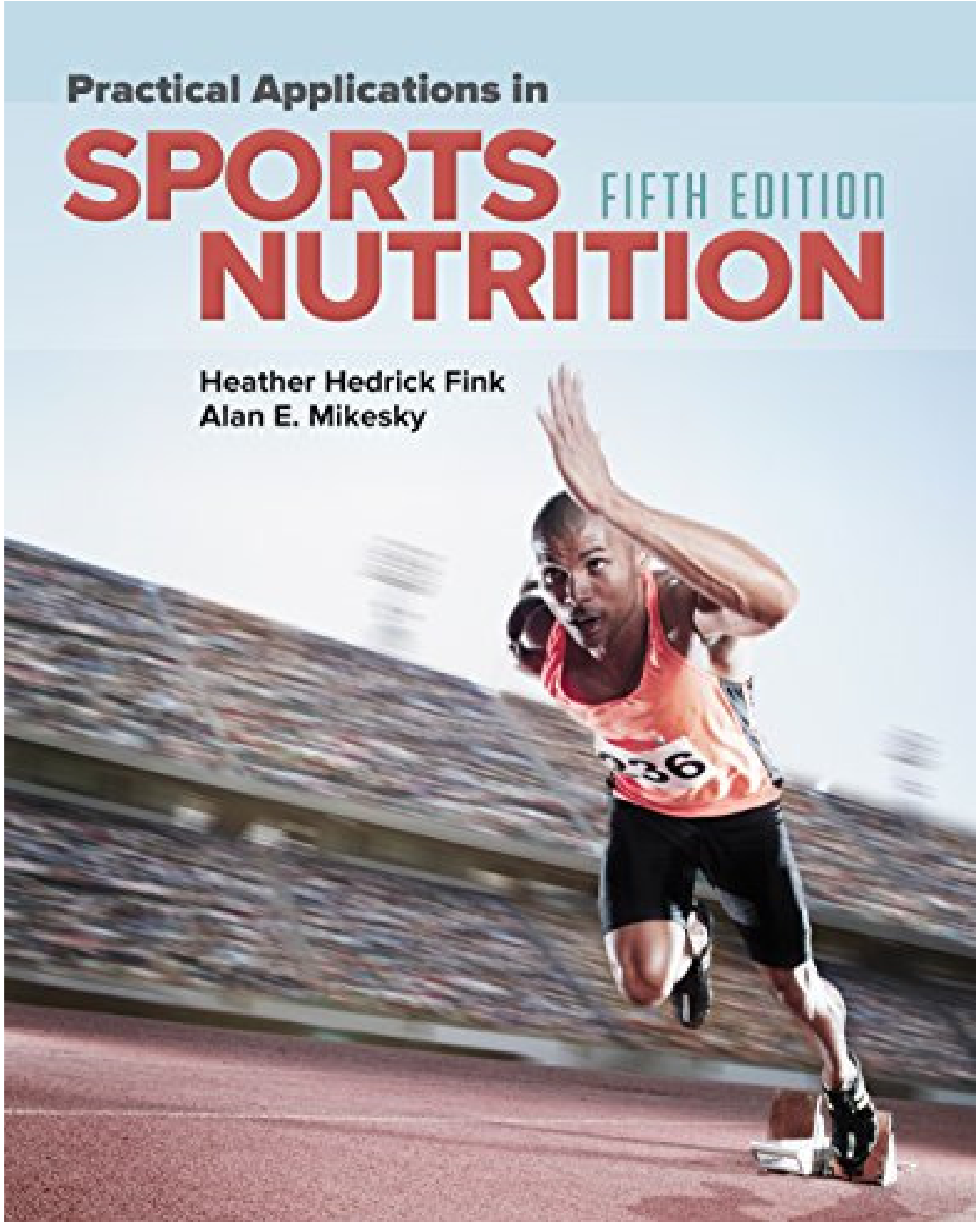
1 ora cammino	340 Kcal
1 ora corsa	630 Kcal
1 ora calcio	454 Kcal
1 ora nuoto	546 Kcal
8 ore acciaieria	4000 Kcal
3 ore stirare	415 Kcal
2 ore ballare	450 Kcal

ATTIVITA' FISICA e CALORIE

Le calorie necessarie per realizzare la contrazione muscolare variano in rapporto a: DISTANZA

- tipo di attività : es. corsa
- intensità: velocità km/h
- durata h
- peso corporeo kg

1 ora cammino veloce	5 km/h	350 Kcal
1 ora corsa	10 km/h	700 Kcal
1 ora calcio		450 Kcal
1 ora nuoto		500 Kcal
2 ore ballo		450 Kcal


Practical Applications in
SPORTS
NUTRITION
FIFTH EDITION
Heather Hedrick Fink
Alan E. Mikesky
036

Key Questions Addressed

- What is different about strength/power athletes?
- What energy systems are utilized during strength/power exercise?
- Are the calorie needs of strength/power athletes different from those of other types of athletes?
- Are carbohydrate needs different for strength/power athletes?
- Are protein needs different for strength/power athletes?
- Are fat needs different for strength/power athletes?
- Are vitamin and mineral needs different for strength/power athletes?
- Are fluid needs different for strength/power athletes?

What is different about strength/ power athletes?

The terms *strength* and *power* are often used interchangeably when describing athletes. Although strength and power are important aspects of physical fitness, and strength is a component of power, they are not synonymous.

strength The ability of a muscle or group of muscles to generate force. Strength is purely a measure of how much weight can be successfully lifted by an athlete. It is highly dependent on the amount of muscle tissue an athlete possesses.

power The ability of a muscle or group of muscles to generate force at high movement speeds. In other words, the more work performed per unit of time, the greater the power output of the muscle. Power is also known as speed-strength.

What energy systems are utilized during strength/power exercise?

The body's three energy systems (the phosphagen, anaerobic, and aerobic systems) are constantly working together to meet the body's immediate energy demands. The short, high-intensity muscle contractions required to perform strength and power sports rely heavily on the phosphagen system, with increasing contribution from the anaerobic system as the length of the activity increases (see Figure 13.1).

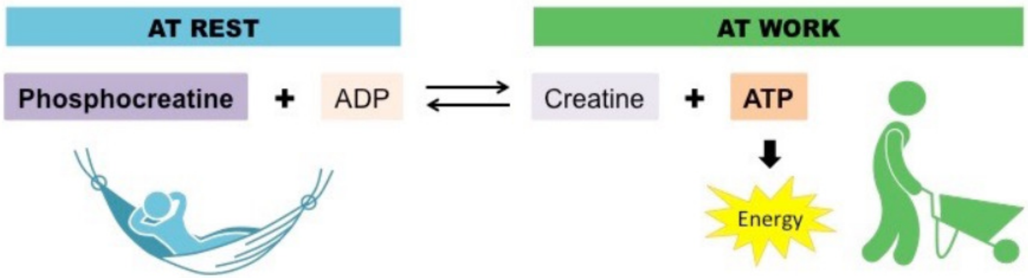
Phosphagens are energy storing compounds that are chiefly found in muscle and nervous tissue in animals

- They function as an immediate access reserve of high energy phosphates that can be used to make ATP
- Phosphagens are found in tissues that experience rapidly changing energy needs (muscles and nerves)

A common phosphagen used by animals (including humans) is phosphocreatine (or creatine phosphate – CP)

- At rest, ATP is hydrolysed to ADP and the phosphate is transferred to creatine to make phosphocreatine
  - This occurs in the mitochondria, where ATP levels are high (thus driving the reaction)
- During exercise, phosphocreatine is hydrolysed and the phosphate is released to make ATP from ADP
  - This occurs in the muscles, where ADP levels will be high (thus driving the reaction)

ATP–CP Cycle



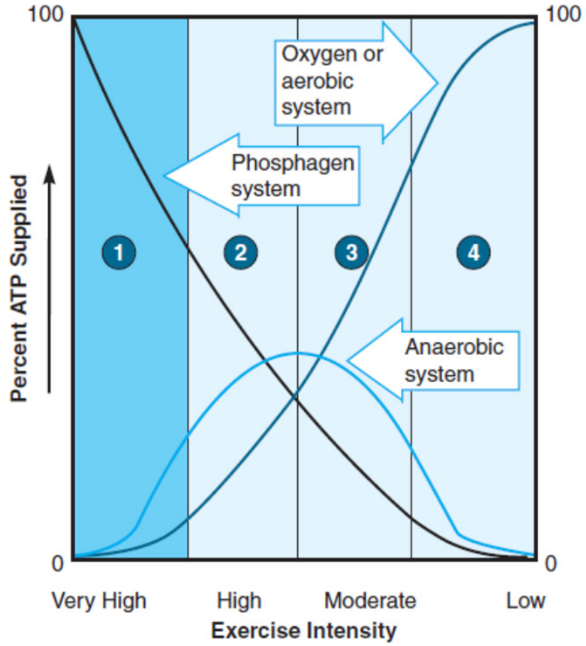


Figure 13.1 Strength/power athletes rely primarily on the phosphagen and anaerobic energy systems to provide ATP. The shaded area 1 in the graph represents all-out activities that progress in length from 1 second (i.e., left margin) to 30 seconds (right margin). Area 2 involves all-out efforts that progress from 30 seconds to about 1.5 minutes. Strength/power athletes tend to perform activities that fall in areas 1 and 2. Although the aerobic energy system is not a major provider of energy for these athletes, it is important for recovery afterward.

Source: Reproduced with permission of the McGraw-Hill Companies from Bowers RW, Fox EL. *Sport Physiology*. 3rd ed. Dubuque, IA: William C. Brown; 1992.

Are the calorie needs of strength/ power athletes different from those of other types of athletes?

As with most athletes, the main dietary concern with individuals involved in strength/power sports is the consumption of adequate amounts of total daily calories. Energy needs are based on several factors, including age, gender, body mass, and sport-specific demands, which can vary tremendously between athletes. No single macronutrient is more important than the others; thus the dietary composition for strength/power athletes is not much different from the recommended healthy diet of nonathletes. This section will review calculating total calorie needs for strength/power athletes, and subsequent sections will focus on the roles of each of the macronutrients, micronutrients, and fluids.

TABLE 13.1

Resting Energy Expenditure (REE) Calculations and Activity Factors

Gender and Age	Equation (BW in kilograms)	Activity Factor
Males, 10 to 18 years	REE = (17.5 × BW) + 651	1.6–2.4
Males, 18 to 30 years	REE = (15.3 × BW) + 679	1.6–2.4
Males, 30 to 60 years	REE = (11.6 × BW) + 879	1.6–2.4
Females, 10 to 18 years	REE = (12.2 × BW) + 749	1.6–2.4
Females, 18 to 30 years	REE = (14.7 × BW) + 496	1.6–2.4
Females, 30 to 60 years	REE = (8.7 × BW) + 829	1.6–2.4

Source: Data from World Health Organization. Energy and Protein Requirements: Report of a Joint FAO/WHO/UNU Expert Consultation. Technical Report 724. Geneva, Switzerland: World Health Organization; 1985:206.

How are calorie needs calculated during strength/power training and competition?

Energy needs for strength/power athletes can vary greatly between a training session and a competitive event. Training sessions can last several hours, whereas performance at a competition may last only seconds or minutes. Therefore, these two scenarios should be addressed differently.

gaining the performance edge

A majority of required calories for strength/power activities should be consumed before or after exercise sessions to avoid gastrointestinal upset and the subsequent interference with training. Consuming sports beverages throughout a practice or eating a light snack during a break will provide the energy needed to fuel high-intensity performance.

For some strength/power athletes, competition day consists of only one event that lasts less than a few minutes. In these situations, it is neither practical nor necessary to consume calories during the event. The body will not deplete its energy reserves in such a short burst of effort, and therefore immediate replenishment is not critical to performance. The exception to this rule is when an athlete is competing in multiple events at the same meet within one day. In this situation, the length of the meet can last several hours, with a small, but progressive, depletion of energy stores with each event. Therefore, to sustain a high level of performance throughout the day, an athlete should plan on consuming easy-to-digest snacks, beverages, and possibly small meals in between events to keep energy levels elevated. The quantity of food consumed will depend on several factors including time between events, length of each event, time elapsed since the last full meal, and personal preferences.

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To meet calorie needs, strength/power athletes should focus on consuming calorie-containing beverages and easily digestible snacks during training sessions and half- or full-day competitive meets. However, during single-bout events it is neither practical nor necessary to consume any food or beverage.

Are carbohydrate needs different for strength/power athletes?

Consuming enough carbohydrates on a daily basis is critical for optimal strength/power performance. Because many strength/power sports rely on anaerobic metabolism, carbohydrates are the main fuel for these short, high-intensity bursts of energy. Anaerobic metabolism taps into glycogen stores for energy during an activity; therefore, if glycogen stores are depleted, performance will suffer.

How are daily carbohydrate needs calculated for strength/power athletes?

Many strength/power athletes will train intensely three to five times per week; without sufficient dietary carbohydrate intake, this could lead to glycogen depletion and decreased performance. An intake of 6–10 grams of carbohydrates per kilogram of body weight per day has been shown to replenish glycogen stores after daily training sessions.[18] This quantity of carbohydrates should contribute approximately 55–65% of total calorie intake.

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Carbohydrates are the master fuel for strength/power sports. Consuming adequate amounts of carbohydrates on a daily basis ensures glycogen stores will be sufficient to support high-intensity training and competition. Carbohydrates also act as a support crew for the construction of muscle mass in response to resistance training.


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Energy needs:
2072
Carbohydrate needs:
290 grams


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Energy needs:
3377
Carbohydrate needs:
468 grams


© Photodisc

Energy needs:
4157
Carbohydrate needs:
612 grams

```
> 290*4/2072
[1] 0.560
```

```
> 468*4/3377
[1] 0.554
```

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> 612*4/4157
[1] 0.589
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Are carbohydrates needed before and during training and competition?

The performance effects of carbohydrate ingestion immediately prior to and during strength/power sports are unclear. The limited research available presents evidence to support a variety of benefits and potential drawbacks. Thus, trade-offs exist, requiring recommendations and nutrition plans to be individualized based on the goals and objectives of the athlete and a consideration of the specific activity to be performed.

A general recommendation for preactivity eating is to consume a carbohydrate-rich meal approximately 2 to 4 hours prior to the initiation of exercise. The provision of carbohydrates helps to top off the body's glycogen stores prior to training or competition.

In fact, some athletes, coaches, and researchers are suggesting the exact opposite nutrition practice—avoiding carbohydrates before and during training.

This school of thought exists mainly in the world of weight lifting and body building. It is based on the premise that a steady stream of carbohydrates into the bloodstream will prevent the body from tapping into other energy sources, specifically fat stores. Therefore, the recommendation is to avoid eating carbohydrate-rich foods 2 to 4 hours prior to exercise. In fact, most recommend not consuming any food before a workout. The second half of the recommendation includes the avoidance of carbohydrate beverages, supplements, and food during a workout. Although this practice will cause the body to turn to fats (adipose tissue and intramuscular fats) for energy, it is well known that when glycogen and blood glucose levels begin to run low, the athlete will begin to tire, perception of effort increases, and performance levels can plunge.

gaining the performance edge

Trade-offs exists in the "to eat" or "not to eat" schools of thought regarding consuming carbohydrates before and during strength/power sports. Currently, most research suggests that supplying the body with carbohydrates before and during exercise will lead to greater gains in strength/power performance. Athletes should try both methods and determine which recommendation is ideal in helping the athlete reach his or her goals and performance potential.

The final recommendation should be based on an athlete's preference for carbohydrate consumption, the effects on performance, and the safety of the athlete. Some athletes feel they perform better on an empty stomach, whereas others become hungry, distracting them from performing well. In terms of safety, if blood glucose levels run too low, athletes can pass out and injure themselves, especially during an activity such as weight lifting. Athletes should test both methods during practice sessions and determine which recommendation leads to improved performance, increased strength/power, overall safety of the athlete, and a feeling of well-being that they are meeting their goals. At the same time, researchers will continue to examine the effects of macronutrients on strength/power performance and eventually determine specific nutritional guidelines.

Are carbohydrates needed for recovery from strength/power activities?

Similar to endurance sports, strength/power activities can deplete glycogen stores, requiring carbohydrate consumption after exercise. Complete replenishment of glycogen stores can take as little as 4 to 6 hours and up to 24 to 48 hours depending on exogenous carbohydrate availability. It is in the athlete's best interest to consume carbohydrates immediately following exercise as well as throughout the day at regular meals and snacks.

Athletes should focus on the timing and quantity of carbohydrates consumed after exercise. A source of carbohydrates should be eaten as soon as possible—ideally within 15 to 30 minutes—after the cessation of exercise. This will ensure that the carbohydrates are digested and delivered to muscles in the window of time in which the muscles are most receptive to absorbing and storing carbohydrates as glycogen for the next training session. Ideally, athletes should ingest 1.0–1.5 grams per kilogram of body weight every 2 hours for 6 hours postexercise. Consuming enough carbohydrates is more important than the exact type of carbohydrates.

Are protein needs different for strength/power athletes?

The high intensities that strength/power athletes train at on a daily basis challenge the body and skeletal muscle. This "challenge" creates microscopic tears in muscle tissue, which are the stimuli for subsequent tissue repair and rebuilding. Amino acids, either synthesized by the body or obtained from the digestion and breakdown of dietary protein, are the building blocks for muscle repair and rebuilding. Because of this function, protein has long been a major dietary focus for strength/power athletes. The mantra has typically been "the more protein, the better." Although strength/power athletes do have higher protein needs than their sedentary counterparts, an overdose of protein intake on a daily basis is not ergogenically beneficial.

How are daily protein needs calculated for strength/power athletes?

Strength/power athletes have an increased requirement for dietary protein. Muscle tissue goes through a process of self-repair on a daily basis and, therefore, sufficient amounts of high-quality protein sources need to be consumed at every meal. Dietary proteins are digested and broken down into amino acids, which the body then uses for building blocks for all bodily tissues. Insufficient protein intakes will lead to suboptimal improvements in muscle development, low energy levels, and poor performance. However, excessive protein intakes can also lead to adverse effects on performance, body composition, and overall health. Strength/power athletes need to find the right balance between these two extremes. In addition to the total protein intake, the variety of protein sources ingested is also of importance.

How do you determine the "optimal" daily dose of protein for strength/power athletes?

The true "optimal" quantity of daily protein intake for strength/power athletes has been debated over the years. A few articles have reported that active individuals become more efficient at using protein on a daily basis, and therefore protein needs actually decline versus increase in athletes.[26,35] However, a majority of the current research points to protein needs in the other direction, at the higher end of the scale. Some researchers suggest a range of 1.4–1.7 grams of protein daily per kilogram of body weight is appropriate,[36] whereas others recommend a higher upper limit of 2.0 grams of protein per kilogram of body weight.[37] Magazines, coaches, practitioners, and athletes often push the upper limit even higher, to levels greater than 2.5–3.0 grams per kilogram of body weight. The bottom line is that strength/power athletes do have increased protein needs; however, there is a limit to the amount of protein that can be used effectively and ingested without adverse effects.

Training Table 13.4: Tips for Maximizing the Benefits of Dietary Protein for Strength/Power Athletes

- *Consume enough total calories to meet energy needs.* If calorie intake declines, a higher percentage of ingested protein will be used for energy versus for muscle building and repair.
- *Consume a level of protein that falls within 1.4–2.0 grams of protein per kilogram of body weight.* This level of protein generally contributes 15–20% of total calories. Athletes should ensure that plenty of carbohydrates and at least minimum amounts of fat are also ingested daily.
- *Include a protein source in every meal and snack.* By focusing on including a protein source at every meal and snack, protein is digested gradually and continuously throughout the day. This recommendation is especially important for athletes engaging in multiple training sessions daily.
- *Choose a variety of different protein sources.* Lean meats, poultry, fish, and dairy products are excellent choices because of their amino acid profile and high overall protein content. Vegetarians should consume plenty of soy products, which also contain an ideal amino acid profile and high protein content. Beans, lentils, nuts, seeds, and grains supply protein in smaller amounts and with low levels of one or two amino acids. By consuming a variety of these sources on a daily basis and in larger quantities, strength/power athletes can achieve optimal intakes of protein.
- *Consume protein supplements in moderation, if necessary.* In general, protein needs can be met through "real" foods consumed throughout the day. Studies have shown that supplemental protein provides no added benefit over whole food sources.[38] However, if an athlete is already eating a well-balanced diet but is still having a hard time obtaining optimal quantities of protein, a supplement can be used in moderation. Protein powders are an appropriate supplement to use because a powder can be added to "real" foods such as milk, yogurt, cereal, and smoothies.

Is protein needed before and during training sessions and competitions?

The benefits of consuming protein before strength/power sports have recently received more attention in the research. Most of the studies have explored not only the effects of protein, but also the combination effect of carbohydrates and protein on muscle synthesis, catabolism, and performance. The influence of ingesting protein during training or competition on strength/power performance has received minimal attention, and therefore the relationship between these two factors is still under investigation.

gaining the performance edge

Until further research is conducted to elucidate the benefits and drawbacks of consuming individual or groups of amino acids, the best way for athletes to obtain amino acids is from protein-rich, whole foods eaten daily in appropriate amounts.

Similar to consuming carbohydrates immediately after endurance exercise to optimize glycogen replenishment, a combination of protein and carbohydrates should be consumed as soon as possible after strength/power activities. A protein–carbohydrate food or beverage should be consumed immediately following a training session or competition, with benefits diminishing 1 to 3 hours postexercise.[55] This nutrition protocol will stimulate the release of insulin to prevent muscle breakdown while also supplying amino acids needed as building blocks for muscle tissue.

gaining the performance edge

Strength/power athletes should aim for consuming at least 6 grams of essential amino acids (obtained by consuming approximately 15 grams of high-quality protein) and 35 grams of carbohydrates as soon as possible after training sessions and competitions. The combination of carbohydrates and protein will aid not only muscle protein synthesis, but also glycogen replenishment.

Are fat needs different for strength/power athletes?

Strength/power athletes burn very little fat during the performance of their sport. The bioenergetic demands of the forceful muscle actions performed by strength/power athletes are met by the phosphagen and anaerobic energy systems, neither of which relies on the metabolizing of fats for production of ATP. Does that mean that strength/power athletes do not need to consume fat? No. Essential fatty acids are needed for the general health of all bodily tissues. Fats are also attractive to the strength/power athlete because of their caloric density. A moderate amount of fat should be consumed on a daily basis, with an emphasis placed on unsaturated fats. The timing of fat consumption is also of importance to avoid any potential performance disturbance during training or competition.

How are daily fat needs calculated for strength/power athletes?

For strength/power athletes, the goal is to find the right balance of carbohydrate, protein, and fat intake to supply all essential nutrients and allow athletes to perform at their best. Fat is a controversial topic requiring the consideration of several factors, including caloric needs; the athlete's desire to lose, maintain, or gain weight; health history; and ideal sources of fat. All strength/power athletes need fat; however, fat intake recommendations can vary greatly.

A general recommendation cited by Rogozkin[18] suggests a daily fat intake of approximately 2 grams of fat per kilogram of body weight. This quantity of fat may be appropriate for most athletes; however, as always, the calculated estimate should be compared to total calorie needs before a final recommendation is made to the athlete. For general health, a fat intake of 30–35% of total calories is considered an upper limit.

gaining the performance edge

Fats are an important component to an overall healthy diet for strength/power athletes. Fat consumption should be kept within the range of 20–35% of total calories, based on total calorie needs and the athlete's goals and objectives. Fats should be obtained from mainly unsaturated sources, while minimizing saturated and trans fat intake. The ingestion of fats before, during, and immediately postexercise should be kept to a minimum. Fats should be ingested in other meals and snacks spread throughout the day.

Do strength/power athletes need to supplement with antioxidant vitamins?

The main antioxidants receiving attention in the exercise arena are beta-carotene, vitamin C, vitamin E, and selenium. Antioxidants are touted to combat free radical damage occurring during and after exercise, including strenuous and high-intensity exercise. Most of the current research conducted on the effects of antioxidants and exercise-related free radical damage has focused on endurance athletes. Although strength/power athletes may need more of these nutrients, a specific recommendation cannot be made at this time. The best option is to consume a variety of antioxidant-rich foods such as citrus fruits, dark green and orange vegetables, nuts, seeds, and Brazil nuts.

Is multivitamin/mineral supplementation necessary for strength/power athletes?

It is a common practice for athletes to take a multivitamin/mineral supplement on a regular basis. Although this may be a good practice for nutrient "insurance," it may not be ergogenic. Several research articles have been published reporting no performance benefit from multivitamin/mineral supplementation for athletes participating in strength/power sports.[68,69]

Food for Thought 13.3

Dietary Analysis of a Power Athlete

In this exercise, you will analyze the meal plan of an athlete whose goal is to gain weight.

Are fluid needs different for strength/power athletes?

Fluid consumption and hydration are important for all types of athletes. Muscle tissue is composed mainly of water, and therefore when dehydration sets in muscular function and performance decline. Consuming adequate amounts of fluid before, during, and after strength/power training sessions and competitions will ensure that an athlete feels energetic; has the stamina for long, intense workouts; and recovers well after each session.

What should athletes drink and when should they drink it?

Similar to other sports, strength/power athletes should focus on water and sports beverages for fluid replacement during training sessions and competitive events. Water is appropriate for training sessions lasting less than 1 hour, whereas sports beverages are the preferred beverage for any activity lasting longer than 60 to 90 minutes.

Logistically, it is slightly more challenging for strength/power athletes to actually ingest adequate amounts of fluid during training, but certainly not impossible. Strength/power athletes should take hydration breaks at least every 10 to 15 minutes during training sessions. Sufficient amounts of water or sports drinks should be consumed at each break to meet individual sweat rate requirements over the course of an hour. Athletes need to take personal responsibility for maintaining hydration by bringing bottles filled with adequate amounts of water and sports beverages to every practice and drinking consistently.