



# Vitamins and oligoelements in NMD nutrition

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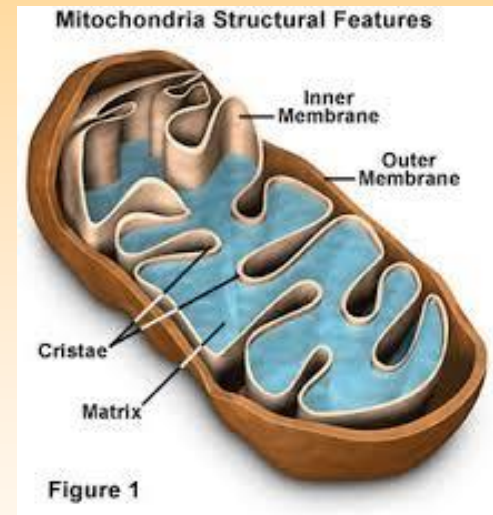
# Drugs, vitamins, carnitine in supermarket, drugstores... What is important to know? Where to start?



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# Carnitine

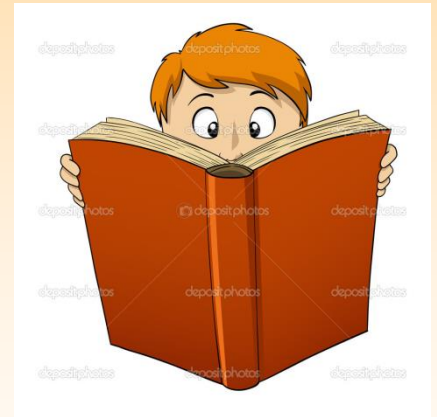
- In living cells, it is required for the transport of fatty acids from the cytosol into the **mitochondria** during the breakdown of lipids (fats) for the generation of **metabolic energy**.
- Important for organs with high energy demands
- **In food** up to 75% of daily carnitine needs (red meat, fish, milk)
- **Synthetised** in liver and kidney
- 
- More than 90% of carnitine in human body is in striated muscles
- In vegetarians: endogenous synthesis and kidney tubular absorption may rise up to 90%





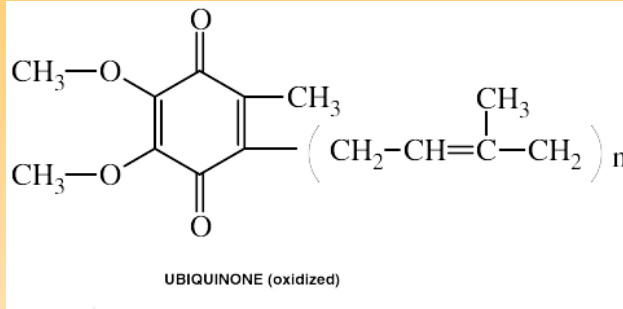
# Literature, internet, recommendations and indications

- Infertility
- Immune system
- Chronic fatigue
- Weight reduction
- ADHD
- Learning difficulties

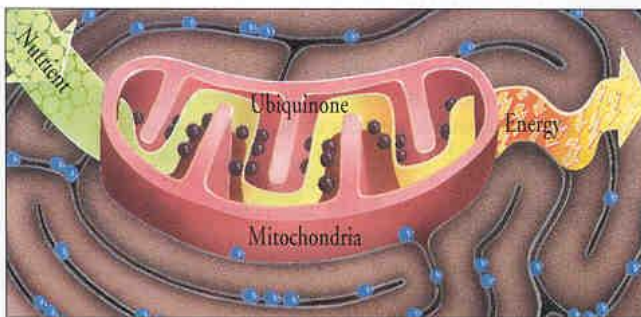


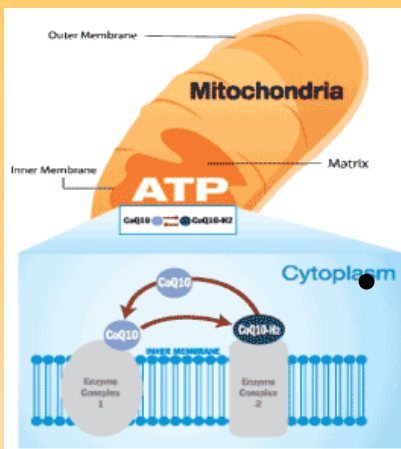
- **Therapy in muscle diseases: up to 1 g/day**

# Coenzyme Q10



- Discovered in 1957 by FL Crane
- In organelle membranes
- Present in every human cell
- **Aerobic metabolism**
- Tissues with high energy demands
- Biosynthesis and food





# Coenzyme Q10 from food:

- **Heart** (113 mg/kg), **liver** 50, sardine 64, soy oil 280, fruits and vegetables only 1-5.




## CoQ10 has „enemies“:

- **Cooking**- decreases CoQ10 30%
- **Statins** (decreased absorption)
- After 20 years of life: decreased utility of CoQ10
- **UV rays**: decrease skin CoQ10

**Q: should healthy people take CoQ10?**

# CoQ10

- **There is no signs of CoQ10 increase in voluntary muscles after increased ingestion of CoQ10**
- Annual sale in US **200 000 000** 
- **The benefit for inherited muscle diseases is not proven**
- Good results: in some mitochondriopathies with myopathy
- No side effects, no intoxication

# Idebenone, coenzyme Q10, vitamin E

- Friedreich ataxia with heart involvement
- CIAP (chronic idiopathic axonal polyneuropathy)
- CoQ10 400 mg/day i 2100 IU vit E (Lodi R et al 2001 Ann Neurol)
- Idebenone 5 mg/kg/day
- **Vitamin E-** Postirradiation plexopathy, autoimmune diabetic polyneuropathy
- Caution: intoxication possible (DEKA vitamins)



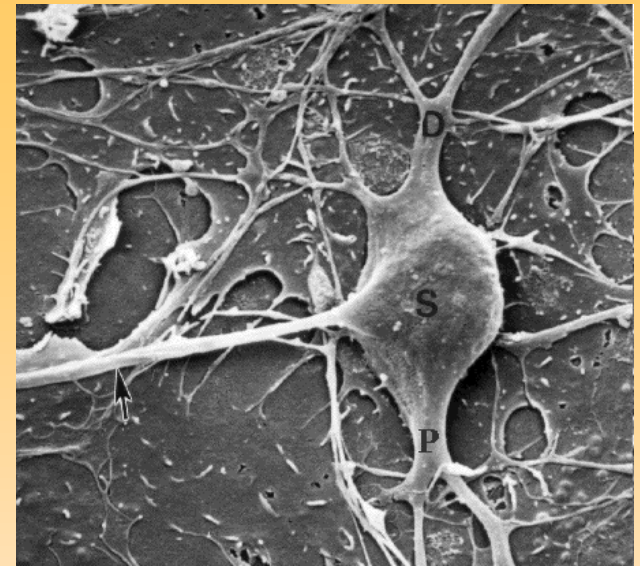
# Hypovitaminosis B12: the curable neurological disease

- Described by Sir Russell Brain (1895-1966)

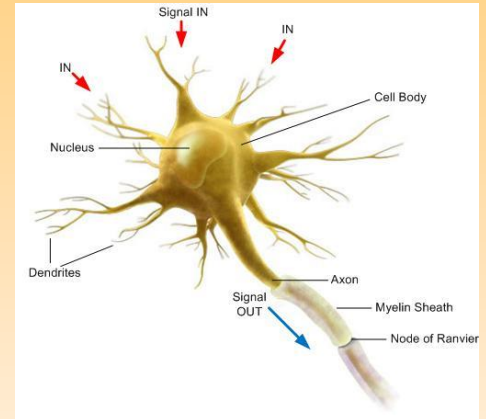


# Clinical signs:

- UMN and LMN signs:
- Cognitive alteration
- Sweat production changed
- Falling, gait disturbance
- Mood alterations
- Weakness and hypotrophy of distal muscle groups
- Paresthesia
- Depression
- Sleep disturbances



# Food and B12

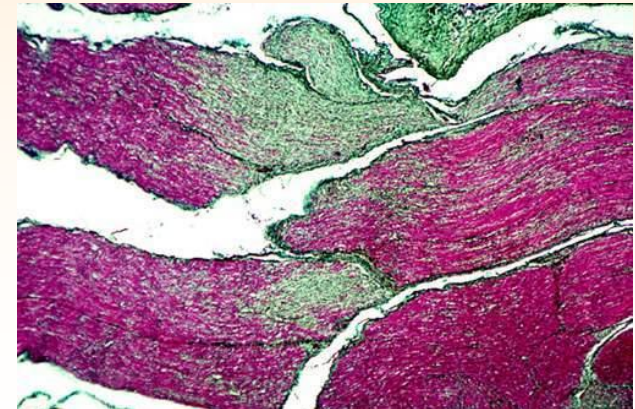
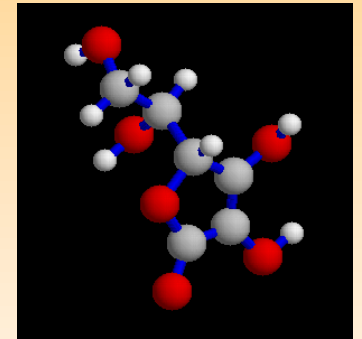


# Who is affected?

- Up to 25% of South America population
- 7% of USA population
- 2% of European population
- 32% of europeans older than 60 y



- Studies about high vitamin C doses in inherited **polyneuropathy**
- 2x1g of vit C orally in CMT1A.  
**No significant improvement**
- Hughes RAC et al (Brain 2004):  
no significant difference in vit C  
in CIAP patients





# Selenium



- Lack of selenium is connected with autoimmune thyroid diseases and other **autoimmune diseases**
- Involved in regulation of T immune cells
- It is recommended to determine selenium concentration in **chronic autoimmune polyneuropathy**



# Copper

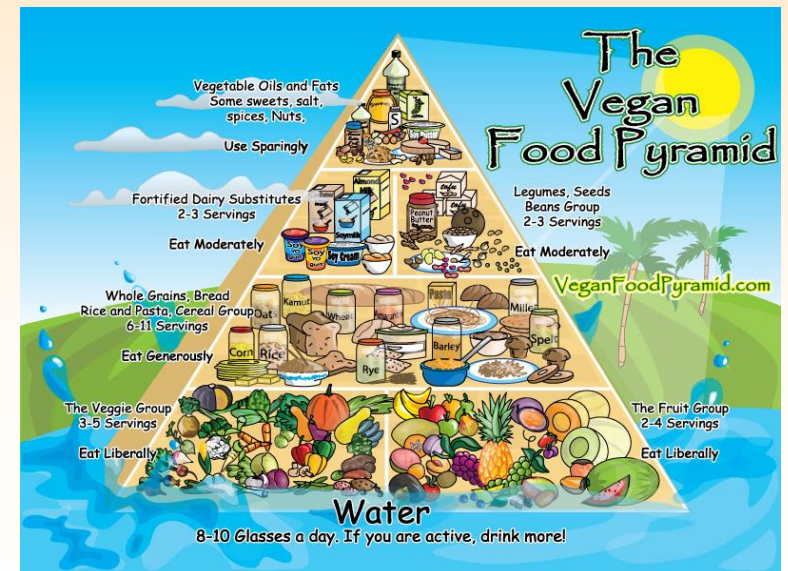


# Copper

- Neuropathy, myelopathy, ataxia
- Anemia,
- Immunoregulatory role
- Th dose from **2 mg/day**
- Multivitamin drugstore products contain max **0.5 mg!**



# Food is good 😊



# Take home messages

- Regular and diverse food is good
- Vitamins when needed **BUT in proper doses**
- Carnitine and Co Q10 when there is indication **BUT in proper doses**





Thank you😊

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