



*Die Kompetenz in Kalium und Magnesium*

K+S KALI GmbH

**Magnesium - Mineral of Wellbeing and Wellness**

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**2<sup>nd</sup> International Symposium on Magnesium  
in Crop Production, Food Quality and Human Health  
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# Magnesium is an Essential Mineral

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- Macromineral
- Bioessential
- For all plant, animal & human organisms
  
- Fourth most abundant mineral in human body
- Important in all stages of life
  - Children, teenagers, elderly
  - Pregnancy, lactation
  - Stress, sports
  
- Potent activity as a healing agent in traditional medicine around the world

# Occurrence in Nature



## EARTH'S CRUST

1.94% AS CARBONATES (DOLOMITE)  
SILICATES (TALC)  
CHLORIDES (CARNALITE)  
SULPHATES (KIESERITE)  
IN MINERAL SPRING, „BITTER WATER“

## PLANTS

CHLOROPHYLL



## SEA WATER

0.30% Mg CHLORIDE  
0.04% Mg BROMIDE  
0.18% Mg SULPHATE



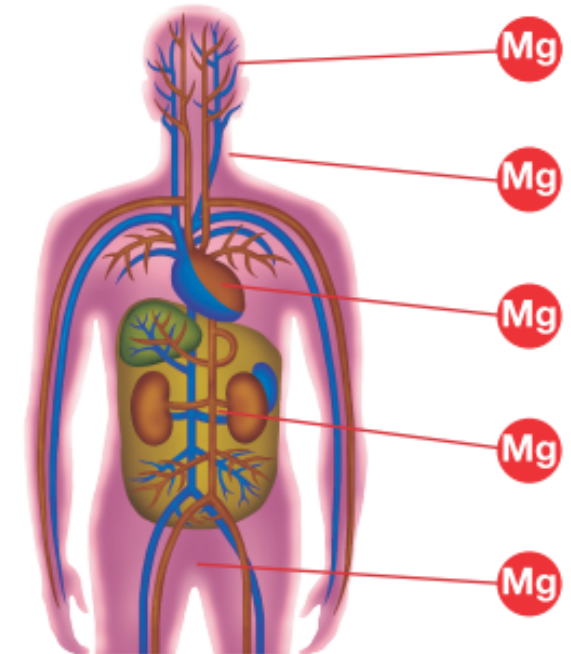
# Functions in the Human Body

## Key mineral in over 300 enzyme reactions

- Protein synthesis
- Muscle and nerve functions
- Blood glucose control
- Blood pressure regulation
- Energy production
- Structural development of bones

## Magnesium in the human body

- 25 g in the whole body
- 50-60% in the bones; the rest in the soft tissue
- < 1% in blood serum (optimal [Mg] 0.7- 1.0 mmol/L)



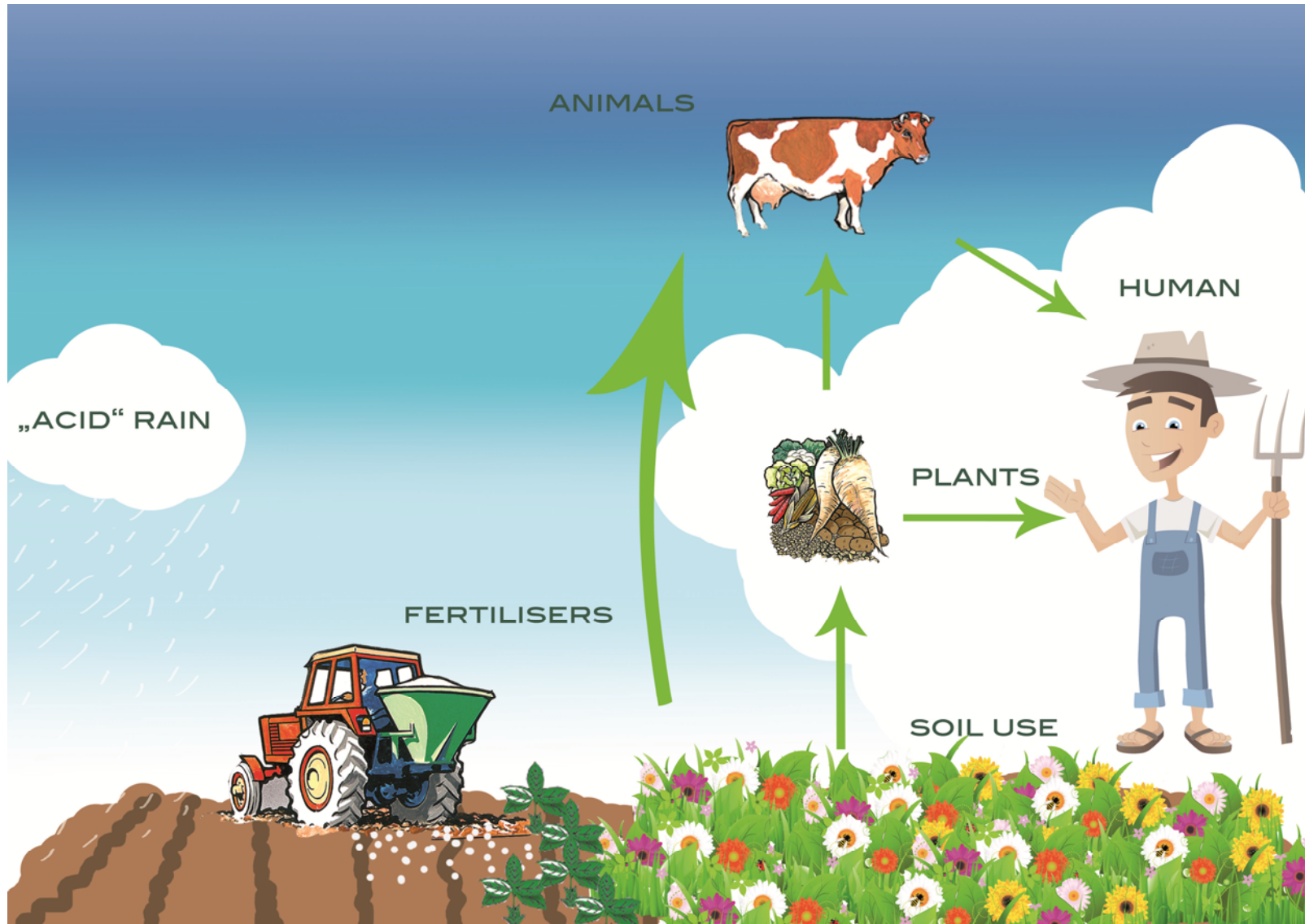
# Recommended Dietary Allowance (RDA)

| Age               | Male   | Female | Pregnancy | Lactation |
|-------------------|--------|--------|-----------|-----------|
| Birth to 6 months | 30 mg* | 30 mg* |           |           |
| 7-12 months       | 75 mg* | 75 mg* |           |           |
| 1-3 years         | 80 mg  | 80 mg  |           |           |
| 4-8 years         | 130 mg | 130 mg |           |           |
| 9-13 years        | 240 mg | 240 mg |           |           |
| 14-18 years       | 410 mg | 360 mg | 400 mg    | 360 mg    |
| 19-30 years       | 400 mg | 310 mg | 350 mg    | 310 mg    |
| 31-50 years       | 420 mg | 320 mg | 360 mg    | 320 mg    |
| 51+ years         | 420 mg | 320 mg |           |           |

\* Adequate Intake (AI)

Source: [1] Institute of Medicine (IOM). Food and Nutrition Board. [Dietary Reference Intakes: Calcium, Phosphorus, Magnesium, Vitamin D and Fluoride](#). Washington, DC: National Academy Press, 1997.

# Normal Magnesium Absorption



# Origin of Magnesium Deficiency

Actual diet trends (Gluten free, fibre rich, etc.)  
Bad habits (Caffeine, alcohol, etc.)



Lower magnesium absorption



Magnesium deficiency

## Treatment Options

Oral Intake

Pharmacological  
Treatments

Transdermal Intake



# Diseases Caused by Magnesium Deficiency

Magnesium amount within the body decreases

Loss of appetite, nausea, vomiting, fatigue, weakness, bad mood etc.



Magnesium deficiency is not compensated and worsens

Numbness, tingling, muscle contractions etc.



Cardiovascular disease

Hypertension, stroke, hypocalcaemia, hypokalaemia



Death

# Compensation of Magnesium Deficiency

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- Naturally occurring magnesium in food
- Dietary supplements
- Drugs (when magnesium deficiency is severe and/or pathological)
- Transdermal crèmes and oils also known as wellness treatment

## Magnesium-rich Food

- Green leafy vegetables (spinach, legumes, etc.)
- Nuts (almonds, cashews, peanuts, etc.)
- Whole grains (millet, barley, rye, buckwheat)
- Fish
- Some fruits as bananas and avocados
- Dark chocolate

## Dietary Supplements

- Magnesium Bicarbonate
- Magnesium Carbonate
- Magnesium Chloride
- Magnesium Hydroxide
- Magnesium Oxide
- Magnesium Phosphate
- Magnesium Sulphate

# Functional Uses of Epsom Salt in Food

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- Nutrient used primarily in
  - Salt-replacer products
  - Dietary supplements
  - Carbonated diet soft drink beverages
  - Sports drinks
  - Enhanced (fortified) water beverages
- Flavour enhancer in bottled water products
- Processing aid (fermentation aid in malting and brewing of beer, ale and malt beverages)
- Firming agent in soybean curd in Japan

# Pharmacological Treatments

Magnesium oxide  
Magnesium citrate  
Magnesium gluconate  
Magnesium sulphate (intravenous infusions)

## Heart and blood vessels diseases

- Irregular heartbeat
- High blood pressure
- High level of “bad” cholesterol
- Heart valve disease

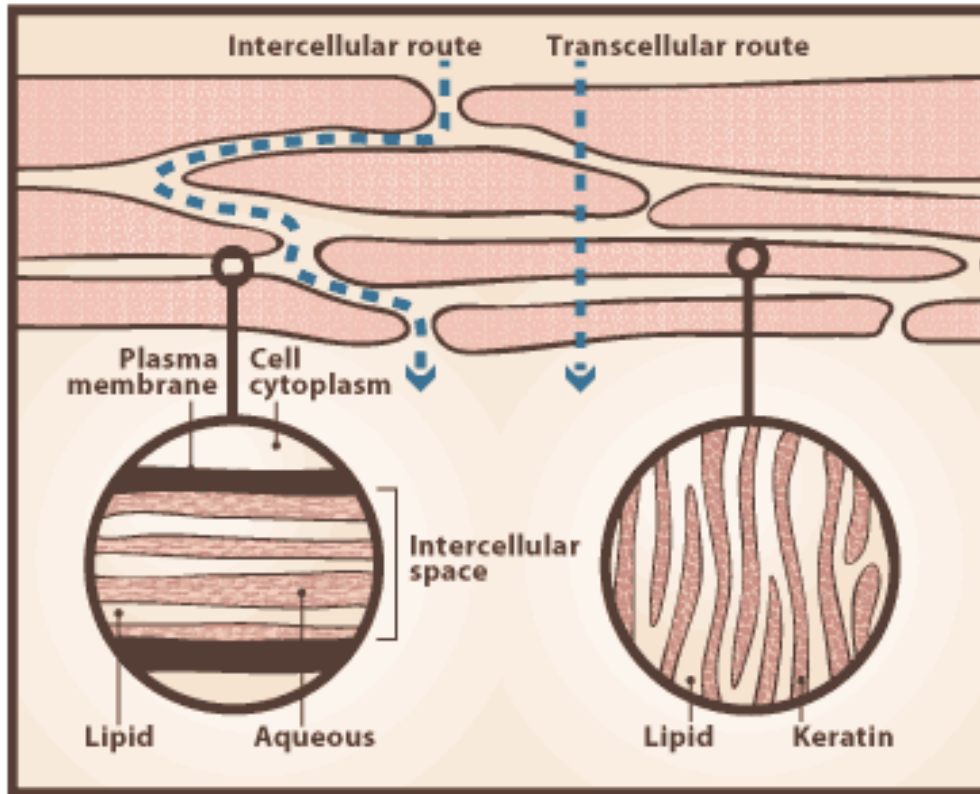
## Mental disease/ psychosomatic disorders

- Anxiety and depression
- Attention deficit-hyperactivity disorder (ADHD)
- Chronic fatigue syndrome

## Others

- Bones diseases
- Allergies

# Transdermal Absorption



- Transdermal application is the method of delivering a substance to the body through the skin
- Epsom Salt is the most used magnesium salt for skin treatment
- For magnesium it is a safe method of increasing the magnesium intake beyond the oral supplement!

Source: Ancient Minerals. *Topical Magnesium: How It Works*. 1996-2010 LL Magnetic Clay Inc. Available at: <http://www.ancient-minerals.com/transdermal-magnesium/how-topical/>. Accessed 19<sup>th</sup> September 2014

# Benefits of Magnesium in Human Health

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- Reduced muscle aches, pain, cramping, spasma
- Reduced outbreaks of eczema and psoriasis
- Increased sleep
- Increased athletic performance
- Better relaxation
- Improved moods



