

***THOUGHTS:
GENOMICS AND SULFUR WATER BATH THROUGH
SKIN OF EMOTIONAL RHEUMATOID ARTHRITIS
PATIENTS***

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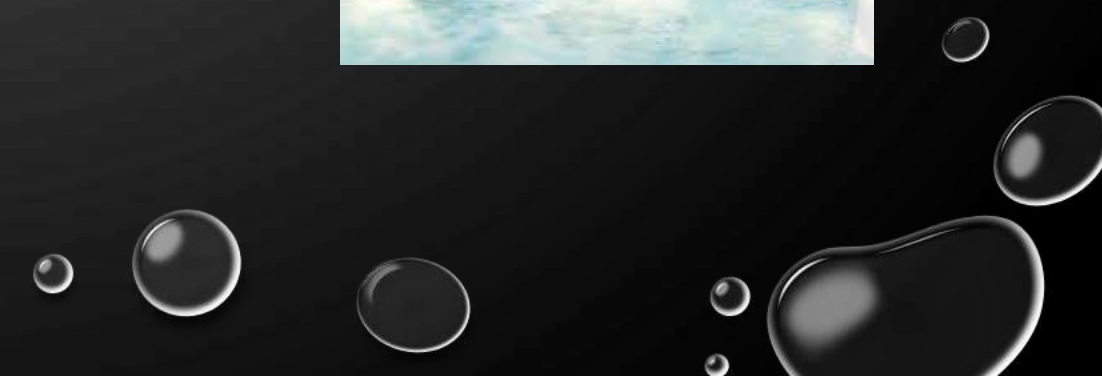
SUMMARY

- **WHAT ABOUT FACTS, BELIEVES AND MYTHS?**

- **GROUNDWATER** – SPECIALLY SULFUR WATER
- **SKIN** - MESSAGE TRANSMISSION TO WHOLE BODY OF RHEUMATOID ARTHRITIS PATIENTS
- **INTERACTION** BETWEEN THE 2 ABOVE “WORLDS”
- **REFLEXIONS ...**



AIM: Critical thinking on the nature, mode and reasons for the pathways of sulfur water through the skin of each rheumatoid arthritis patient

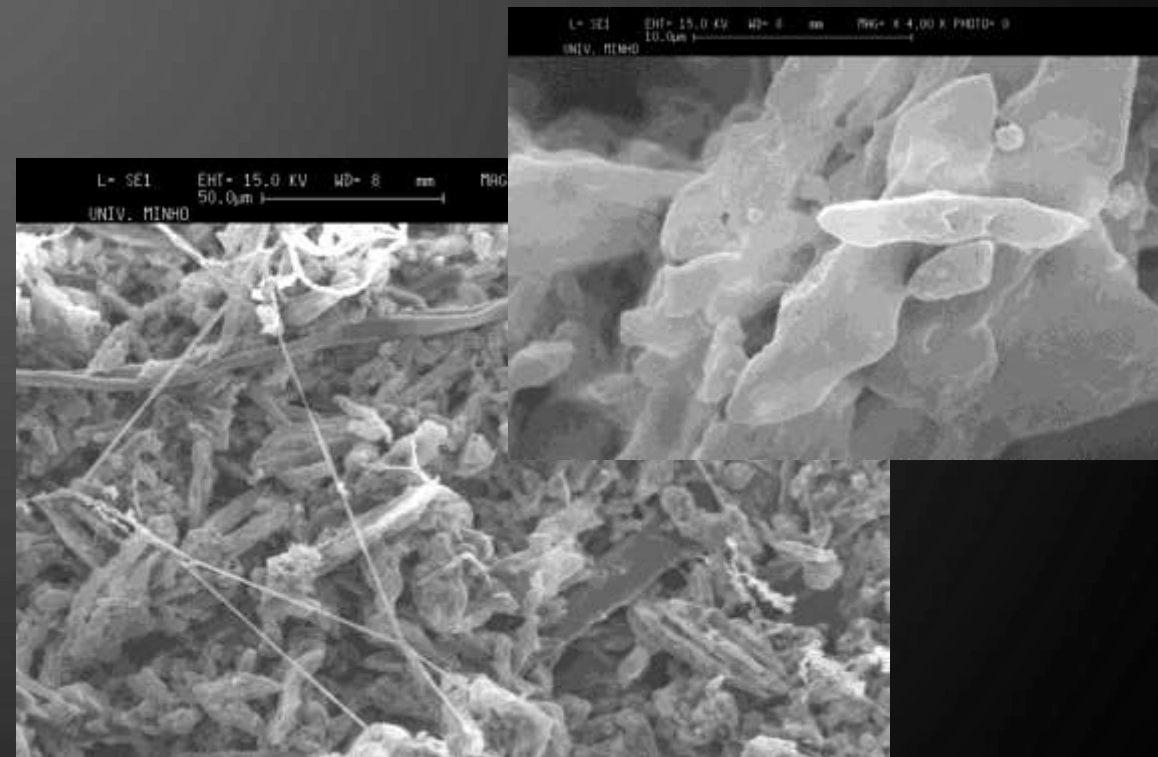


GROUNDWATER

Natural mineral water = “true fingerprint of thermal waters” - different and differencing microbial along with physical-chemical specificities has unique characterization, resulting in different therapeutic properties

To what extent are microorganisms differentiating thermal waters in terms of composition and, as such, responsible for their biological action?

How they communicate?!...

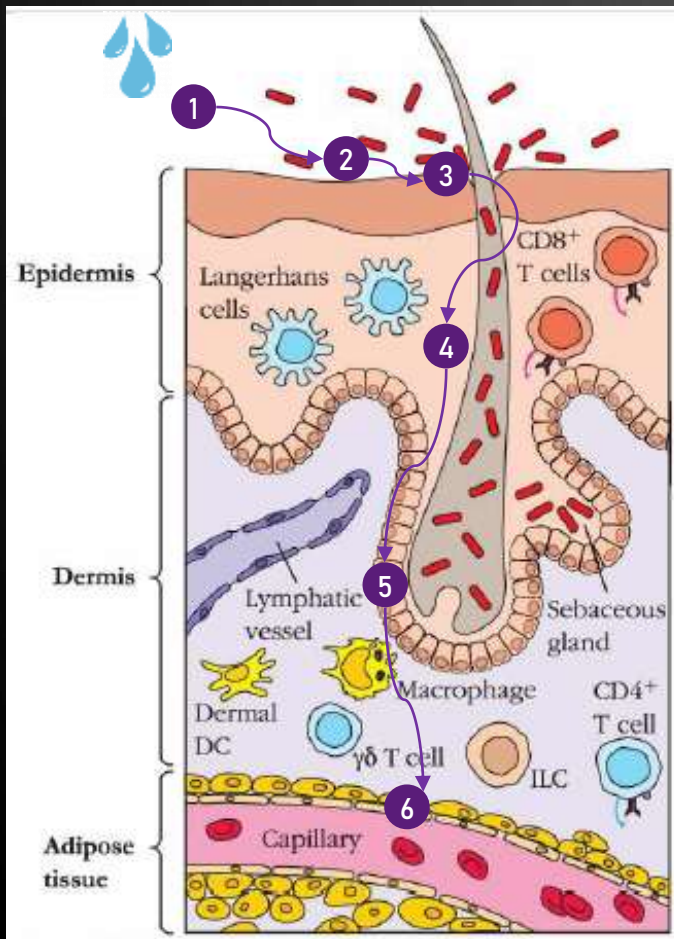


Sulfur particles and growing bacteria between them in a water sample of S. Jorge Spa (scanning electron microscope)

SULFUR IN MINERAL WATERS AND IN THE HUMAN BODY

- Sulphide (in different formulas) is dissolved in geothermal waters of many hot springs
 - Sulfur cycle has an important role on the indigenous microbial community following alterations of subsurface biogeochemistry and microbial metabolic activities
 - Sulfur waters contain microorganisms which DNA genes, less or more active at the emergency spring, including the intervention of RNA may be source of unique composition and biologic function of water
 - Hydrogen sulfide (H₂S) controls **physiological** and **pathologic** responses but multiple mechanisms are still unknown.
- Endogenous and exogenous hydrogen sulphide (H₂S) has many therapeutic functions but it is still not clear what are the ideal concentrations of each chemical element in order to be effective

TRANSDERMAL PASSAGE



- **Autoimmune disease** - after initiation of self-destruct, or worse after self-destruction completed, there is little to do!
- At each step of the process, the **active ingredient** must be more soluble or driven by a concentration gradient so that it further penetrates the skin.

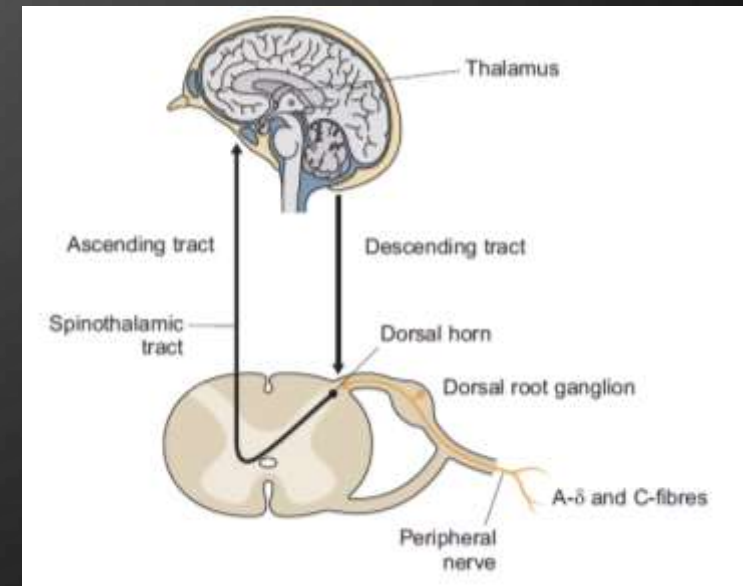
1. Liberation
2. Adsorption
3. Absorption
4. Penetration
5. Permeation
6. Resorption

Practically all cell types residing in and transiting through skin can exhibit immune functionality.

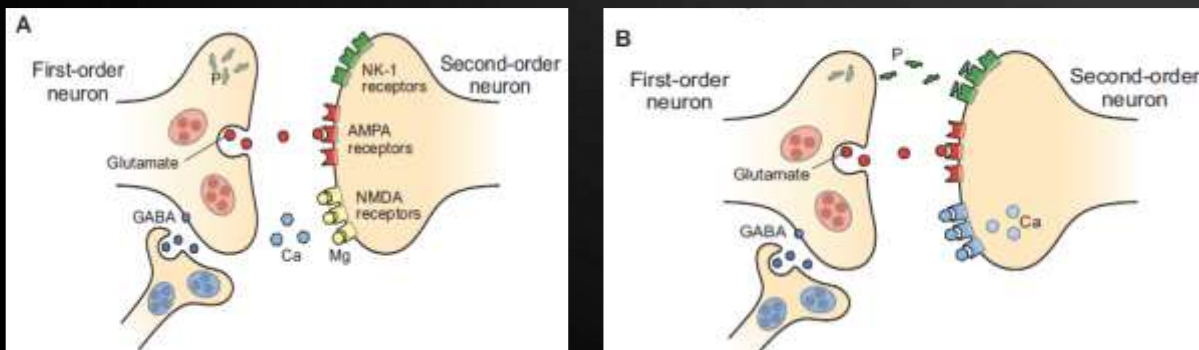
SKIN

- Strategically placed to provide not only a **barrier** against a range of noxious stressors but also to act as the **periphery's 'sensing' system**
- An enormous **multi-functionality**, namely acting as a real **neuroendocrine organ** and an **immune system**, in the periphery

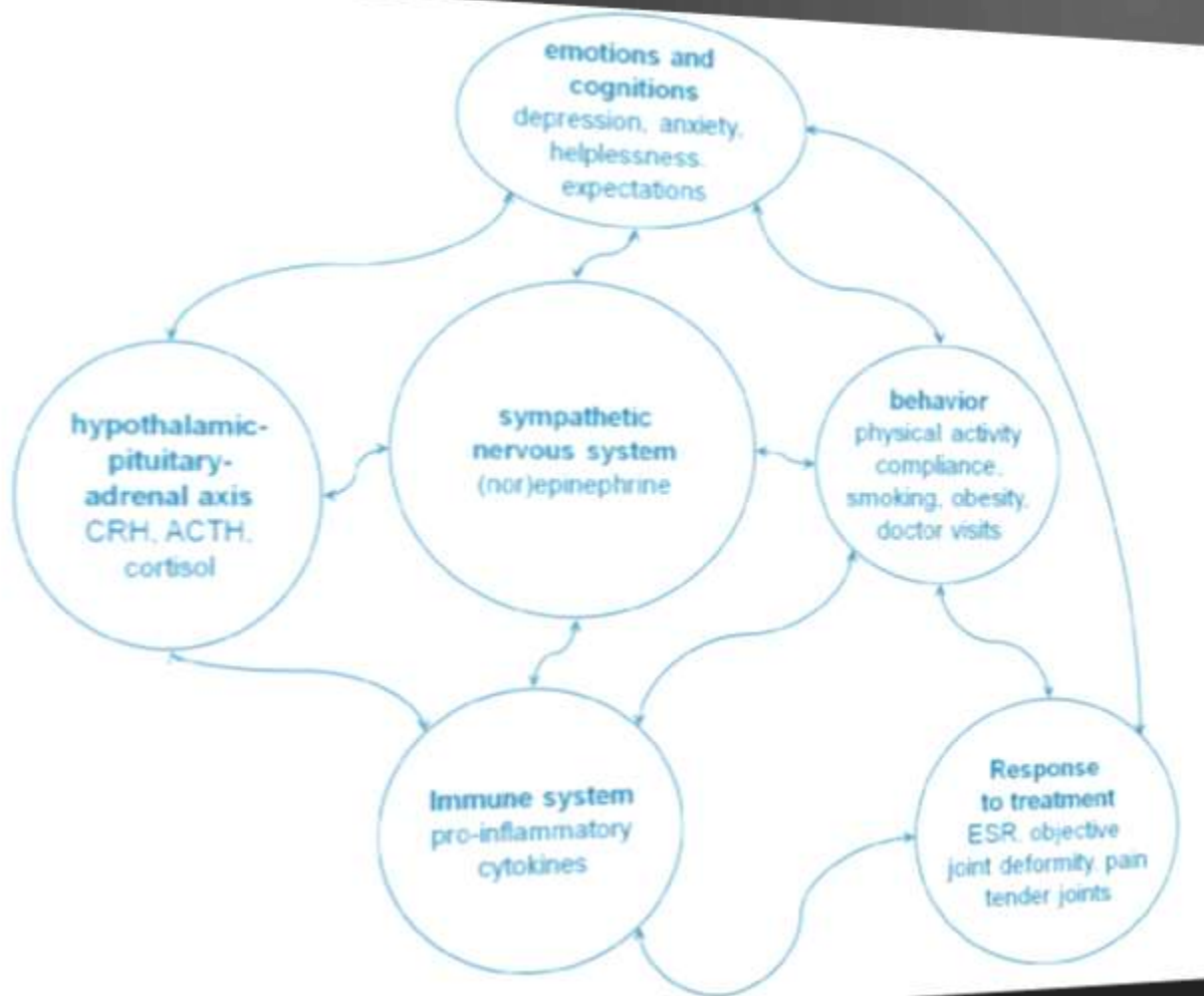
Each person - specific commensal microbial flora (like the groundwater)



We can act at **peripheral level?!?**



BEING HUMAN - BEING EMOTIONAL



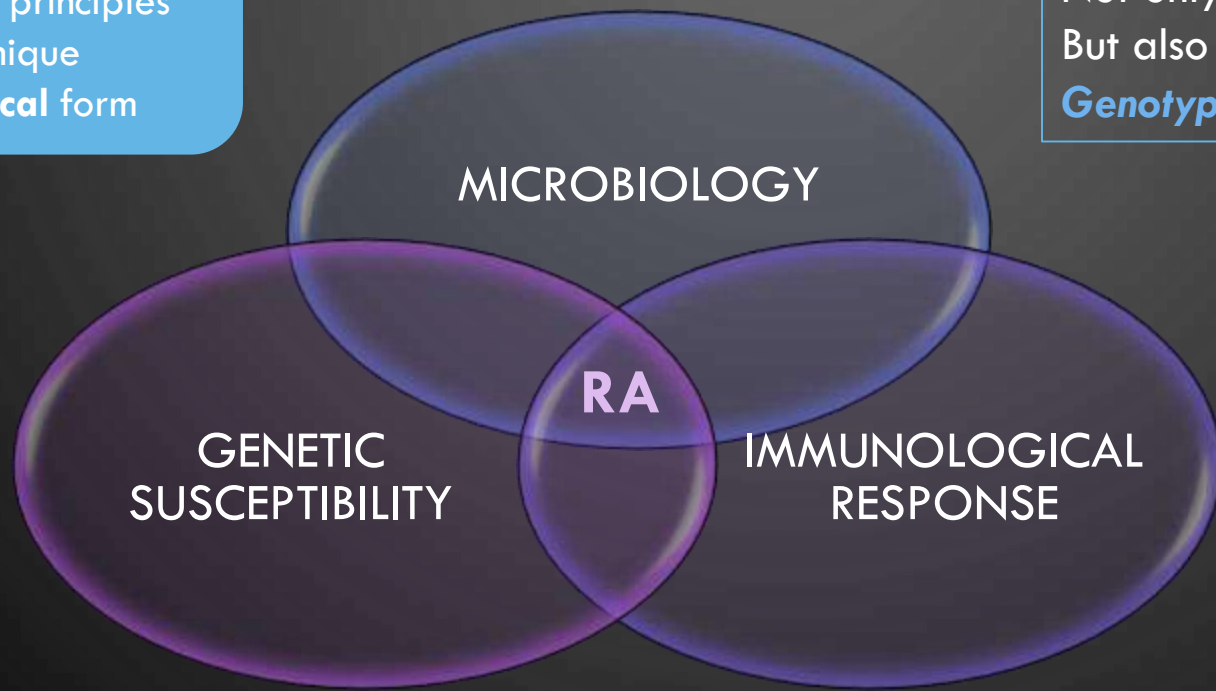
Physical and emotional imbalances

Personal Life Impact
undoubtedly interferes with
the disease

REFLEXIONS

Sulfur Water Bath = true drug (like any topical therapy) for body treatment, with active principles that define its unique hydrobiogeochemical form

+++ DNA and RNA
Not only in human body
But also in groundwater
Genotypic and phenotypic information



IMMUNE FAMILY
« **Functional** » immunogenic system:
receptor of internal and external signals, and the center of complex interactions (patient/skin/sulfur water).

Future useful algorithms will almost certainly require combining genetic information with other biomarkers, both for diagnosis and risk assessment, as well as treatment decisions - genotypic and phenotypic information need to be joined to achieve long-term goals!

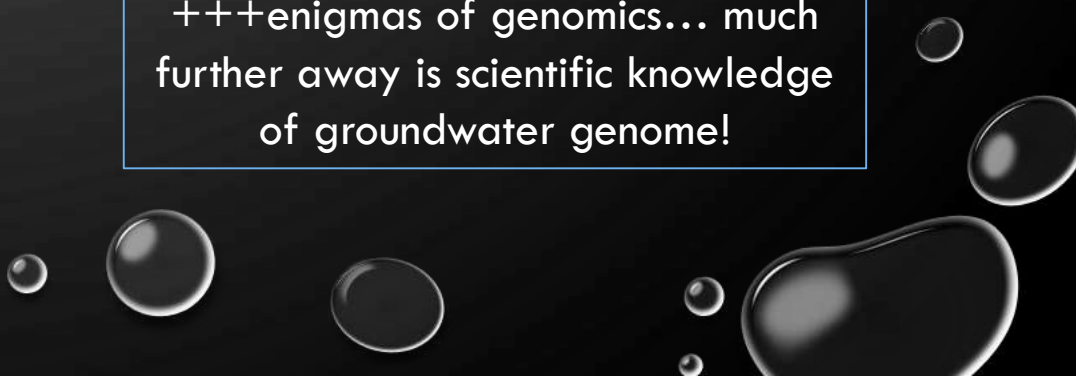
REFLEXIONS

Hydromineral resources have relevant **economic value** for the thermal spas industry, promoting **quality of life of the population** with an adequate prescription.

A multi-technical approach highlights the importance of groundwater vulnerability to contamination mapping as a tool to support hydrogeological conceptualization, contributing to better decision-making of **water resources management and sustainability** – **molecular fingerprinter in groundwater with security**

**Complexity of geothermal microbial communities
interacting with the whole Human**

Big and Opening challenges
+++enigmas of genomics... much
further away is scientific knowledge
of groundwater genome!



REFLEXIONS

Perhaps in the future, we can answer to the questions: what actually happens between genomics of sulfur water and rheumatoid arthritis (RA) patients bathing in sulfur water? As any other drug, what is the systemic response of **biopsychosocial** individual in contact with thermal mineral water through the skin?

In our society, with less and less respect for the environment, **preserving** and **promoting** natural wealth, such as thermal waters, can help to restore human well-being.

- Always working, discover (genetics, biomarkers, serum analysis, etc)
- “Real” Team, sharing knowledge (Health professionals; Geologists; etc)
- Each contribution is **Complementary not Alternative!**

WHO - *Preventive Medecine*

Improved **effectiveness** and less **toxicity**

Thank you for your attention
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