Chronic Lyme and Neurological Disorders: Mechanism & Treatments

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PHELIX RESEARCH AND DEVELOPMENT

Neuro-Degeneration and Chronic Infections

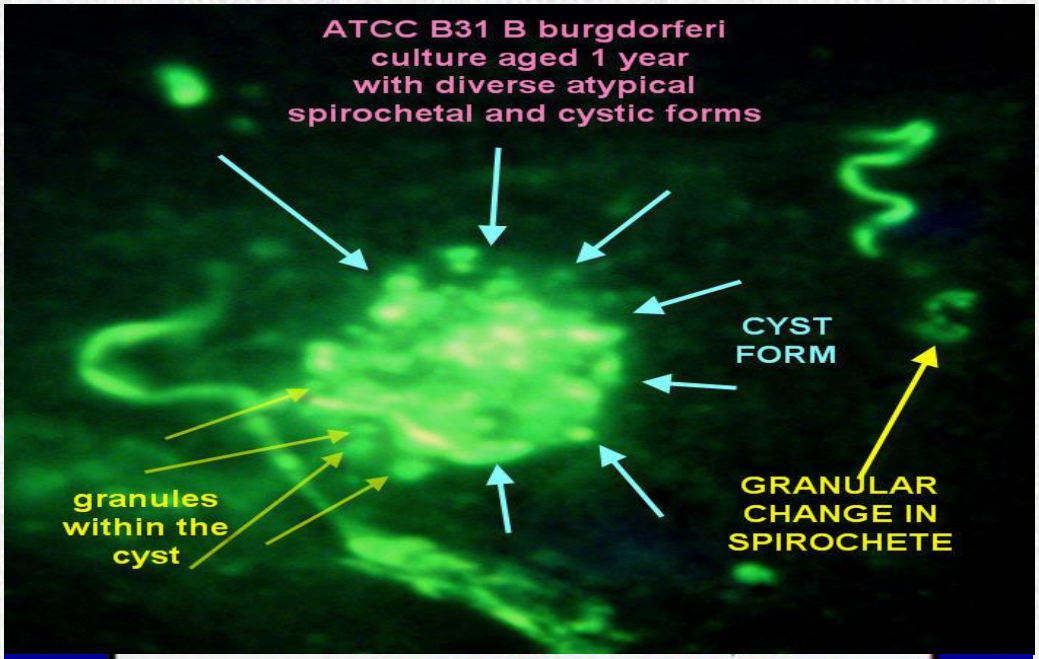
Infections and co-infections

Conditions Identified by Symptoms	Chronic Infections Commonly Observed
Amyotrophic Lateral Sclerosis (ALS)	Mycoplasma fermentans (and other species), *Borrelia b.*, *Chlamydia pneumoniae*, HHV6 virus.
Multiple Sclerosis (MS)	*Chlamydia pneumonia*, *Borrelia* b., HSV1 and other Herpes Viruses
Alzheimer's Disease (AD)	*Chlamydia pneumonia*, Mycoplasma species, *Borrelia* b, HVV6 and other Herpes Viruses
Parkinson's Disease (PD)	*Helicobacter pylori*, coronavirus, *Mycoplasma* Species.
Autism Spectrum Disorder (ASD)	*Mycoplasma fermentans* (and other species), *Borrelia b*, *Borrelia* g., Borrelia a., *Rickettsia*, *Sutterella*,*Chlamydia pneumoniae*, HHV6 virus.
Chronic Fatigue Syndrome (CFS)	*Mycoplasma pneumonia* (and other species), *Borrelia* b., *Borrelia* g., *Borrelia* a, *Chlamydia pneumonia*

Source : Garth Nicolson (Institute for Moclecular Medecine CA USA)

Lyme *Borrelia* strains

- ***Borrelia*** **is an obligate parasite with a minimal genome with a main chromosome (911 kb for the type strain B31), and 20 or more smaller plasmids ranging from 5-50 kb**
- ***Borrelia*** **rely on the host to acquire building blocks**
- **Survival forms : Cyst, Blebs, Biofilms & Cell Wall deficient**
- **In the human body, glucose is the primary energy source for *Borrelia***
- ***Borrelia*** **in the blood is very low < 100/ml**
- ***Borrelia*** **can be outside human cells or inside human cells, antibody-binding is necessary to locate**
- **Intracellular *Borrelia* can survive inside human cells**



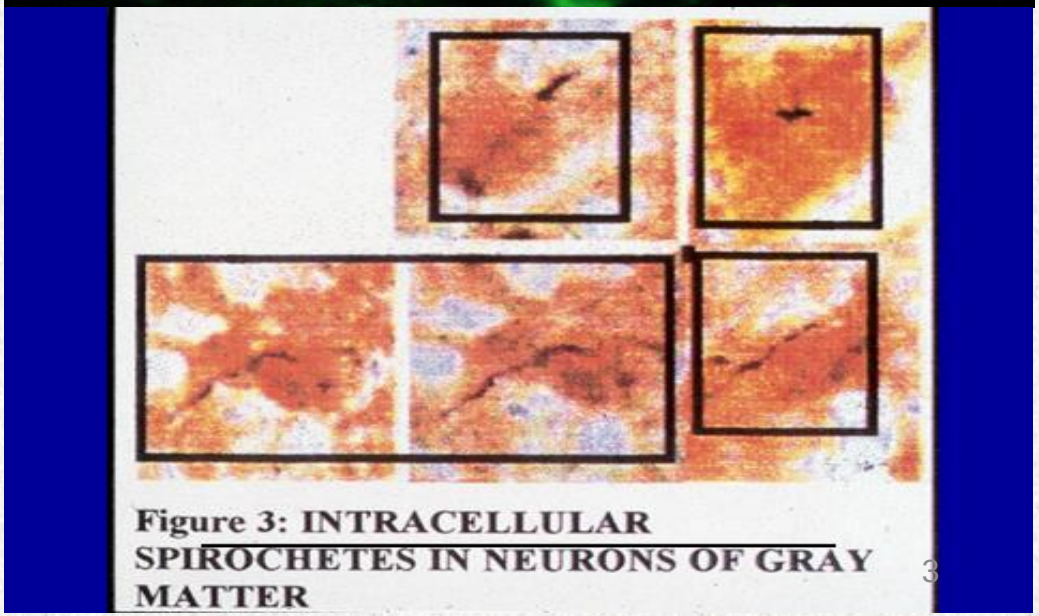
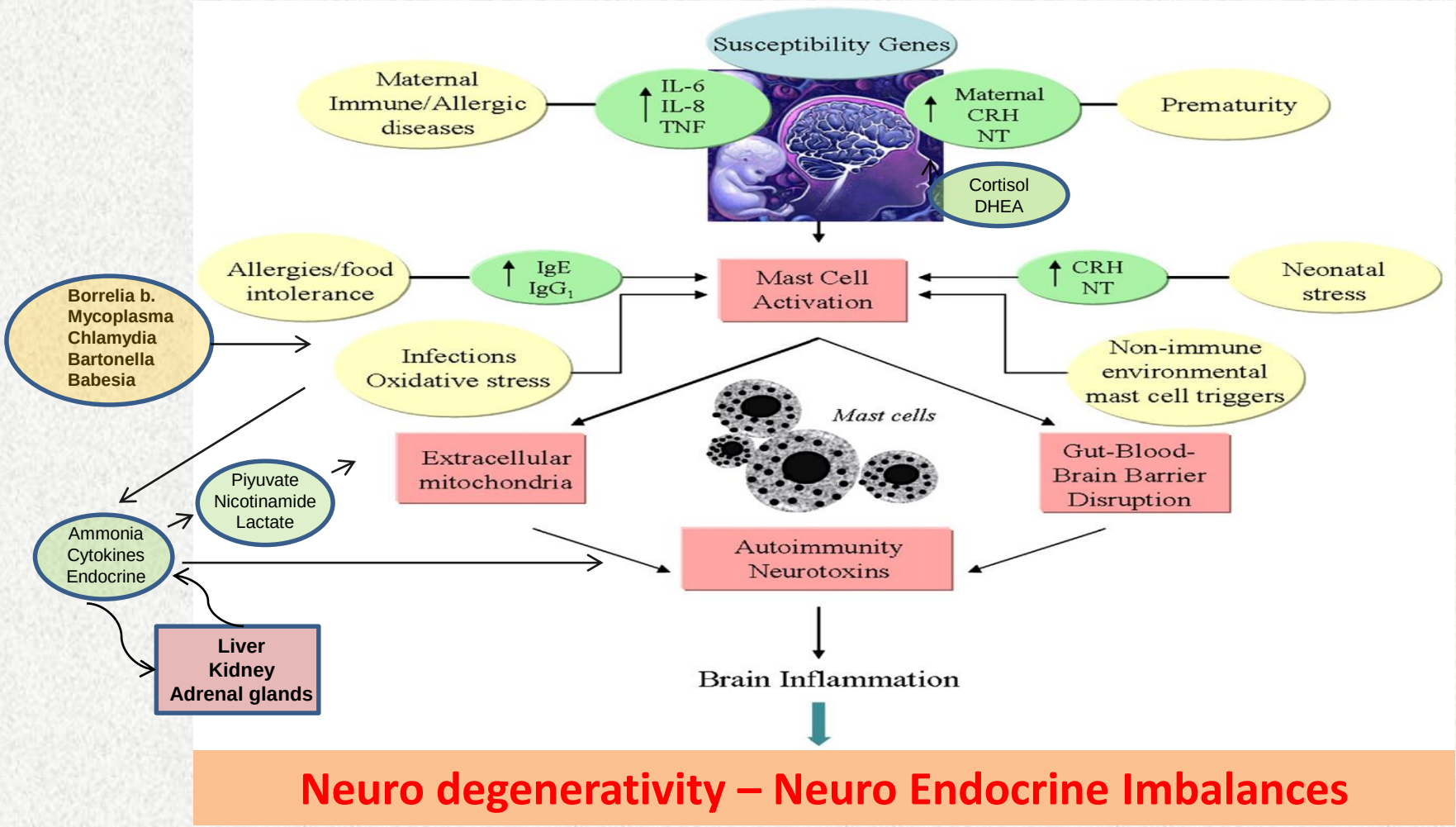


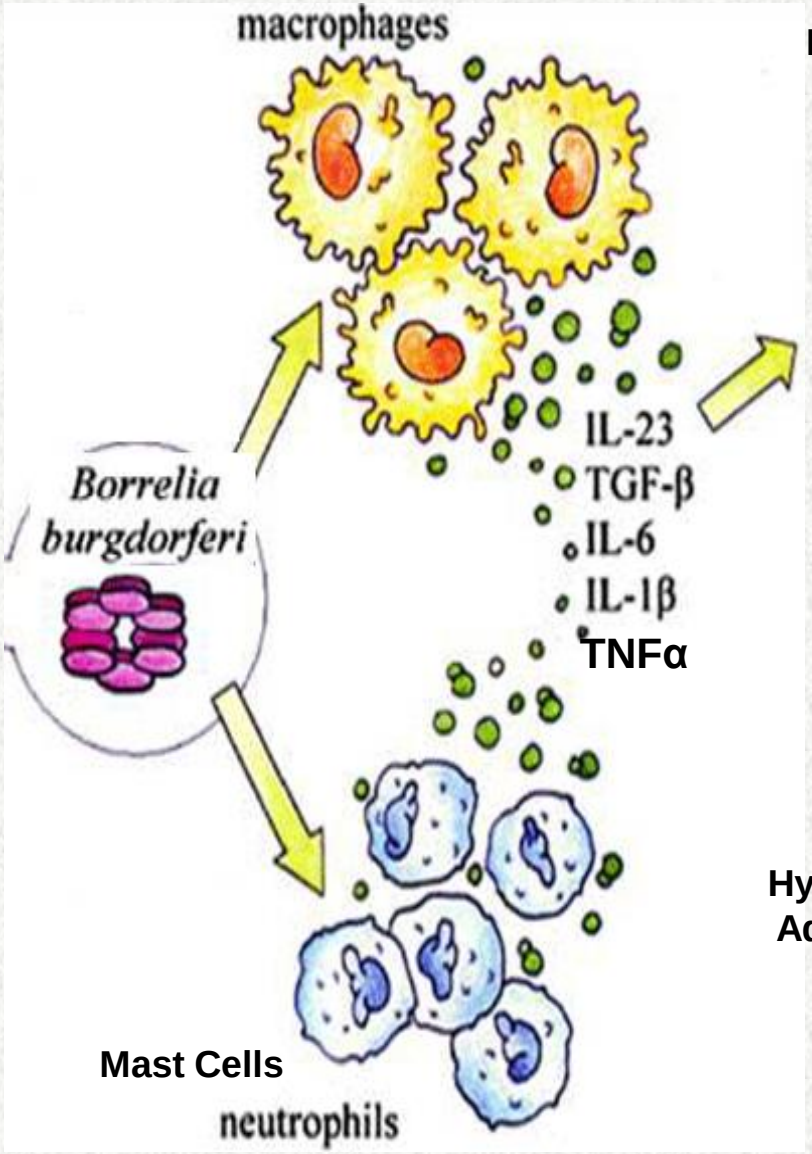
Figure 3: INTRACELLULAR SPIROCHETES IN NEURONS OF GRAY MATTER

Neuro-Inflammation

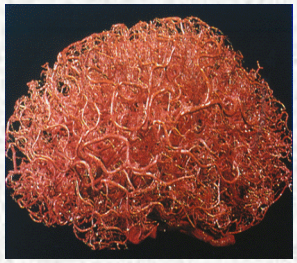
Representation of the different processes involved in mast cell activation by infectious and immunological triggers, leading to a disruption of the blood-brain-barrier, to the autoimmunity and to a chronic inflammation contributing to pathogenesis.



Neuro Borreliosis : Inflammation & Microglia activation



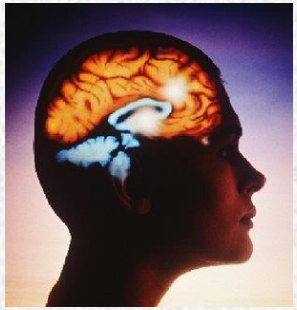
Brain Blood Barrier Permeability



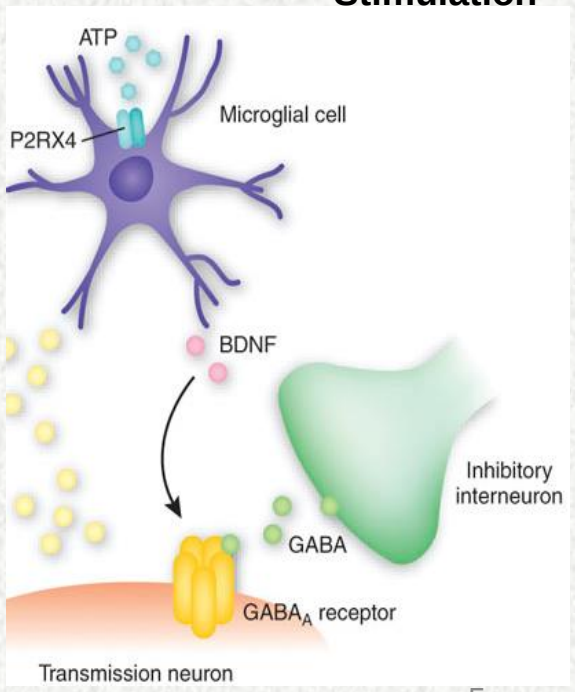
Microglia Activation Neuro-toxicity

Nitric Oxide

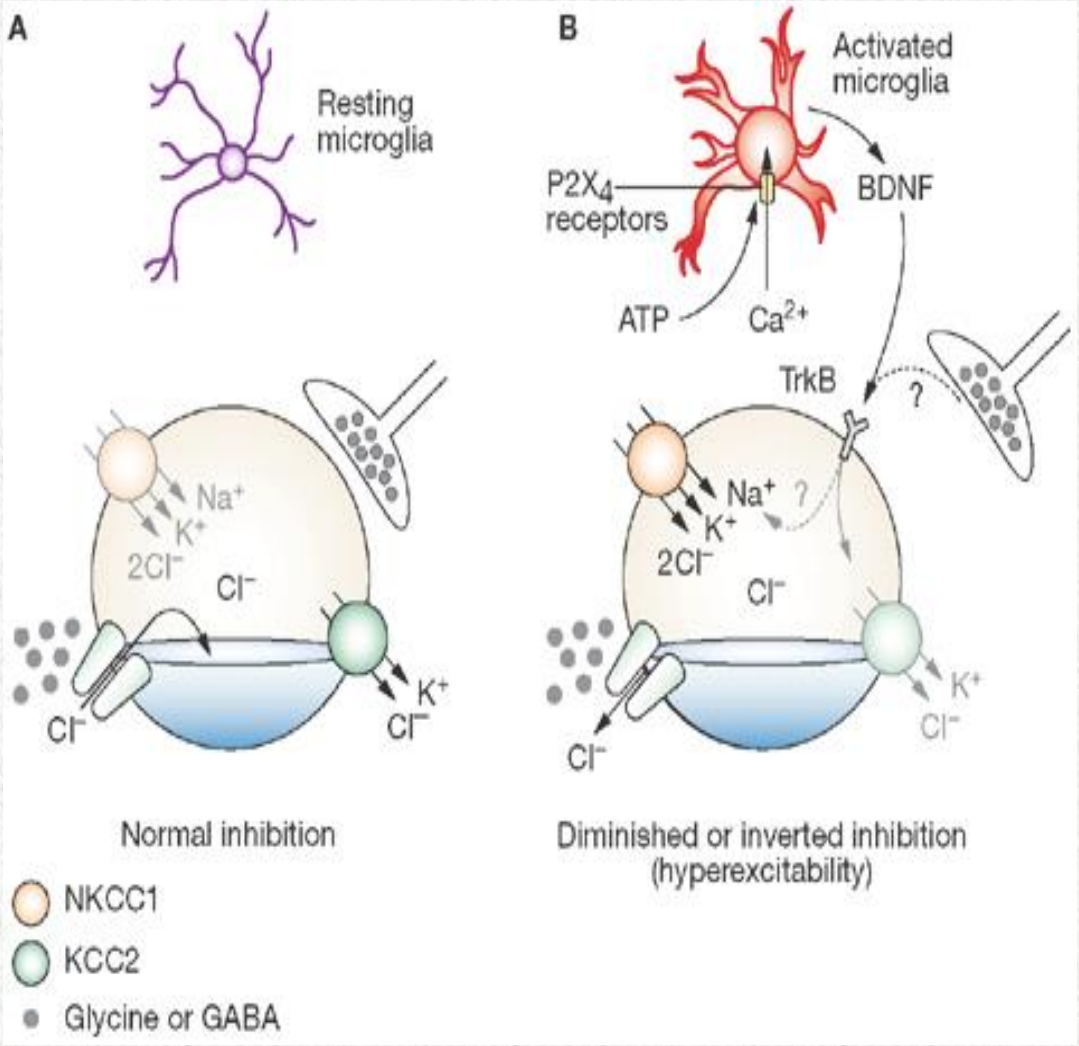
Astrocyte-Proliferation Microglia-Stimulation



Hypothalamus Pituitary Adrenal Axis damages



Release of BDNF & pro-inflammatory cytokines by the activation of Microglia : Effect on Co-KCC2 (--) & GABA (--)

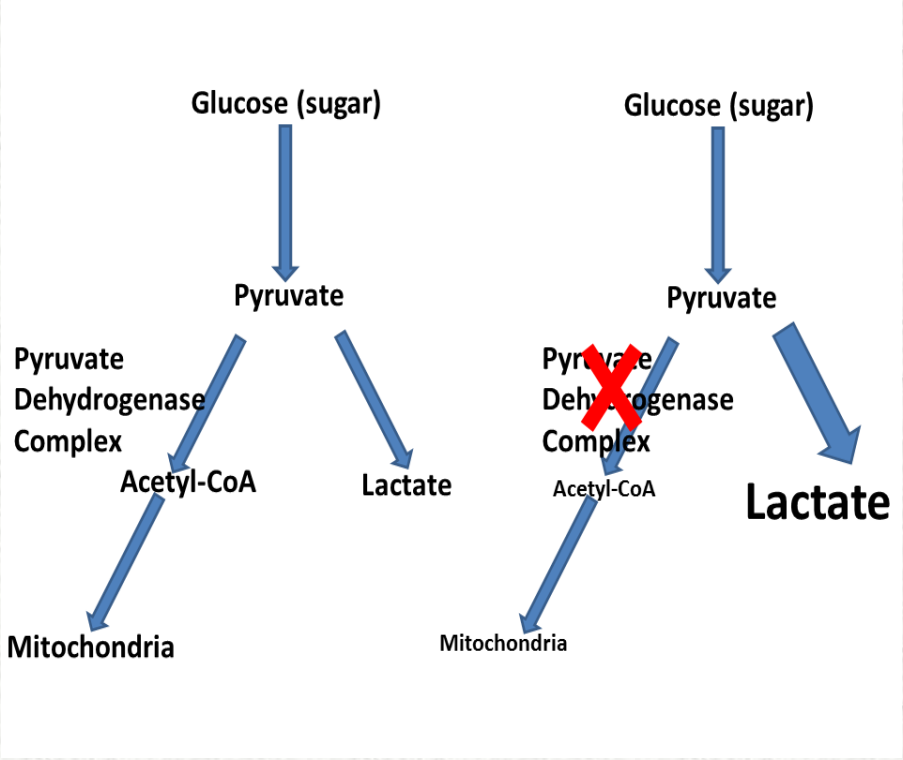


Microglia : CNS immune defence
BDNF : Brain derived Neutrofic Factor
GABA : Gamma Amino-Butyric Acid
KCC2 : co-transporter type 2 Cl-
NKCC1 : co-transporter typ1 Na+, K+, 2 Cl-
P2X4 : Receptor

Microglia is activated via the P2X4 receptor and via the ATP.
This releases BDNF, which then inhibits the exporter potassium/chloride KCC2.
There is therefore a loss of the inhibition exerted by GABA and glycine.
Chlorine (2Cl-) remains imprisoned, resulting in an increase in K+ and Na++ concentration, which in turn leads to a depolarization of the postsynaptic neuron, and hypersensitivity to pain, and cerebral stirring.
This explains aches and/or burning sensations, or/and cramps and tingling.
The ratio between pyruvate & lactate plays an important role in the glutamine GABA glutamate cycle.
A too High CO2 concentration seems to favour glutamate (astrocytes) at the expense of GABA neuron circuit. The GLYCINE can correct this dysfunctional pathway.

Pyruvates and Ammonia

Pyruvate / Lactate ratio imbalance (--)

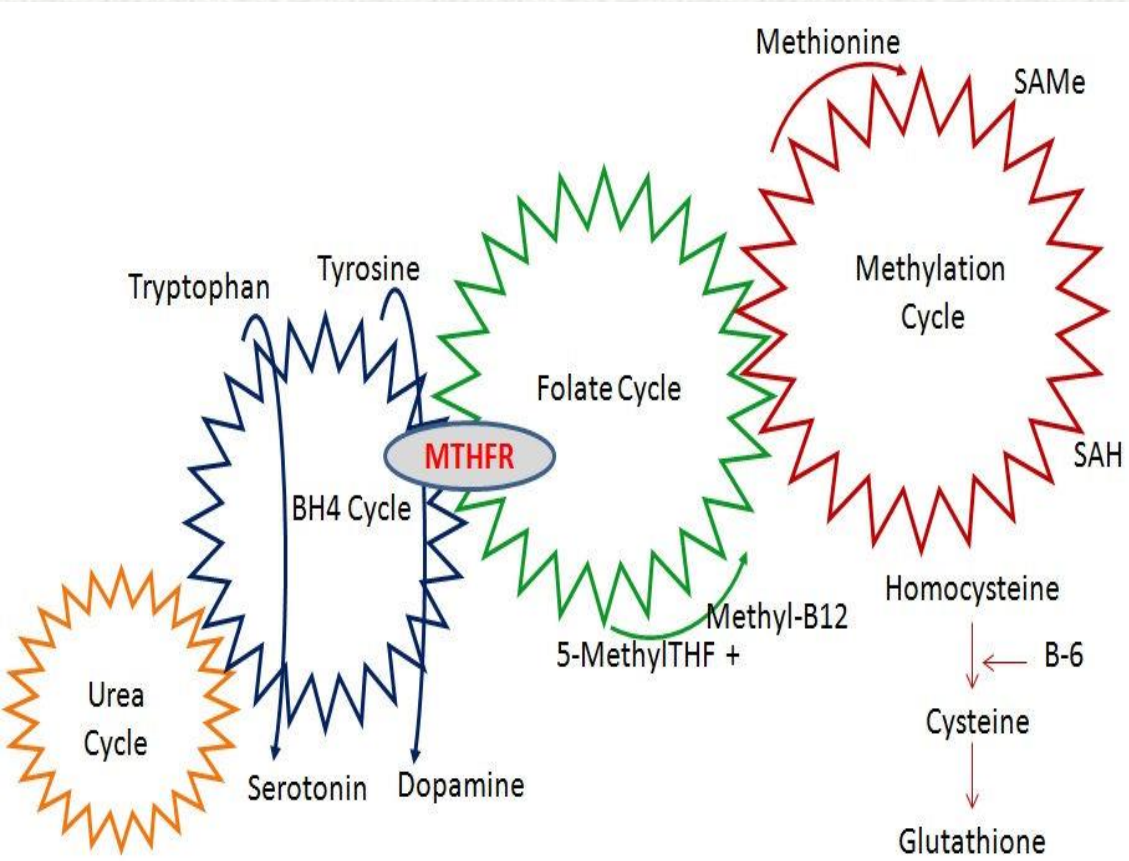


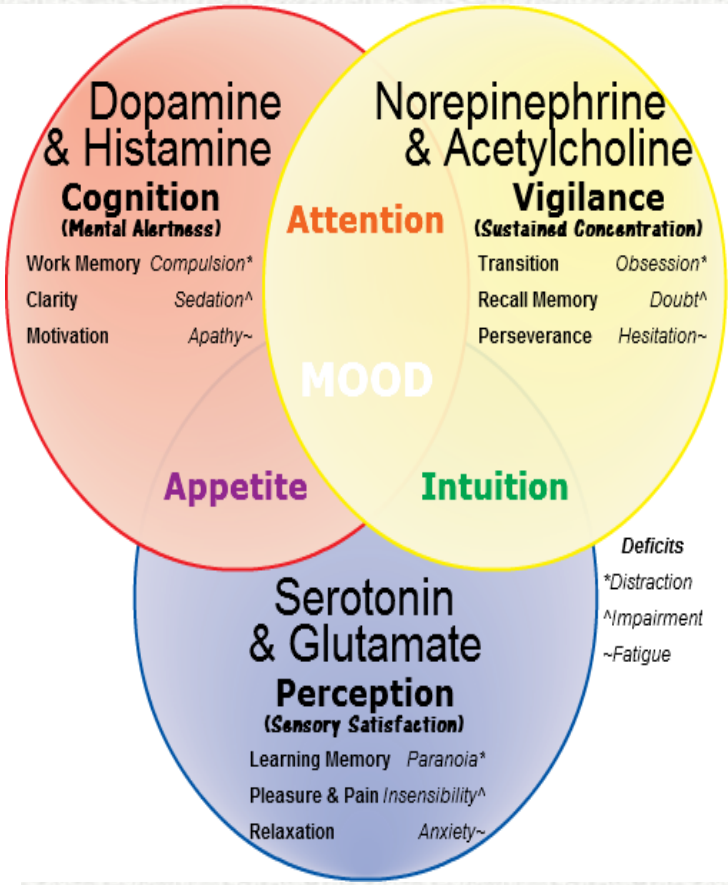
Excess of Ammonia and Glutamate (++)

- Krebs cycle dysregulation
- High Lactate levels
- High intra-cell increased ammonia levels
- Increase ammonia enhances Glutamine formation
- This reduces Glutamic acid pool of brain cell
- Result in decreased formation of the inhibitory neurotransmitter GABA
- Low citric acid cycle (Krebs cycle)
- Liver & Kidney functions ?
- Toxicity ?

A high intracellular ammonia concentration (with Pyruvates suffocation & hypo functionnal liver) impairs the CNS functions but also the Methylation cycles

Ammonia, Methylation cycles , Neurotransmitters & Oxidative Stress

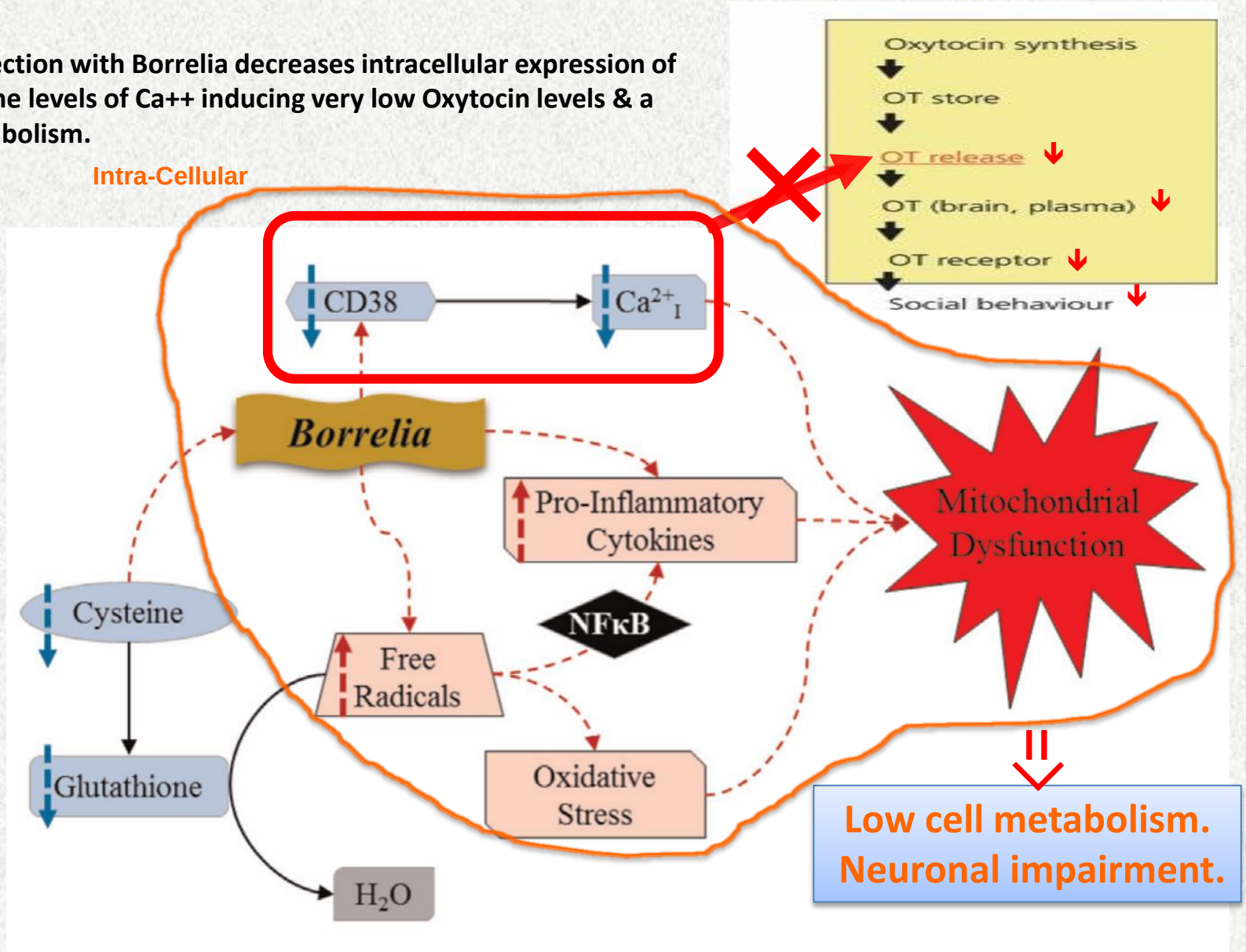




A Chronic inflammation the Kynurenine pathway in the Methylation cycles leading to a poor conversion of Tryptophan & Tyrosine : Monoamines Imbalance, Folate cycle impaired & Glutathione depletion

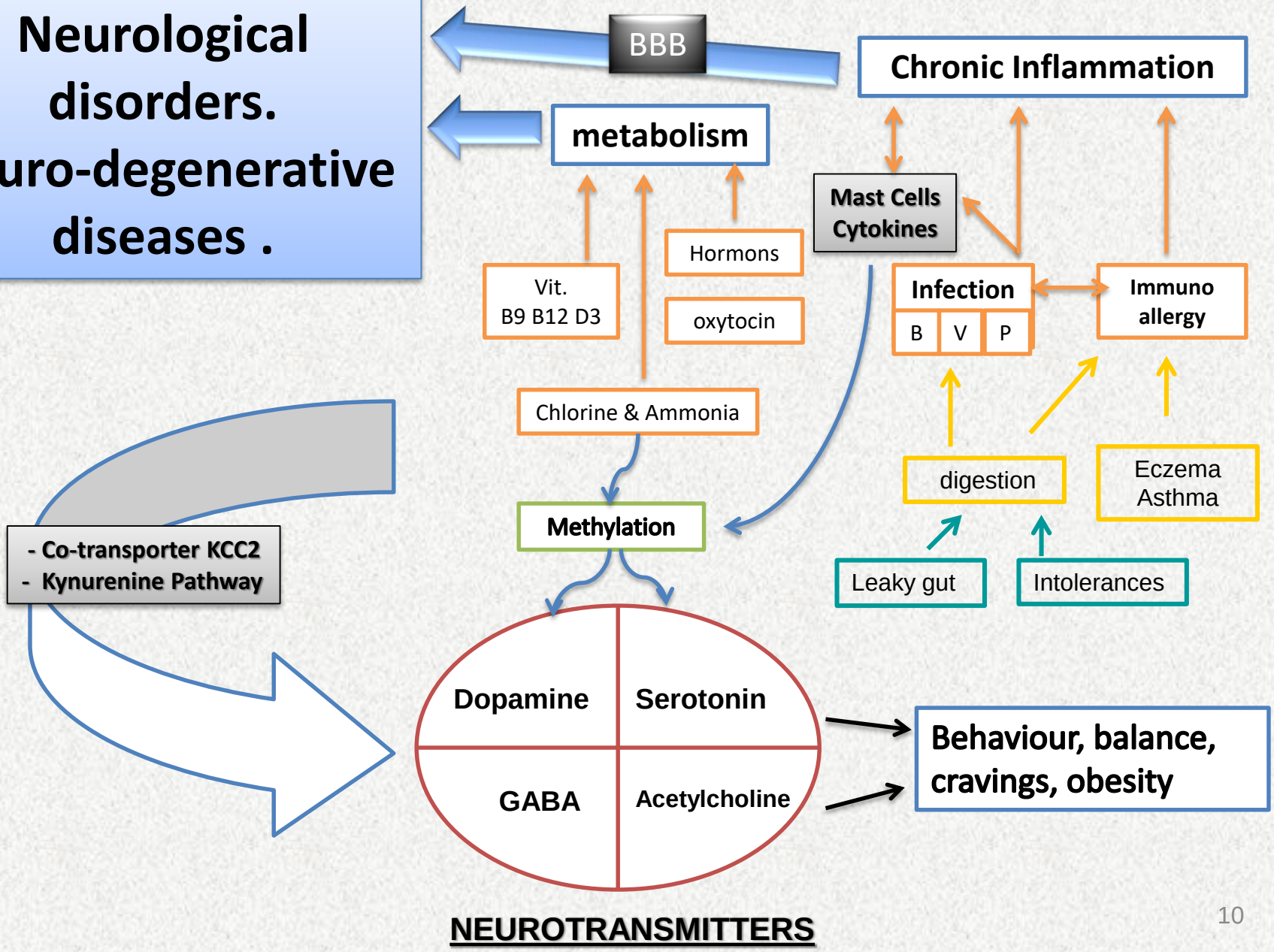
Intracellular Borrelia, CD38 & Ca++ levels, Oxytocin and Mitochondria

A chronic infection with Borrelia decreases intracellular expression of the CD38 & the levels of Ca++ inducing very low Oxytocin levels & a low Cell metabolism.

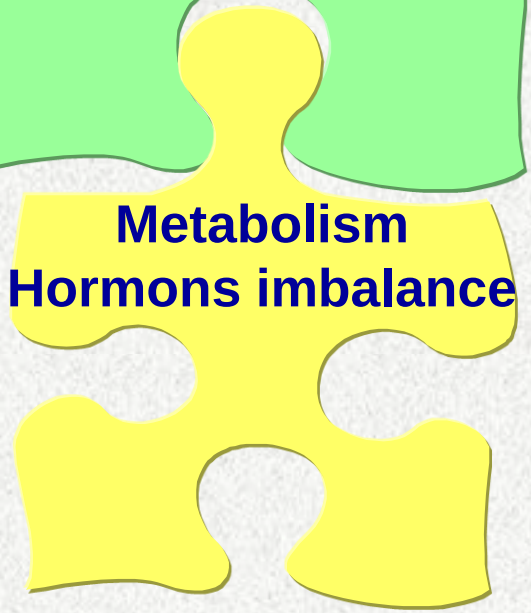


Complexcity of the condition: overview

Neurological disorders. Neuro-degenerative diseases .



Treatment of chronic infections

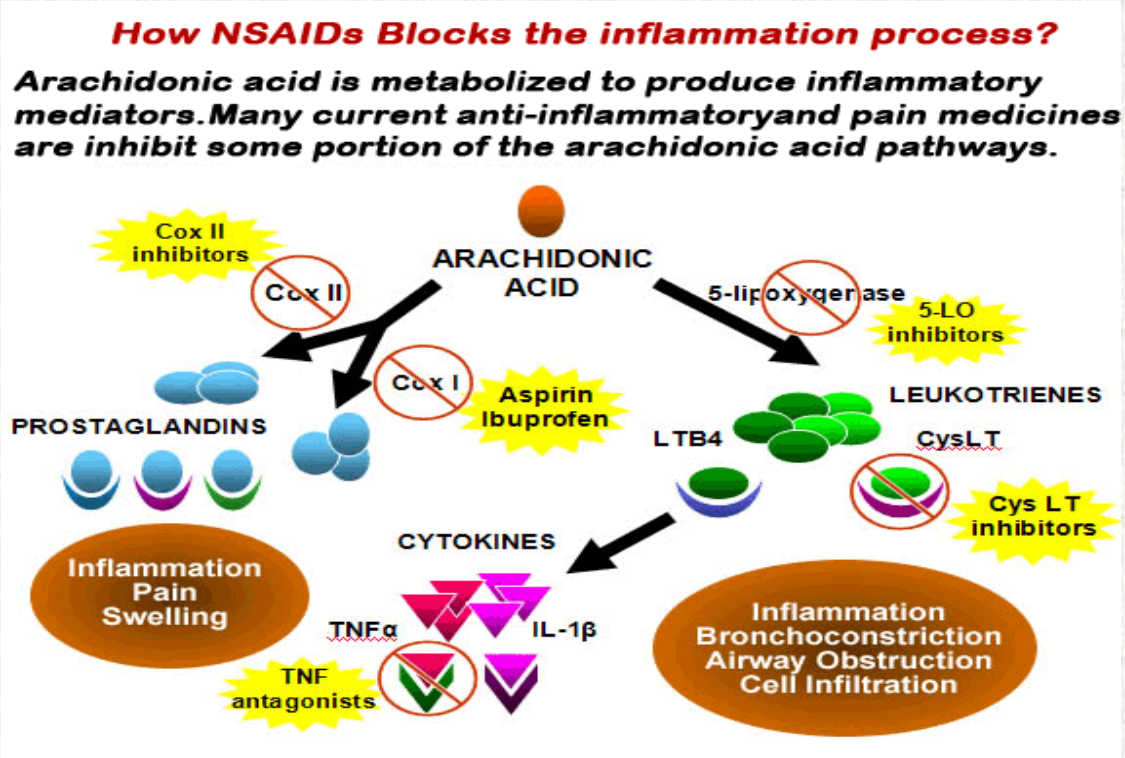


Pulsed Antibiotics Therapy

- **Objective : to kill or reduce active forms of bacteria with pulsed courses of antibiotics, targeting intracellular pathogens (macrolides, tetracyclines, cephalosporins).**
- Pulsed courses are over 15 to 20 days maximum.
- A break of at least 21 days is crucial between courses. One course of 20 days is almost never sufficient, even if patients improve. If the treatment is discontinued, a relapse is certain.
- The symptoms reappear one after the other, during the 2nd week of the therapeutic break. This relapse signs the awakening of dormant forms. Is it a relapse or an inflammatory immune response? BOTH

- **<u>Why Pulsed ABX ?</u>**
  - **Better tolerance: moderate dosage enables the leveraging of therapeutic windows for the associated treatments and drainage**
  - **Reduce ABX resistance**
  - **Reduce the proportion of « cystic » forms**

Non-Steroidal Anti-Inflammatory Drugs and supplements. Long-term effects on the Neuro-degeneration.



Nb: Prostaglandins produce Nitric Oxide (NO) which inhibits the production of Oxytocin in the Posterior Pituitary

The ultimate goal is to reduce inflammation, as well as fight infections and/or co-morbidities

Non-steroidal inhibitors

-5-Lipoxygenase
Boswelia & Curcuma
GSE (Grapfruit Seed Extract)

-Cytochrome c Oxidase subunit II (Cox II)
Flavonoids(Arginine,Luteolin,Quercetin, Rutine, Bromelain)
GSE (Grapefruit Seed Extract)

Cytochrome c Oxidase subunit I (Cox I)
Aspirin
Ibuprofen

-Interleukines-1β
Rilonacepte nettle extract Uva Ursi

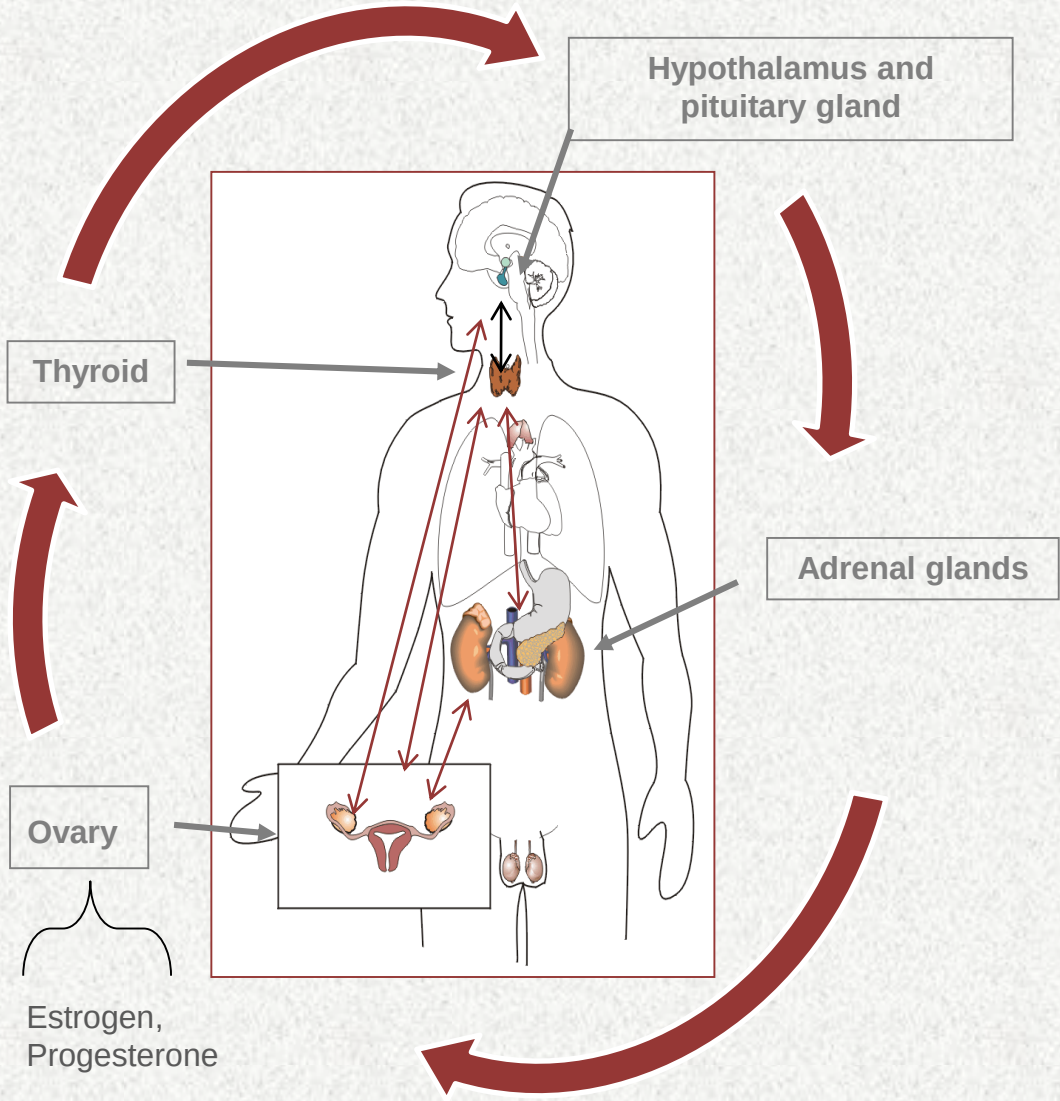
-Ammonia
Salvia azzura Lezpêdeza
Apple pectin L-Citrulin

-Gaba et precursors
Huperzin A L-theanin Lysine Methylation

Support and Regulate the neuro-endocrine system

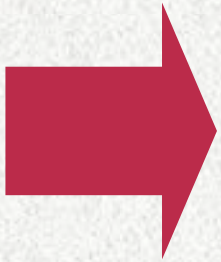
Reduction of symptoms to prevent relapses

Pituitary gland hypothalamus	Thyroid	Adrenal Glands
Metabolic compensation		OverWorked
Re-Balancing the neurotransmitters cocktail	Risk of saturation and exhaustion	



Side effects, quality of life and treatment efficiency

- **Support intestines (leaky gut) in case of allergic immune response**
- **Support liver for effective detoxification**



- **During ABX courses**
- **Probiotics, aloe clay**

- **Between ABX courses**
- **Protection hépatique**
- **(Phytotherapy:Desmodium Chrysantellum Curcuma…)**

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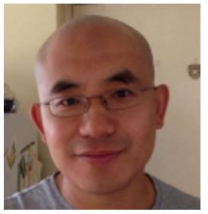
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