

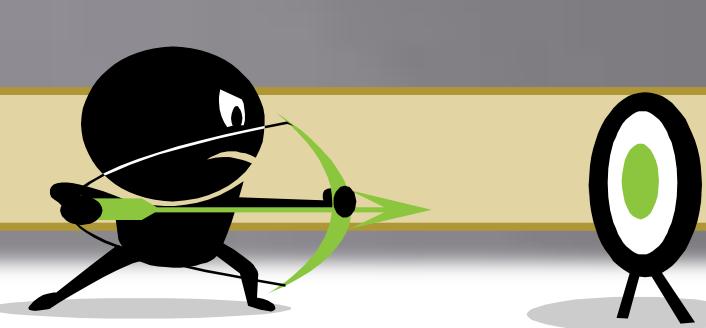


NEUROCYSTICERCOSIS

VÍCTOR SACRISTÁN FRAILE
DEGREE IN BIOCHEMISTRY, UAB
VICTOR.SACRISTAN.FRAILE@GMAIL.COM



1. Objective



Neuroinfections are important brain diseases and they affect a lot of people all over the world, but not all the people know about their existence. The aim of this work is to deepen in the pathological, biochemistry and clinical aspects of Neurocysticercosis, an helminthic disease that affects the central nervous system. It is caused by larvae of *Taenia solium*, who lives in the small intestine of humans.

3. Introduction

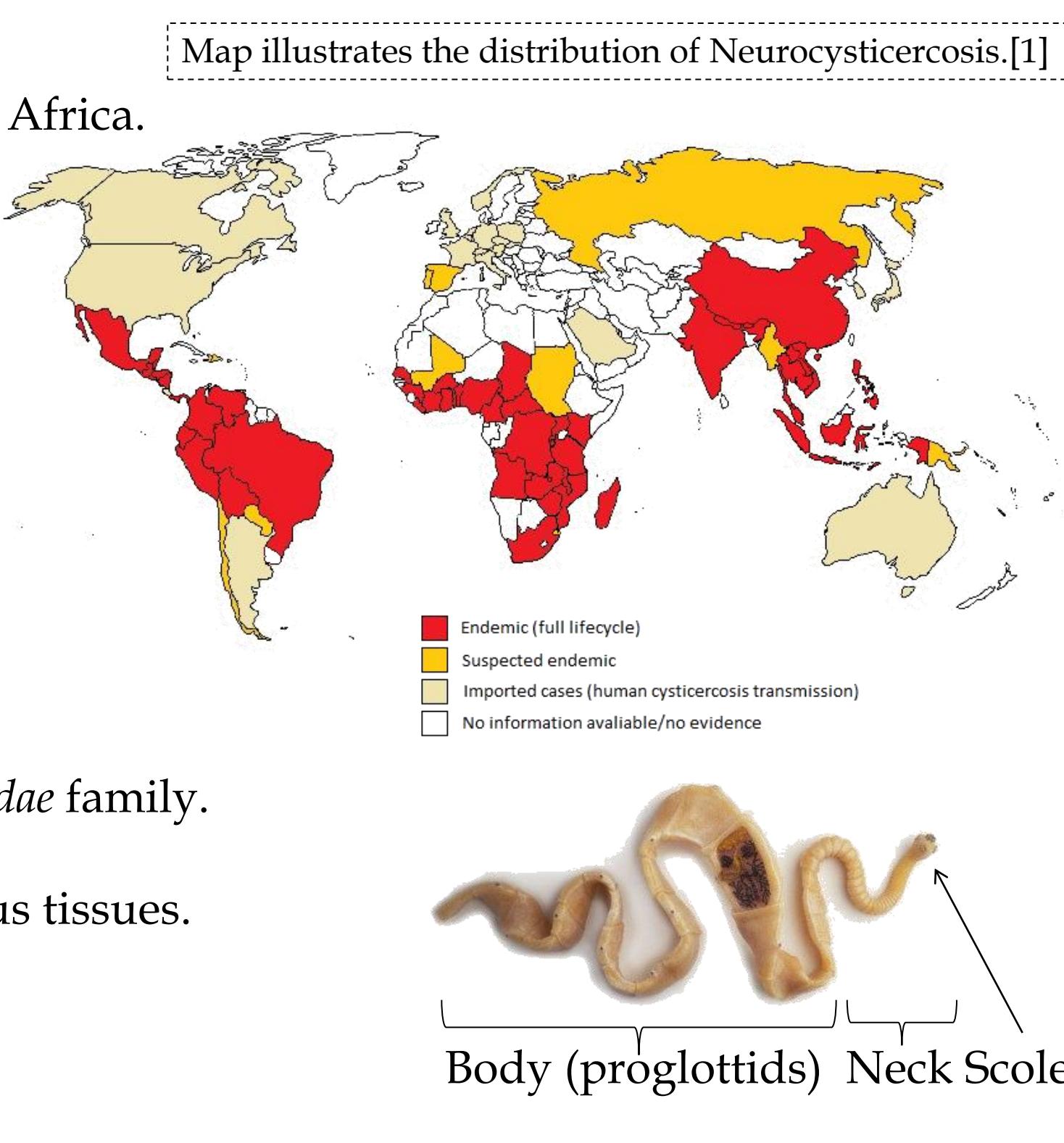


General information:

- Affected countries: Latin America, India, Asia and Sub-Saharan Africa.
- Imported cases: Europe, Australia, USA and Canada.
- Incidence: 1/1000 for human neurocysticercosis
- 1-10% for humans CC
- 20-40% for pig CC
- Age of infection: 5-15 years old
- Age of manifestation: 25-35 years old
- Problems: high poverty, warm weather, illiteracy...

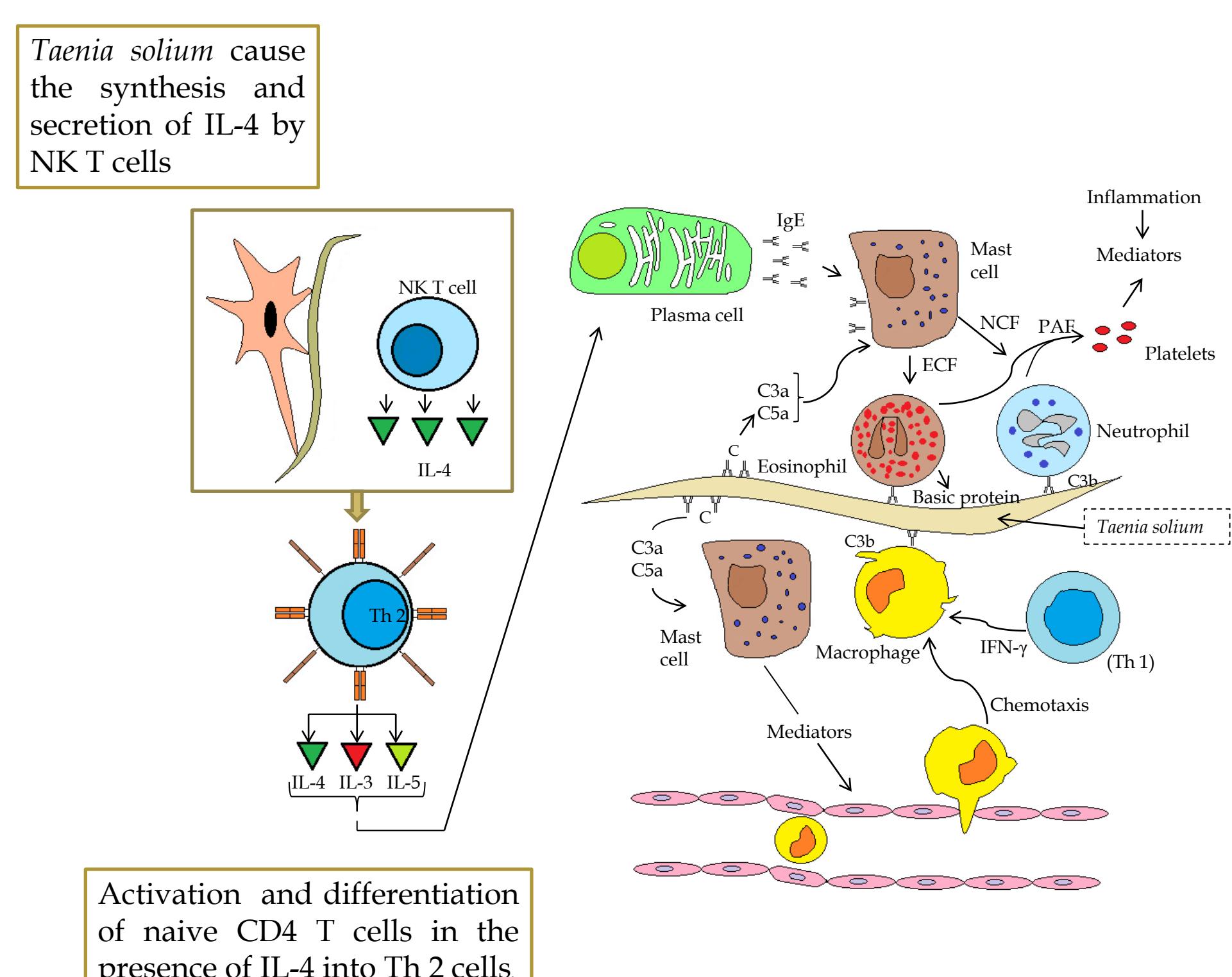
Taenia solium:

- Is a cestode that belongs to the Cyclophyllidea order and the Taeniidae family.
- Tree Stage: egg, larvae and adult tapeworm.
- Target tissues: CNS, eye, skeletal and heart muscles, subcutaneous tissues.



5. Immuno response

Intestinal pathology: Taeniasis [9]



Cerebral pathology: Neurocysticercosis

Larvae suffer some pathological changes until its death. This evolution can be described in four stages:

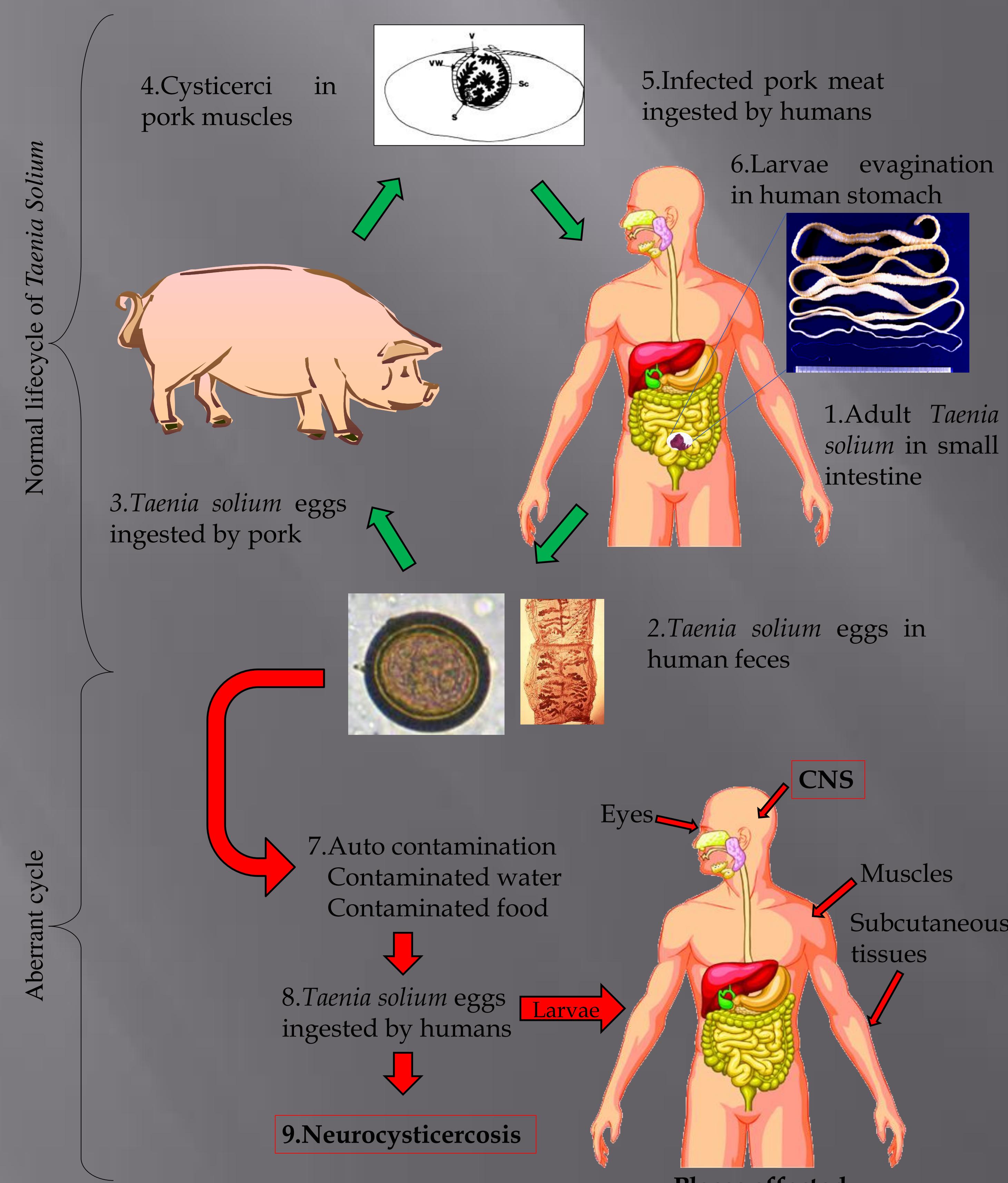
1. Vesicular stage
2. Colloidal vesicular stage
3. Granular nodular stage
4. Calcified nodular stage

These pathology is characterized by a natural progression of innate (neutrophils and macrophages), early induced (NK cells and $\gamma\delta$ T cells) and adaptive immune response ($\alpha\beta$ T cells and B cells) in infected mice. \rightarrow Th1 response

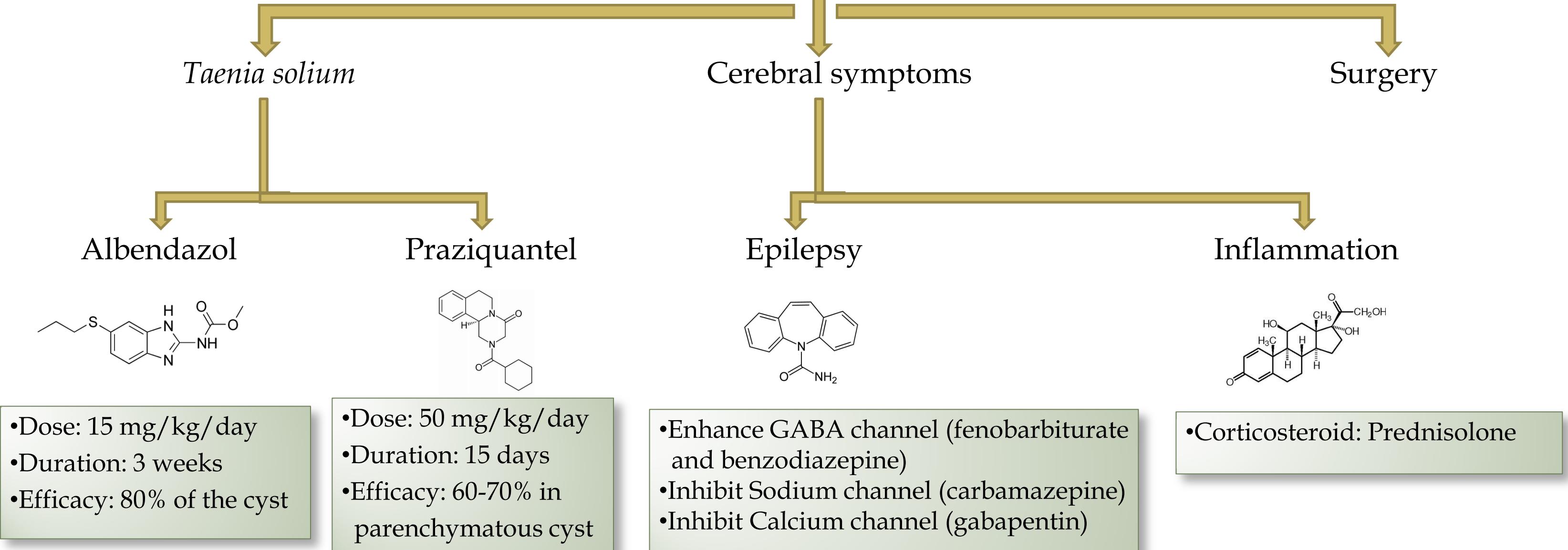
Brain parenchyma								
Time p.i	IL-2	IL-12	INF- γ	TNF- α	IL-5	IL-1,6,13	IL-4,10	
2 days	-	-	-	ND	-	-	-	
3 days	-	-	-	ND	-	-	-	
5 days	-	-	-	ND	-	-	-	
1 wk	-	-	-	-	-	-	-	
3 wk	-	+	-	-	-	-	-	
5 wk	-	+	+	-	+	-	-	
8 wk	-	+	+	-	-	-	-	
11 wk	+	+	-	-	-	-	-	
13 wk	+	+	-	-	-	-	-	

Cytokines were detected in immunohistochemistry reaction: - undetectable, + 1-100 positive cells per section; ++, 100-300 positive cells; +++, 300-500 positive cells; +++, >500 positive cells. MHC class II expression=I-Ad.[4]

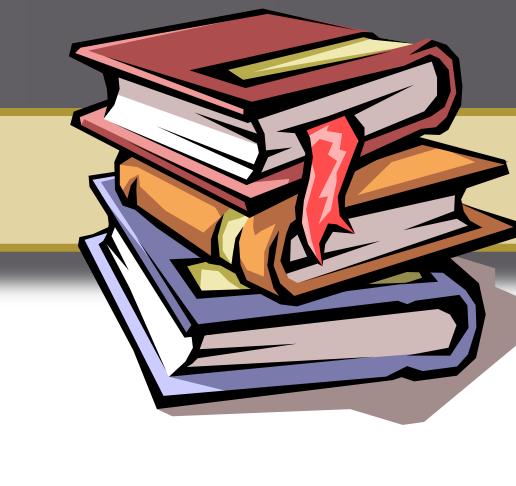
Lifecycle of *Taenia solium*



7. Treatment



2. Sources and methods



Sources

Articles, books and scientific reviews about Neurocysticercosis.

Methods

- Search all the information.
- Read general articles about the topic to get a general idea, and then more specific articles.
- Sum up all the important aspects of the pathology.

4. Diagnosis

Diagnostic criteria

1. Diagnostic criteria [3]
Absolute criteria
• Histologic demonstration of the parasite from biopsy of a brain or spinal cord lesion
• Cystic lesions showing the scolex on CT or MRI
• Direct visualization of subretinal parasites by funduscopic examination
Major criteria
• Lesions highly suggestive of neurocysticercosis on neuroimaging studies
• Positive serum EITB for the detection of anticysticercal antibodies
• Resolution of intracranial cystic lesions after therapy with albendazole or praziquantel
• Spontaneous resolution of small single enhancing lesions
Minor criteria
• Lesions compatible with neurocysticercosis on neuroimaging studies
• Clinical manifestations suggestive of neurocysticercosis
• Positive CSF ELISA for detection of anticysticercal antibodies or cysticercal antigens
• Cysticercosis outside the CNS
Epidemiologic criteria
• Evidence of a household contact with <i>Taenia solium</i> infection
• Individuals coming from or living in an area where cysticercosis is endemic
• History of frequent travel to disease-endemic areas

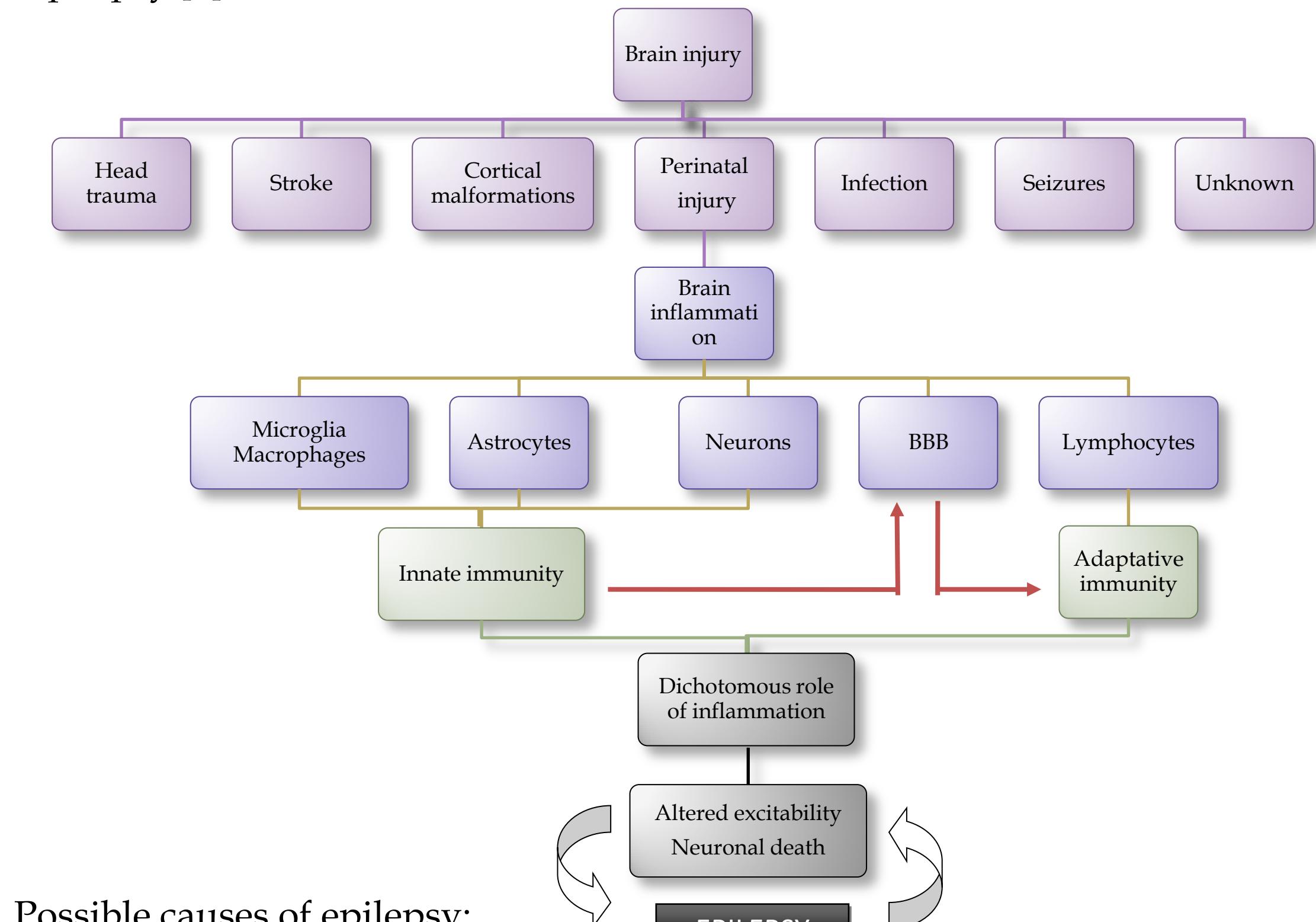
6. Clinical Manifestations



It depends on the number, size, stage and localization of cysts and the patient's immune response.

Clinical manifestation [5]	Pathology
Epilepsy	Pericyst inflammation, granuloma formation
Raised intracranial pressure	Hydrocephalus (arachnoiditis, ependymitis, ventricular cysts), pseudotumor (edema), giant cysts, ventricular ependymitis
Focal deficits	Direct compression by large or multiple cysts
Meningitis	Widespread subarachnoid inflammation
Myelo radiculopathy	Inflammation, local mass effect, vasculitis
Others	Dementia, Encephalitis, Subarachnoid hemorrhage, Trigeminal neuralgia, Subdural hematoma, Stroke/transient ischemic attack, Dizziness, Endocrinological or ophthalmic symptoms
	Intense inflammation and edema, Inflammatory aneurysm, Arachnoiditis, Collection of multiple cysts, Angitis, Intermitent CSF obstruction, Sellar/intraocular cysts

Possible explanation of relation between brain injury, inflammation and epilepsy [6]



8. Conclusions

- Neurocysticercosis is endemic in many parts of the world, specially in developing countries. However we have to take into consideration the diagnosis in developed countries by immigration of endemic countries.
- Neurocysticercosis is the most common cause of symptomatic epilepsy worldwide. Despite the severity of the disease, most people don't give the importance to it, since it principally affects developing countries.
- Treatment and diagnosis works well, but can be improved.
- This parasitic disease is potentially eradicable, but to be effective we need eradication programs that consists:
 - Interrupt the tape worm-host cycle.
 - The vaccination of pig against infection with the parasite, which indirectly reduce the appearance of new cases of the disease.
 - Public health and awareness.
 - Possible vaccination for human.
- But the best alternative is the education and the health promotion, specially in developing countries.