MEDICAL ACADEMY NAMED AFTER S.I. GEORGIEVSKY OF VERNADSKY CFU

NAME – MANAN NAMDEO

TOIPC – ECHINOCOCCUS GRANULOSUS

TEACHER`S NAME – MAM SVETLANA SMIRNOVA

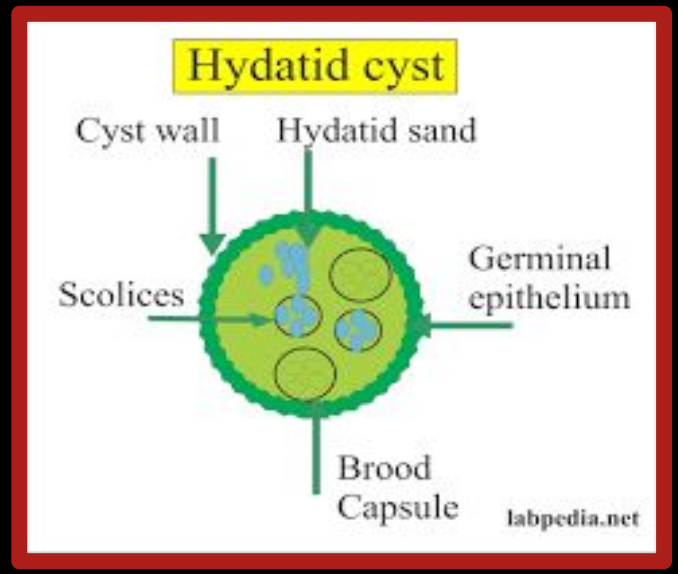
ECHINOCOCCUS GRANULOSUS

Echinococcus granulosus, also called the hydatid worm, hyper tape-worm or dog tapeworm, is a cyclophyllid cestode that dwells in the small intestine of canids as an adult, but which has important intermediate hosts such as livestock and humans, where it causes cystic echinococcosis, also known as hydatid disease. The adult tapeworm ranges in length from 3 mm to 6 mm and has three proglottids ("segments") when intact—an immature proglottid, mature proglottid and a gravid proglottid. The average number of eggs per gravid proglottid is 823. Like all cyclophyllideans, E. granulosus has four suckers on its scolex ("head"), and E. granulosus also has a rostellum with hooks. Several strains of E. granulosus have been identified, and all but two are noted to be infective in humans.

THE LIFECYCLE OF E. GRANULOSUS INVOLVES DOGS AND WILD CARNIVORES AS A DEFINITIVE HOST FOR THE ADULT TAPEWORM. DEFINITIVE HOSTS ARE WHERE PARASITES REACH MATURITY AND REPRODUCE. WILD OR DOMESTICATED UNGULATES, SUCH AS SHEEP, SERVE AS AN INTERMEDIATE HOST. TRANSITIONS BETWEEN LIFE STAGES OCCUR IN INTERMEDIATE HOSTS. THE LARVAL STAGE RESULTS IN THE FORMATION OF ECHINOCOCCAL CYSTS IN INTERMEDIATE HOSTS.[3] ECHINOCOCCAL CYSTS ARE SLOW GROWING, BUT CAN CAUSE CLINICAL SYMPTOMS IN HUMANS AND BE LIFE-THREATENING. CYSTS MAY NOT INITIALLY CAUSE SYMPTOMS, IN SOME CASES FOR MANY YEARS. SYMPTOMS DEVELOPED DEPEND ON LOCATION OF THE CYST, BUT MOST OCCUR IN THE LIVER, LUNGS, OR BOTH.

ECHINOCOCCUS GRANULOSUS

ECHINOCOCCUS GRANULOSUS WAS FIRST DOCUMENTED IN ALASKA BUT IS DISTRIBUTED WORLDWIDE. IT IS ESPECIALLY PREVALENT IN PARTS OF EURASIA, NORTH AND EAST AFRICA, AUSTRALIA, AND SOUTH AMERICA. COMMUNITIES THAT PRACTICE SHEEP FARMING EXPERIENCE THE HIGHEST RISK TO HUMANS, BUT WILD ANIMALS CAN ALSO SERVE AS AN AVENUE FOR TRANSMISSION. FOR EXAMPLE, DINGOES SERVE AS A DEFINITIVE HOST BEFORE LARVAE INFECT SHEEP IN THE MAINLAND OF AUSTRALIA. SLED DOGS MAY EXPOSE MOOSE OR REINDEER TO E. GRANULOSUS IN PARTS OF NORTH AMERICA AND EURASIA.



TRANSMISSION

E. granulosus requires two host types, a definitive host and an intermediate host. The definitive host of this parasite are dogs and the intermediate host are most commonly sheep, however, cattle, horses, pigs, goats, and camels are also potential intermediate hosts. Humans can also be an intermediate host for E. granulosus, however this is uncommon and therefore humans are considered an aberrant intermediate host.

The dog serves as the main definitive host for the dangerous parasite, with eggs being shed in its scat

Echinococcus granulosus is ingested and attaches to the mucosa of the intestines in the definitive host and there the parasite will grow into the adult stages. Adult E. granulosus release eggs within the intestine which will be transported out of the body via feces. When contaminated waste is excreted into the environment, intermediate host has the potential to contract the parasite by grazing in contaminated pasture, perpetuating the cycle.

ECHINOCOCCUS GRANULOSUS IS TRANSMITTED FROM THE INTERMEDIATE HOST (SHEEP) TO THE DEFINITIVE HOST (DOGS) BY FREQUENT FEEDING OF OFFAL, ALSO REFERRED TO AS "VARIETY MEAT" OR "ORGAN MEAT". CONSUMING OFFAL CONTAINING E. GRANULOSUS CAN LEAD TO INFECTION; HOWEVER, INFECTION IS DEPENDENT ON MANY FACTORS.

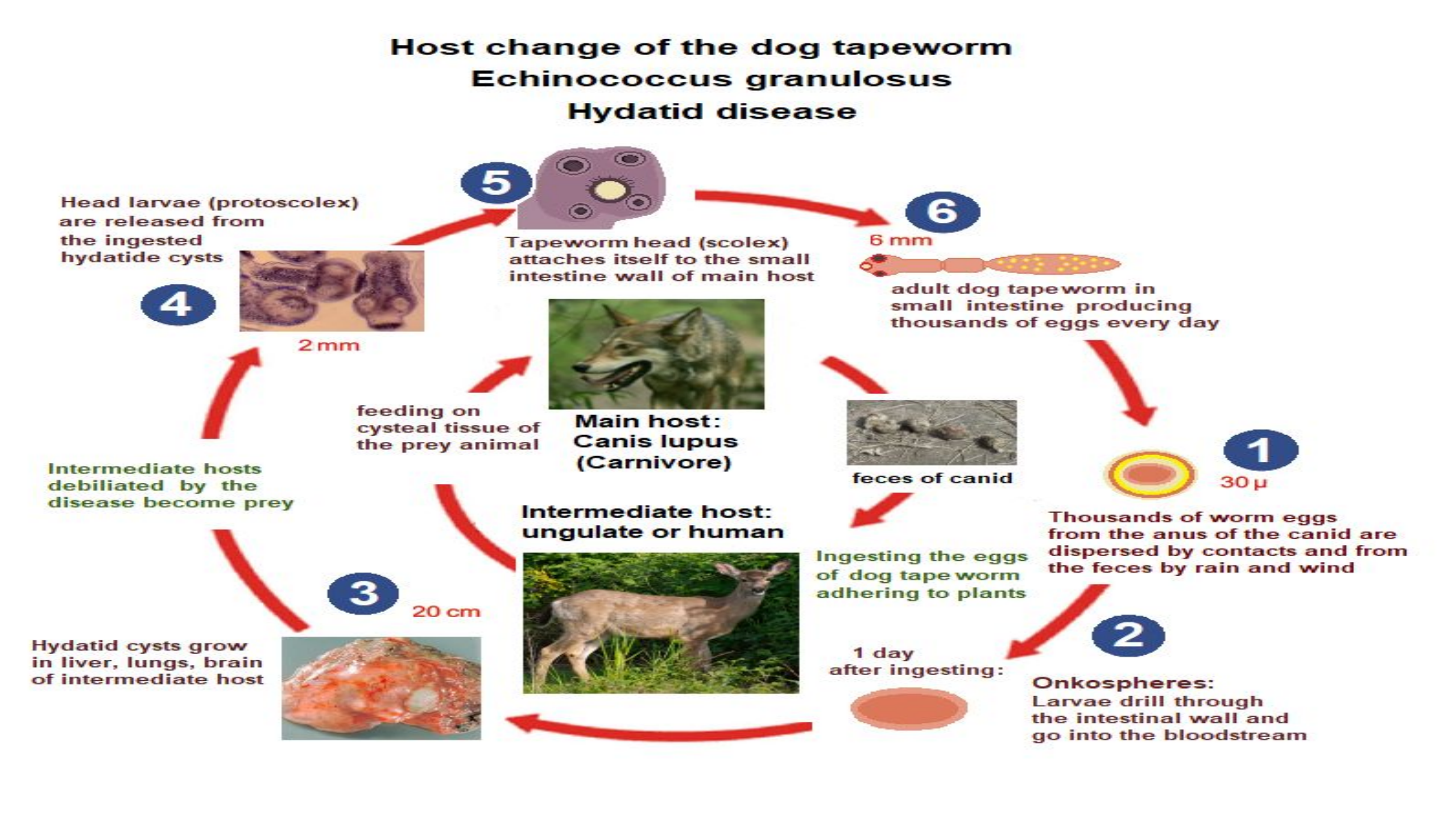
WHILE ADULT E. GRANULOSUS IS HARMLESS IN DOGS, IT CAN BE A HUGE PROBLEM IN HUMANS. ALTHOUGH RARE, THE PARASITE CAN FORM A CYST CAUSING CYSTIC ECHINOCOCCUS ALSO KNOWN AS HYDATID DISEASE. HUMANS CAN BE INFECTED THROUGH INTIMATE BEHAVIOR WITH DOGS CAUSING A PERSON TO ACCIDENTALLY INGEST EGGS. THE CYST CAN CAUSE PRESSURE ON SURROUNDING TISSUE WHICH MAY LEAD TO ABNORMAL ORGAN FUNCTION, SPONTANEOUS FRACTURE OF BONES, AND OTHER NEUROLOGICAL EFFECTS.

THE FREQUENCY OF OFFAL FEEDINGS, THE PREVALENCE OF THE PARASITES WITHIN THE OFFAL, AND THE AGE OF THE INTERMEDIATE HOST ARE FACTORS THAT AFFECT INFECTION PRESSURE WITHIN THE DEFINITIVE HOST. THE IMMUNITY OF BOTH THE DEFINITIVE AND INTERMEDIATE HOST PLAYS A LARGE ROLE IN THE TRANSMISSION OF THE PARASITE, AS WELL AS THE CONTACT RATE BETWEEN THE INTERMEDIATE AND THE DEFINITIVE HOST (SUCH AS HERDING DOGS AND PASTURE ANIMALS BEING KEPT IN CLOSE PROXIMITY WHERE DOGS CAN CONTAMINATE GRAZING AREAS WITH FECAL MATTER).

THE LIFE EXPECTANCY OF THE PARASITE, COUPLED WITH THE FREQUENCY OF ANTHELMINTHIC TREATMENTS, WILL ALSO PLAY A ROLE IN THE RATE OF INFECTION WITHIN A HOST. THE TEMPERATURE AND HUMIDITY OF THE ENVIRONMENT CAN AFFECT THE SURVIVAL OF E. GRANULOSUS.

ONCE SHEEP ARE INFECTED, THE INFECTION TYPICALLY REMAINS WITHIN THE SHEEP FOR LIFE. HOWEVER, IN OTHER HOSTS, SUCH AS DOGS, TREATMENT FOR ANNIHILATING THE PARASITE IS POSSIBLE. HOWEVER, THE INTERMEDIATE HOST IS ASSUMED TO RETAIN A GREATER LIFE EXPECTANCY THAN THE DEFINITIVE HOST.

Host change of the dog tapeworm
Echinococcus granulosus
Hydatid disease



DIAGNOSIS

Diagnosis in the definitive host, the dog, may be done by post mortem examination of the small intestine, or with some difficulty ante mortem by purging with arecoline hydrobromate. Detection of antigens in feces by ELISA is currently the best available technique. The prevalence of Echinococcus granulosus was found to be 4.35% in a 2008 study in Bangalore, India . employing this coproantigen detection technique. Polymerase chain reaction (PCR) is also used to identify the parasite from DNA isolated from eggs or feces. However, it is difficult to determine the eggs in feces because it is indistinguishable from other taeniid eggs.

Diagnosis in humans can be done by x-rays, CAT scans, and ultrasounds.

TREATMENT

If a human becomes infected there are a variety of methods for treatment. The most common treatment in the past years has been surgical removal of the hydatid cysts. The fluid in the cysts contain antigens that can immunologically sensitize the host, so cyst manipulation should be performed with caution, as spilling of cyst contents can cause anaphylactic shock. However, in recent years, less invasive treatments have been developed such as cyst puncture, aspiration of the liquids, the injection of chemicals, and then re-aspiration. Benzimidazole-based chemotherapy is also a new treatment option for humans.

PREVENTION

In order to prevent transmission to dogs from intermediate hosts, dogs can be given anthelminthic vaccinations. In the case of intermediate hosts, especially sheep, these anthelminthic vaccinations do cause an antigenic response—meaning the body produces specific antibody—however it does not prevent infection in the host. Clean slaughter and high surveillance of potential intermediate host during slaughter is key in preventing the spread this cestode to its definitive host. It is vital to keep dogs and potential intermediate host as separated as possible to avoid perpetuating infection. According to mathematical modeling, vaccination of intermediate hosts, coupled with dosing definitive hosts with anthelminths is the most effect method for intervening with infection rates.

ROPER DISPOSAL OF CARCASSES AND OFFAL AFTER HOME SLAUGHTER IS DIFFICULT IN POOR AND REMOTE COMMUNITIES AND THEREFORE DOGS READILY HAVE ACCESS TO OFFAL FROM LIVESTOCK, THUS COMPLETING THE PARASITE CYCLE OF ECHINOCOCCUS GRANULOSUS AND PUTTING COMMUNITIES AT RISK OF CYSTIC ECHINOCOCCOSIS. BOILING LIVERS AND LUNGS WHICH CONTAIN HYDATID CYSTS FOR 30 MINUTES HAS BEEN PROPOSED AS A SIMPLE, EFFICIENT AND ENERGY- AND TIME-SAVING WAY TO KILL THE INFECTIOUS LARVAE.

GEOGRAPHICAL DISTRIBUTION

Echinococcus granulosus sensu lato occurs practically worldwide, and more frequently in rural, grazing areas where dogs ingest organs from infected animals. The geographic distribution of individual E. granulosus genotypes is variable and an area of ongoing research. The lack of accurate case reporting and genotyping currently prevents any precise mapping of the true epidemiologic picture. However, genotypes G1 and G3 (associated with sheep) are the most commonly reported at present and broadly distributed. In North America, Echinococcus granulosus is rarely reported in Canada and Alaska, and a few human cases have also been reported in Arizona and New Mexico in sheep-raising areas. In the United States, most infections are diagnosed in immigrants from counties where cystic echinococcosis is endemic. Some genotypes designated "E. canadensis" occur broadly across Eurasia, the Middle East, Africa, North and South America (G6, G7) while some others seem to have a northern holarctic distribution .

E. MULTILOCULARIS OCCURS IN THE NORTHERN HEMISPHERE, INCLUDING CENTRAL AND NORTHERN EUROPE, CENTRAL ASIA, NORTHERN RUSSIA, NORTHERN JAPAN, NORTH-CENTRAL UNITED STATES, NORTHWESTERN ALASKA, AND NORTHWESTERN CANADA. IN NORTH AMERICA, ECHINOCOCCUS MULTILOCULARIS IS FOUND PRIMARILY IN THE NORTH-CENTRAL REGION AS WELL AS ALASKA AND CANADA. RARE HUMAN CASES HAVE BEEN REPORTED IN ALASKA, THE PROVINCE OF MANITOBA, AND MINNESOTA. ONLY A SINGLE AUTOCHTHONOUS CASE IN THE UNITED STATES (MINNESOTA) HAS BEEN CONFIRMED.

E. VOGELI AND E. OLIGARTHRUS OCCUR IN CENTRAL AND SOUTH AMERICA.

CLINICAL PRESENTATION

Echinococcus granulosus infections often remain asymptomatic for years before the cysts grow large enough to cause symptoms in the affected organs. The rate at which symptoms appear typically depends on the location of the cyst. Hepatic and pulmonary signs/symptoms are the most common clinical manifestations, as these are the most common sites for cysts to develop In addition to the liver and lungs, other organs (spleen, kidneys, heart, bone, and central nervous system, including the brain and eyes) can also be involved, with resulting symptoms. Rupture of the cysts can produce a host reaction manifesting as fever, urticaria, eosinophilia, and potentially anaphylactic shock; rupture of the cyst may also lead to cyst dissemination.

ECHINOCOCCUS MULTILOCULARIS AFFECTS THE LIVER AS A SLOW GROWING, DESTRUCTIVE TUMOR, OFTEN WITH ABDOMINAL PAIN AND BILIARY OBSTRUCTION BEING THE ONLY MANIFESTATIONS EVIDENT IN EARLY INFECTION. THIS MAY BE MISDIAGNOSED AS LIVER CANCER. RARELY, METASTATIC LESIONS INTO THE LUNGS, SPLEEN, AND BRAIN OCCUR. UNTREATED INFECTIONS HAVE A HIGH FATALITY RATE.

ECHINOCOCCUS VOGELI AFFECTS MAINLY THE LIVER, WHERE IT ACTS AS A SLOW GROWING TUMOR; SECONDARY CYSTIC DEVELOPMENT IS COMMON. TOO FEW CASES OF E. OLIGARTHRUS HAVE BEEN REPORTED FOR CHARACTERIZATION OF ITS CLINICAL PRESENTATION.

LIFE CYCLE

The adult Echinococcus granulosus (sensu lato) (2—7 mm long) image resides in the small intestine of the definitive host. Gravid proglottids release eggs image that are passed in the feces, and are immediately infectious. After ingestion by a suitable intermediate host, eggs hatch in the small intestine and release six-hooked oncospheres image that penetrate the intestinal wall and migrate through the circulatory system into various organs, especially the liver and lungs. In these organs, the oncosphere develops into a thick-walled hydatid cyst image that enlarges gradually, producing protoscolices and daughter cysts that fill the cyst interior. The definitive host becomes infected by ingesting the cyst-containing organs of the infected intermediate host. After ingestion, the protoscolices image evaginate, attach to the intestinal mucosa image , and develop into adult stages image in 32 to 80 days.

Humans are aberrant intermediate hosts, and become infected by ingesting eggs image . Oncospheres are released in the intestine image , and hydatid cysts develop in a variety of organs image . If cysts rupture, the liberated protoscolices may create secondary cysts in other sites within the body (secondary echinococcosis).

DISEASE CAUSED – HYATID DISEASE

SYMPTOMS:

The time from ingestion of the eggs to developing symptoms of hydatid disease can range from months to many years.

Ultrasounds or CAT scans may be used to detect the presence of hydatid cysts in the body. Blood tests to check the person's immune response to the parasite may be useful, but are not always positive even when an infection is present. Sometimes a sample is taken from a cyst to check for the presence of the tape worm.

Hydatid cysts are most commonly found in the liver and lungs, although they may also occur in other organs, bones and muscles. The cysts can increase in size to 5 – 10 cm or more and may survive for decades.

Non-specific signs include loss of appetite, weight loss and weakness. Other signs and symptoms depend on the location of the hydatid cysts and the pressure exerted on the surrounding tissues; and may include vomiting, abdominal pain and shortness of breath.

If a cyst leaks or ruptures it can cause a severe allergic reaction and even death.

PREVENTIVE MEASURES

Wash fruits and raw vegetables before eating.

Wash hands before eating or smoking, after handling dogs and after contact with items that are likely to be soiled with dog faeces.

Discourage dogs from licking people's faces, and do not kiss dogs.

Do not allow dogs to defecate near vegetable gardens or children's play areas

Reduce the amount of disease in dogs

Ensure dogs are kept away from areas where animals are slaughtered and are not allowed to scavenge on carcasses.

Prevent dogs from eating uncooked offal.

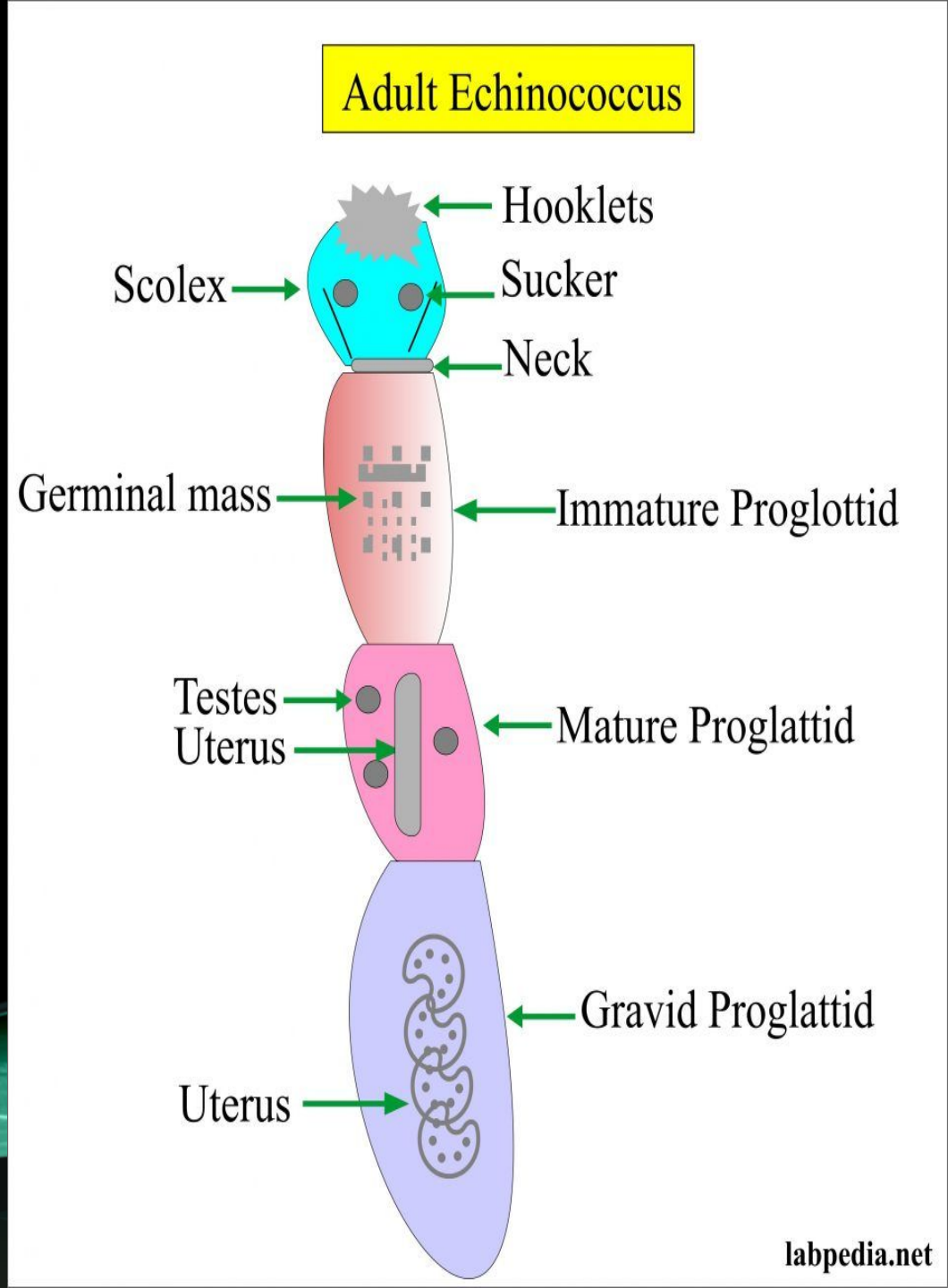
Dispose of infected offal by deep burial or burning to prevent it from being consumed by dogs or other canines.

Reduce dog populations on farms to the occupational need for them.

Seek advice from your veterinarian about effective treatment to prevent infection in working, pet or visiting dogs. This is particularly important for dogs in rural areas or those that may have contact with wildlife or feral animals.

MORPHOLOGY

Echinococcus granulosus [this species causes hydatid disease in mammals, including humans] granulosus worms are small (2-6mm long) and have a scolex with only three attached segments. The scolex has four lateral suckers and the rostellum is non-retractable and armed with a double crown of 28-50 recurved hooks.



SCIENTIFIC NAME- ECHINOCOCCUS GRANULOSUS
HIGHER CLASSIFICATION- ECHINOCOCCUS
ORDER- CYCLOPHYLLIDEA
PHYLUM- PLATYHELMINTHIES
FAMILY- TAENIIDAE
CLASS- CESTODA


thank
YOU
SO
much