Hydatid Disease

With a focus on Qinghai

Jonathan Juzi, MD

Epidemiology

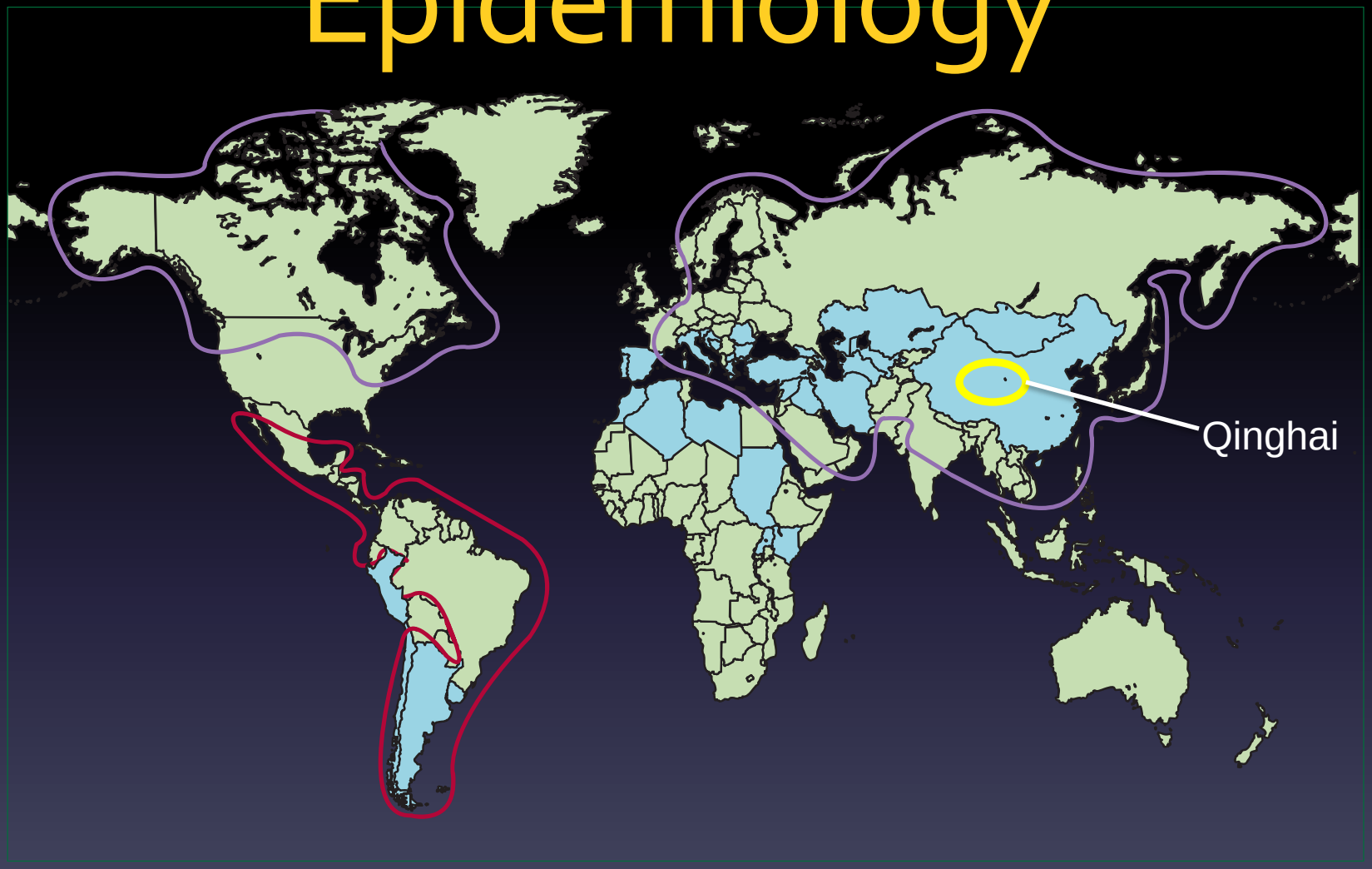


***Figure 1*: Geographical distribution of cystic, alveolar, and polycystic echinococcosis (hydatid disease)**
Blue=countries endemic for cystic hydatid disease. Purple line=endemic areas for alveolar echinococcosis. Red line=areas where polycystic echinococcosis has been reported.

Epidemiology

WHO homepage:

Programmes and projects /

Zoonoses and veterinary public health /

Seven neglected endemic zoonoses - some basic facts /

Cystic Echinococcosis and Multilocular Echinococcosis /

Cystic Echinococcosis, Distribution:

On the Tibetan Plateau for example, cysts have been found in 6.6% of the population.

Multilocular Echinococcosis, Distribution

In Gansu, a province of China, 8.8% of the human population was found seropositive.

Epidemiology

Figure 1. Study area in Sichuan Province, China.

Both cystic echinococcosis (CE) (Echinococcus granulosus infection) and alveolar echinococcosis (AE) (E. multilocularis) were co-endemic in this area at the highest village prevalence values recorded anywhere in the world: 12.9% were infected with one or the other form (6.8% CE and 6.2% AE). Prevalences of both CE and AE were significantly higher in female than male patients and increased with the age of the person screened. Pastoral herdsmen were at highest risk for infection (prevalence 19.0%).

Tiaoying L,, et al. Echinococcosis in Tibetan populations, Western Sichuan Province, China. Emerg Infect Dis. 2005 Dec

Epidemiology

Local inhabitants in 8 towns/townships of the counties Yushu, Zhiduo and Chengduo were examined in 2006. Ultrasound examination found 106 cases out of 2581 people (4.1%); prevalence in females was higher than in males (5% and 3% respectively). The highest prevalence rate (15.5%) was in the group of 60 years old and above. Occupationally, those involved in semi-agriculture and semi-animal husbandry showed highest prevalence rate 11.4%. The survey demonstrated that the prevalence of hydatid disease in human population is at a high level in Yushu Tibetan Autonomous Prefecture.

Liu HQ, et al. An epidemiological survey on hydatid disease in Yushu Prefecture of Qinghai Province. [Article in Chinese]; Zhongguo Ji Sheng Chong Xue Yu Ji Sheng Chong Bing Za Zhi. 2008 Dec 30;26(6):480-1, 484.
Source: Qinghai Provincial Institute of Endemic Control and Prevention, Xining 811602, China.

Epidemiology

Local inhabitants in Jiuzhi County, Guoluo Prefecture, Qinghai Province were examined in 2002-4. Ultrasound examination and indirect hemagglutinin test revealed a prevalence of 8% (124/1549) and a sero-prevalence of 25.8% (287/1113) for echinococcus (5.5% echincococcus granulosus and 2.5% echinococcus alveolaris). It was highest in herdsmen (16.6%) and Buddhist priests (15%) and higher in females (9.8%) than in males (6.2%).

Yu Sen-Hai, et al. Cysic and Alveolar Echinococcus: an Epidemiological Survey in a Tibetan Population in Southeast Qinghai, China; Jpn. J. Infect. Dis., 61, 242-246, 2008


problem


problem


problem

problem

Tibetan Fox (Vulpes ferrilata)


problem?

Epidemiology

Tibetan Culture

- Seminomadic pastoralists
- Livestock farming
  - Sheep, cattle, yaks
- Dogs
  - Help with farming
  - Buddhist monk culture allows strays and looks after them

Epidemiology

- High prevalence of parasite in animals
  - Dogs (55-75% of tested)
  - Livestock
    - Sheep = 81%,
    - Yaks = 54% (however not infectious)

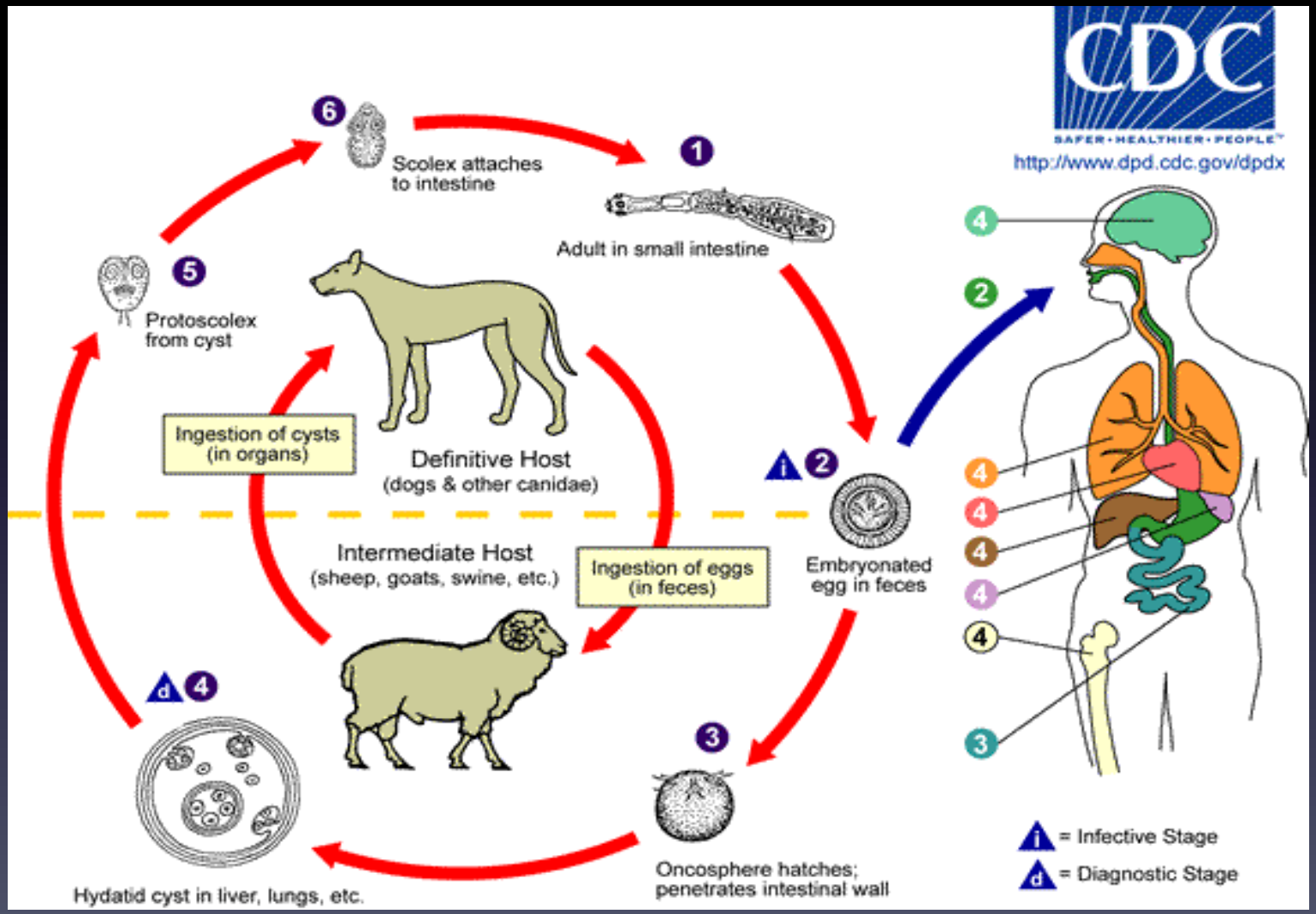
Heath D, et al. INADEQUACY OF YAKS AS HOSTS FOR THE SHEEP DOG STRAIN OF ECHINOCOCCUS GRANULOSUS OR FOR E. MULTILOCULARIS
Am. J. Trop. Med. Hyg., 72(3), 2005, pp. 289–290

Epidemiology

At-Risk Population:

- Preschool age children
  - Direct contact with dogs
  - Higher disease prevalence in adults b/c cysts become symptomatic over time
- Occupation and environment
  - Pastoralism
  - Dog ownership
- Women
  - They care for dogs
  - Work with yak feces
  - (Pregnant = immune suppressed)
- Low socioeconomic status
  - Water quality issues
  - Illiteracy

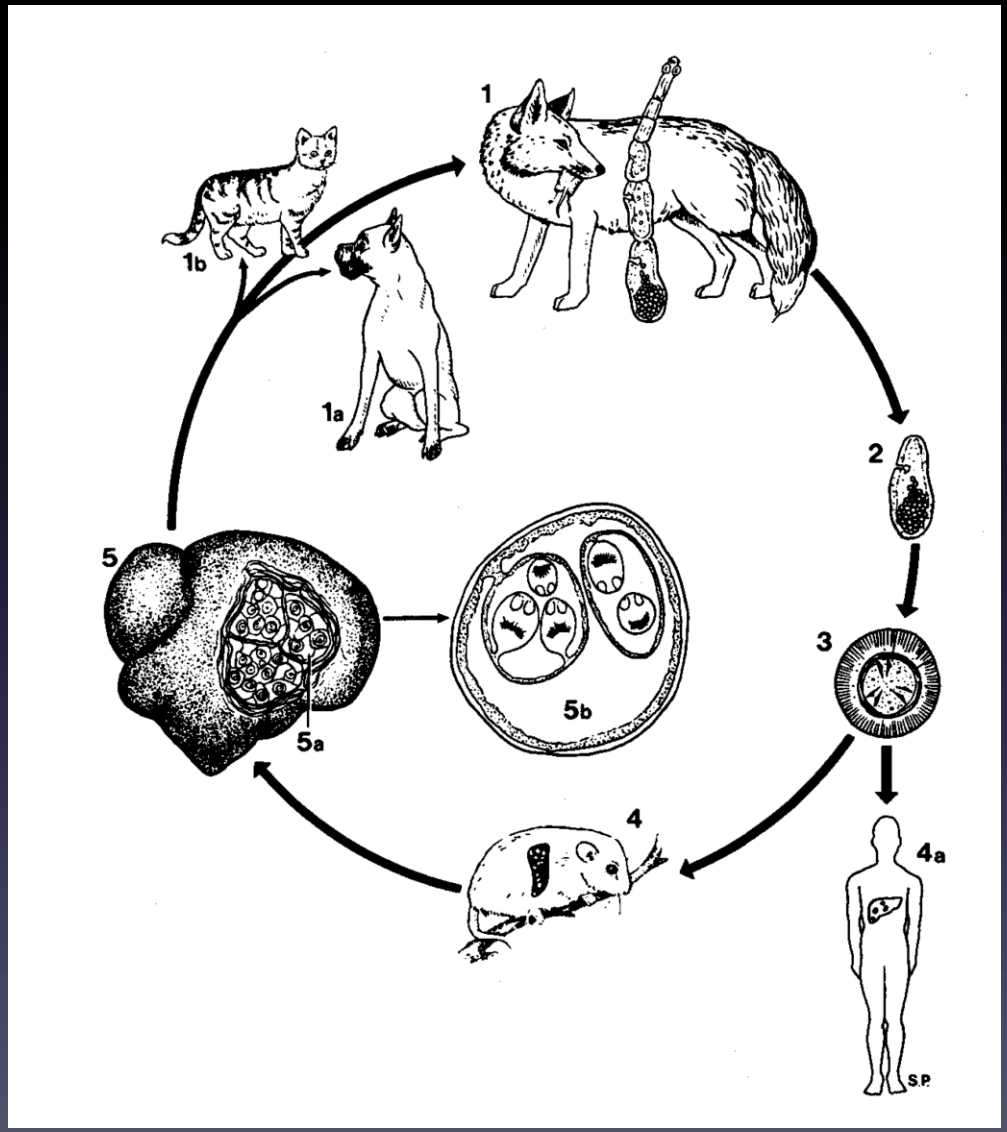
Transmission & Life Cycle



E C H I N O C O C C U S

G R A N U L O S U

Transmission & Life Cycle



ECHINOCOCCUS MULTILOCULARIS

Transmission & Life Cycle

E. granulosus eggs remain viable for several weeks or months in pastures or gardens, and on fomites under ideal conditions:

- moist
- moderate temperatures
- in water and damp sand for three weeks at 30° C
- 225 days at 6° C
- 32 days at 10-21° C
- the eggs survive for only short periods of time if they are exposed to direct sunlight and dry conditions

E. multilocularis eggs remain viable for up to a year in a moist environment at low temperatures:

- cold resistant to -50° C
- killed by desiccation, high temperatures, or sustained temperatures of –70° C or below

Suggested Interventions

Treat people

Vaccinate or treat dogs
- **oral vaccine being tested (EG95 vaccine)**
- **praziquantel 5-10mg/kg every 6 weeks**

Prevent dog access to livestock entrails and internal organs

Meat inspection and disposal of infected parts

Improved hygiene

Education

Suggested Interventions

Challanges

- Lack of cooperation
- Difficult logistics (access)
- Cultural antagonism
- Lack of surveillance of animal infection levels

Pilot Projects

The People's Republic of China MoH and provincial disease control networks approved funding in July 2006 to initiate pilot intervention programs against echinococcosis in 17 Tibetan autonomous counties of northwest Sichuan.

- health education at primary healthcare level
- regular praziquantal for owned and stray dogs
- surveillance of degree of echinococcus infection in dogs by copro-antigen test (fecal)
- surveillance of a specific cohort of schoolchildren: ultrasound & serology once a year
- albendazole free
- subsidized surgery (National Rural Cooperative Medical Insurance System)

Infections in Humans

E. granulosus

Incubation Period:

- months to years (as longs as up to 20-30 years)

Clinical Signs:

- mass lesion
- damage of adjacent tissue and organs
- sometimes anorexia, weight loss and weakness
- 60-70% liver
- 20-25% lungs
- 5-20% elsewhere (bones, kidneys, spleen, muscles, CNS)
- cysts can become very large (several liters of fluid), (in the brain they become symptomatic when still small)

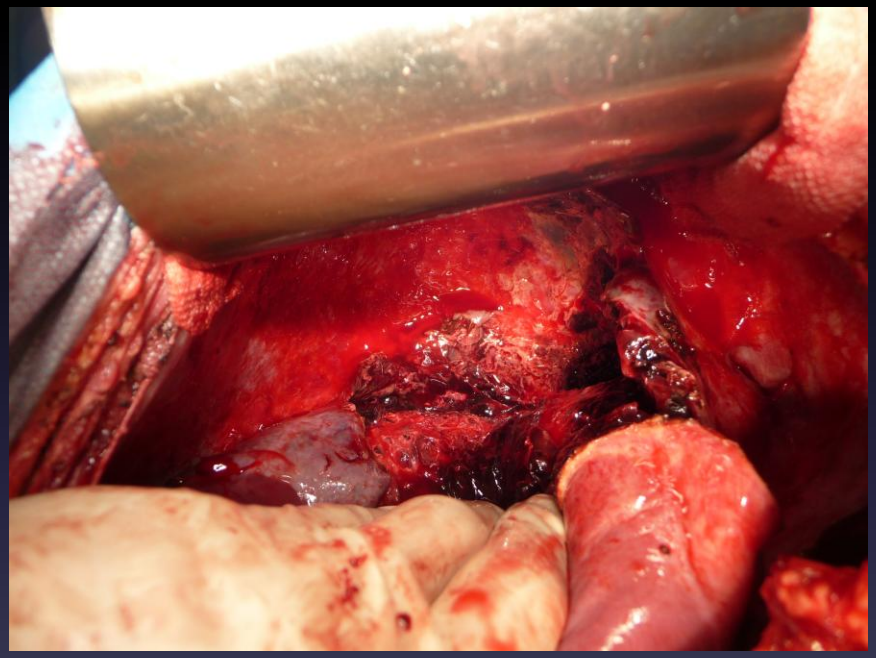
Infections in Humans

E. granulosus

Clinical Signs:

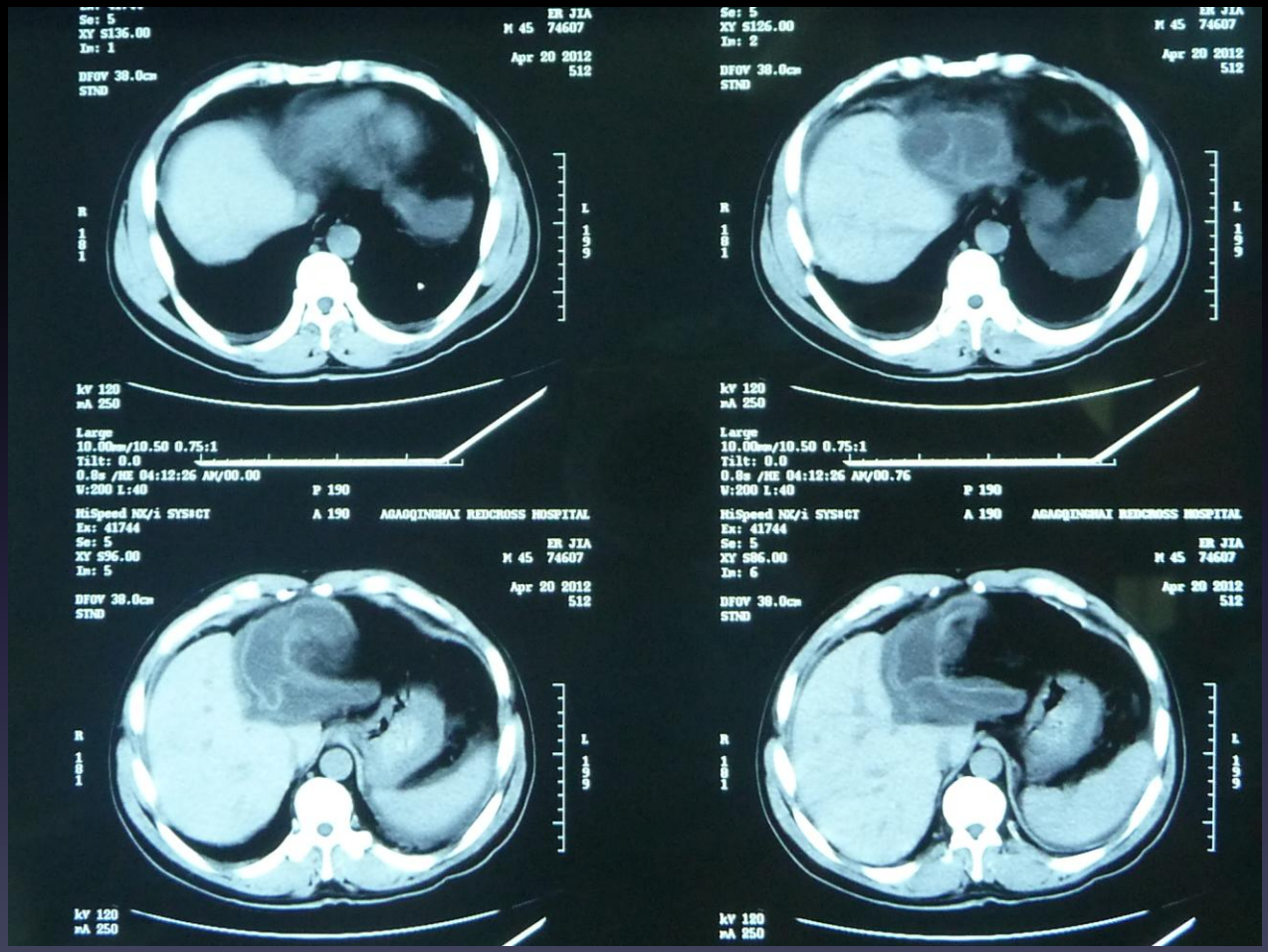
- secondary cystic echinococcosis: leak or rupture ➔ mainly abdominal cavity
- leak / rupture ➔ allergic reactions (chills, fiver, asthma, pruritus, urticaria or life-threatening anaphylaxis
- liver: abdominal pain, nausea, vomiting, indigestion, mimic gallstones (pain and cholestatic jaundice), hepatomegaly, anemia, pleural pain, ascites, portal hypertension
- Lung: chronic cough, chest pain, dyspnea, hemoptysis (specially if they rupture), abscess formation, pneumothorax
- CNS: blindness, seizures, other neurologic signs

Infections in Humans



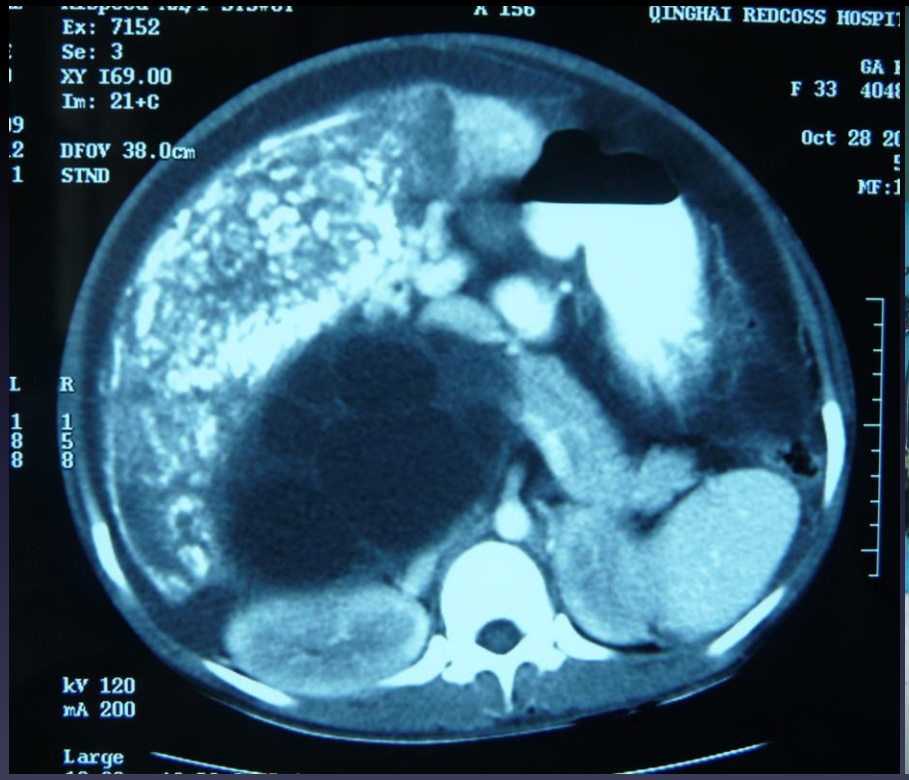
Complication: bleeding (often life threatening)

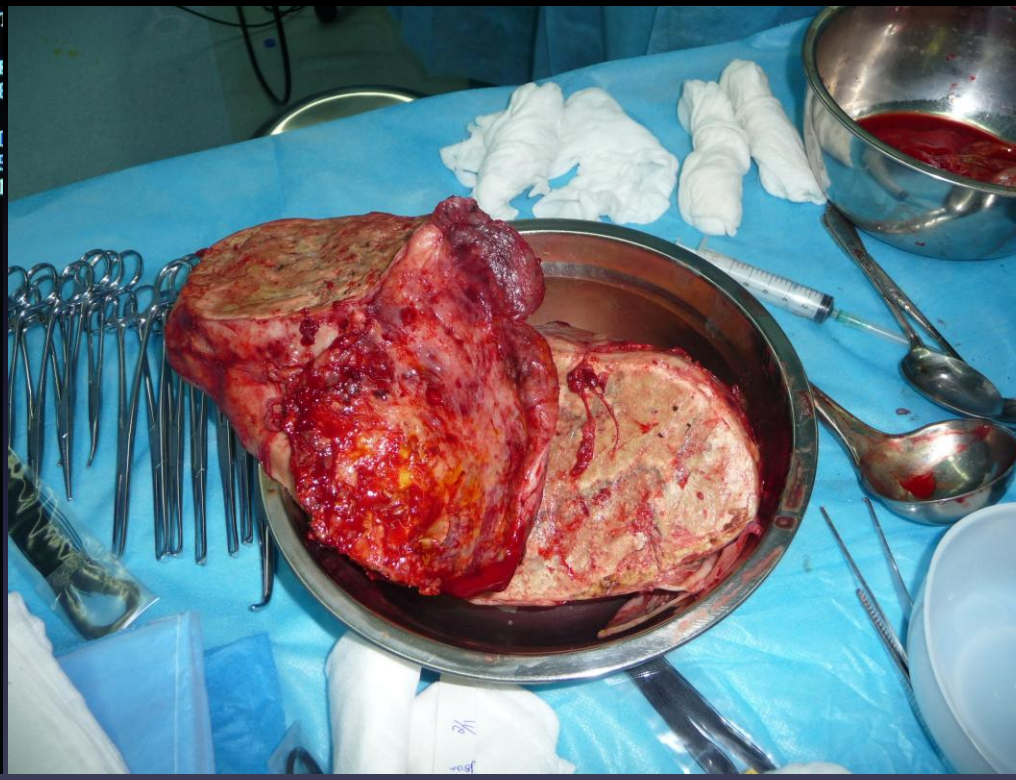
Infections in Humans



Complication: rupture after fall

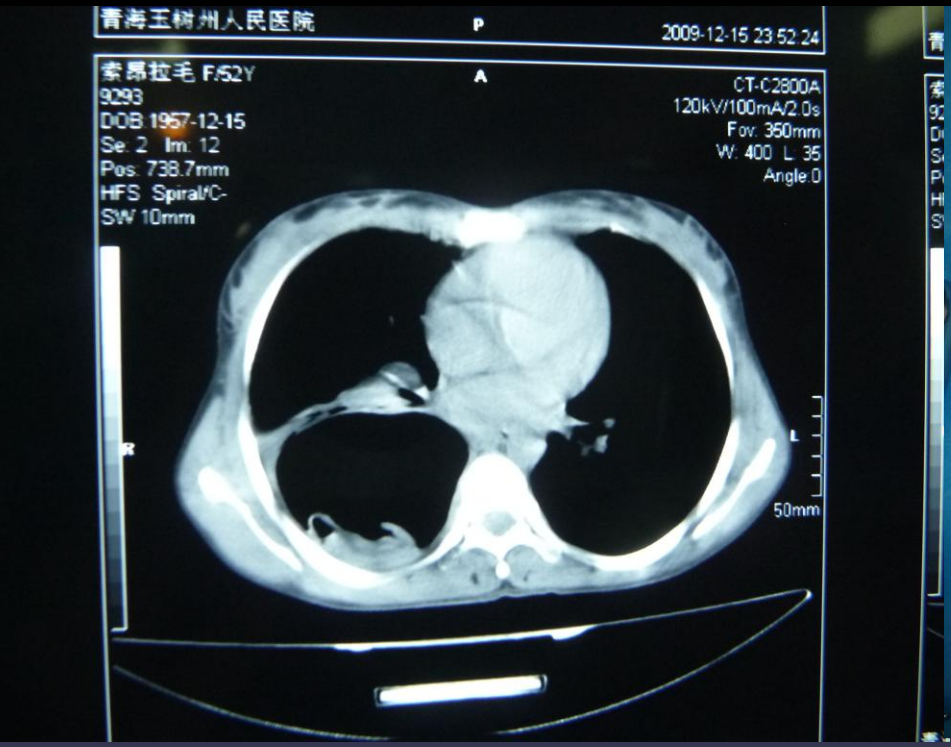
Infections in Humans





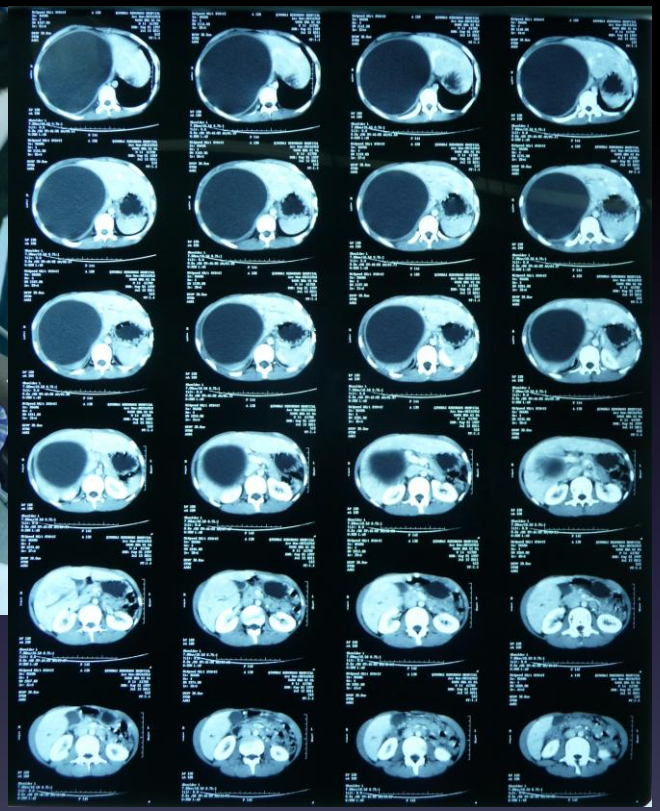
Complication: partial liver necrosis

Infections in Humans



Complication: rupture in the lung

Infections in Humans



Complication: mass lesion causing dyspnea

Infections in Humans

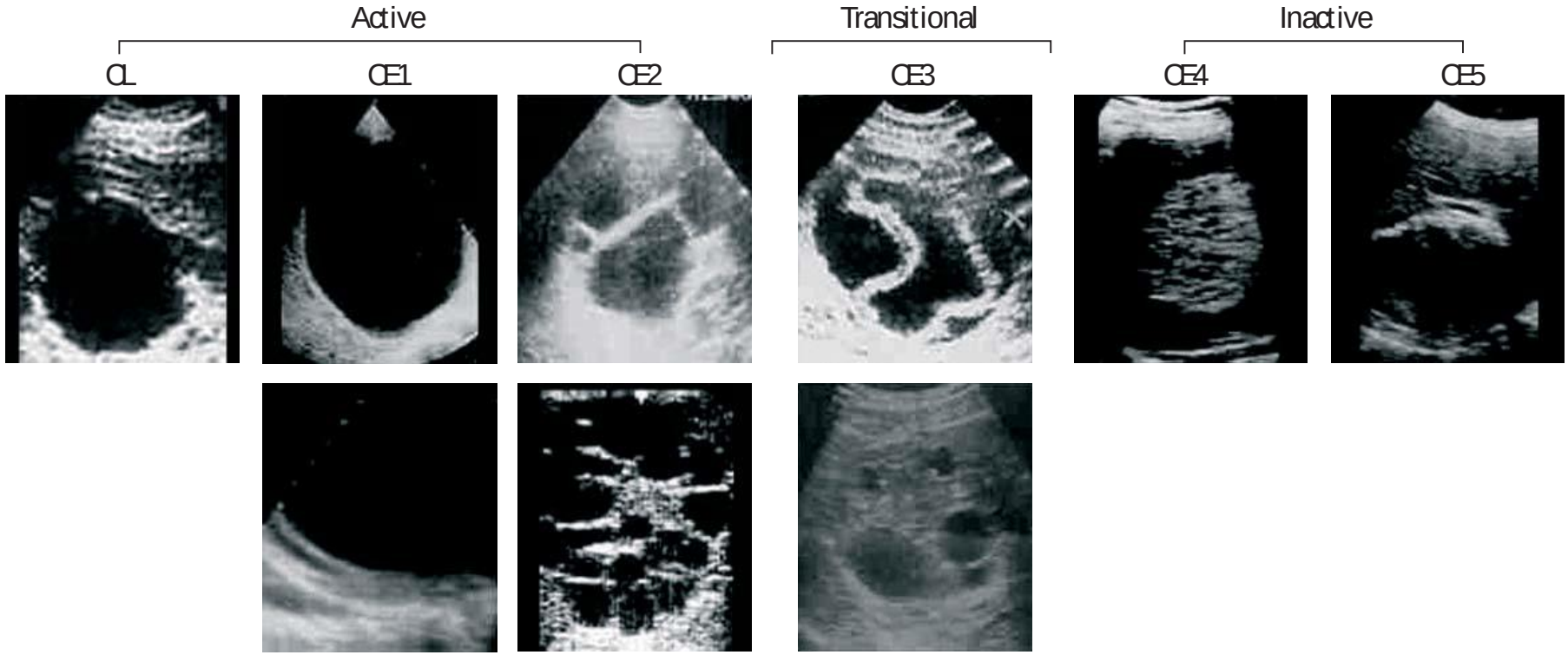


***Figure 3*: Ultrasound findings in cystic echinococcosis (WHO classification)**
Cysts are classified as active, transitional, or inactive according to their imaging characteristics. Reproduced from reference 14, with permission from Elsevier.

WHO classification

Infections in Humans

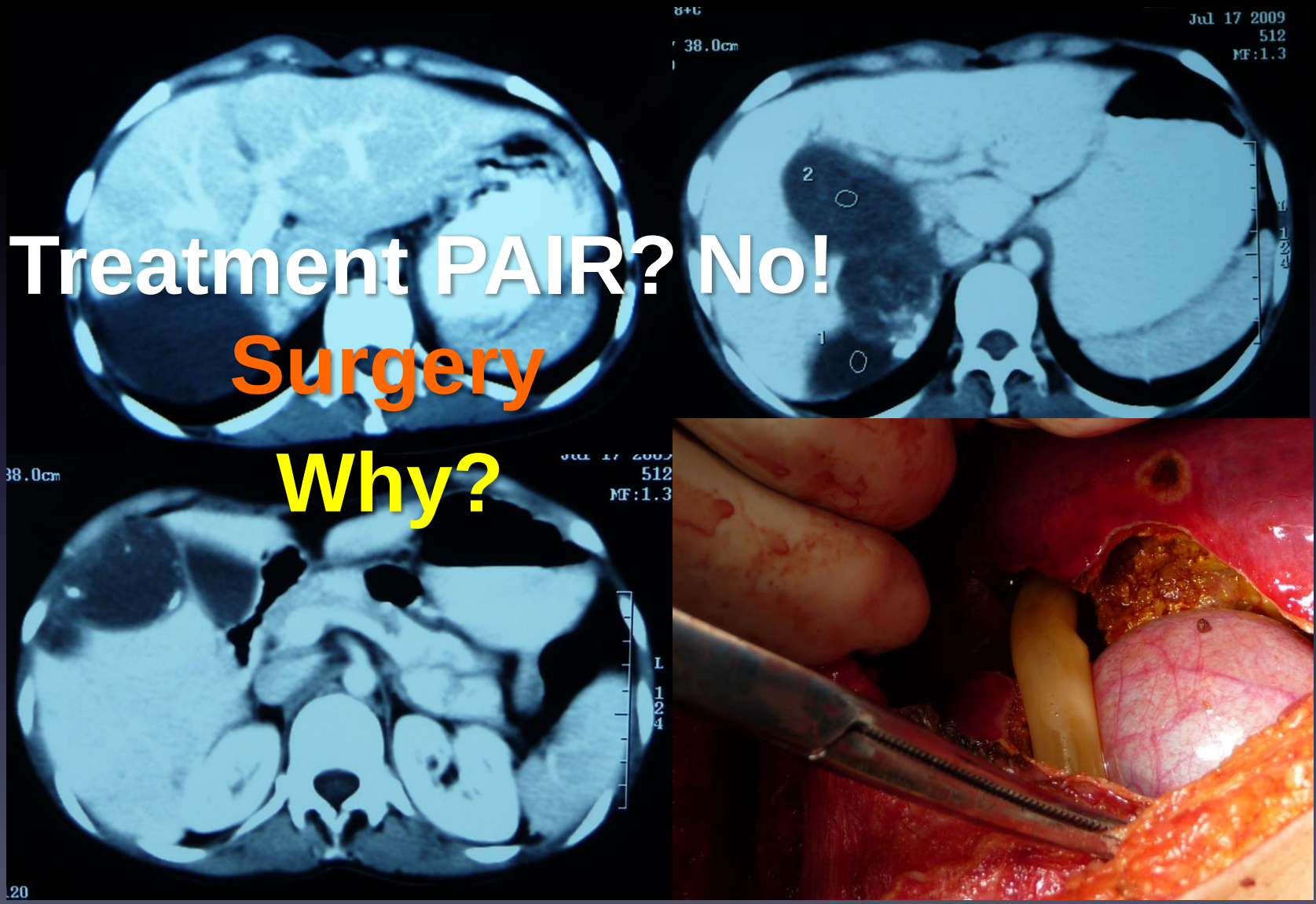
E. granulosus

Treatment:

- Sanford: Meta-analysis supports ‘percutaneous aspiration - injection – re-aspiration’ (PAIR), before and after albendazole 400mg bid, <60kg 15mg/kg/d div. bid
  PAIR: puncture with needle, aspirate cyst content, instill hypertonic saline (15-30%) or absolute alcohol, wait 20-30 min then re-aspirate, continue albendazole for 28 days ➔ cure 96% (surgery 90%)

? Is this the adequate treatment for Qinghai ?

Infections in Humans



Infections in Humans

E. granulosus

Treatment: PAIR

- indications:
  - univesicular cysts (WHO CE1)
  - univesicular cysts with detached membrane (WHO CE3)
  - some multivesicular cysts (WHO CE2)
- contraindications:
  - cysts inaccessible to puncture (lung, near vessels etc.)
  - cysts in which puncture may damage structures in vicinity
- complications:
  - spillage: allergic reactions (chills, fiver, asthma, pruritus, urticaria or life-threatening anaphylaxis)
  - secondary echinococcosis

Infections in Humans

E. granulosus

Treatment: ALBENDAZOLE

- preferred to mebendazole (absorption ↑, clinical efficacy ↑)
- dose:
  - 15-20 mg/kg/d div. bid
- contraindications:
  - chronic liver disease
  - pregnancy up to 12 weeks (teratogenic)
- adverse effects:
  - headache, nausea, anorexia, abdominal pain, itching
  - initial transient increase in liver enzymes
  - leucopenia & hair loss (rare)

Infections in Humans

E. granulosus

Treatment: ALBENDAZOLE

- preoperative treatment: start 3 days before surgery ➔ recurrence ⬇
- postoperative treatment:
  - 3 - 8 weeks for uncomplicated cases
  - 3 - 6 months for complicated cases
- used as only treatment modality for 3 – 6 months in univesicular cysts
  - success rate: 80%
  - relapse rate: 25% (most within 2 years)

Infections in Humans

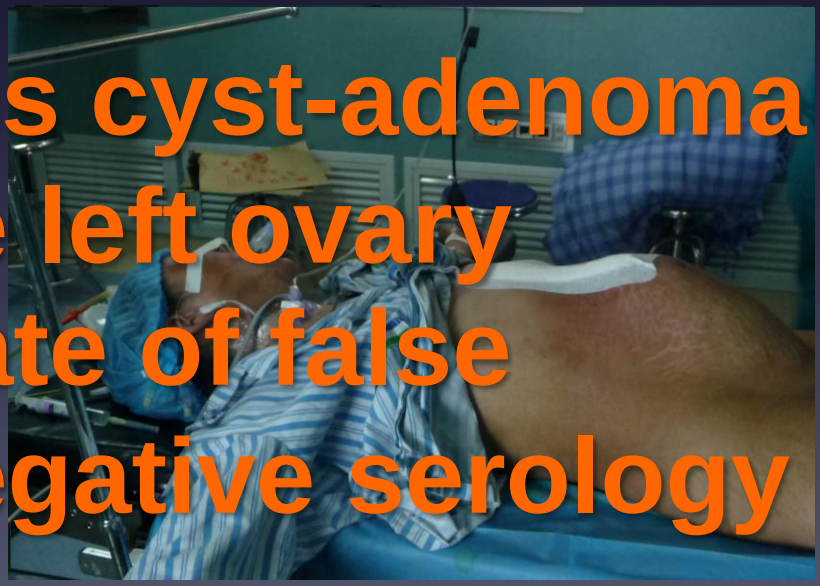
E. granulosus

Case: 36 yo Tibetan lady, 5 months pregnant

- already previous to pregnancy abdominal swelling
- now increasing abdominal swelling and dyspnea
- MRI: multiple cysts consistent with E. granulaosus
- echinococcus serology: positive

Diagnose: Serous cyst-adenoma of the left ovary

Problem: High rate of false positive/negative serology



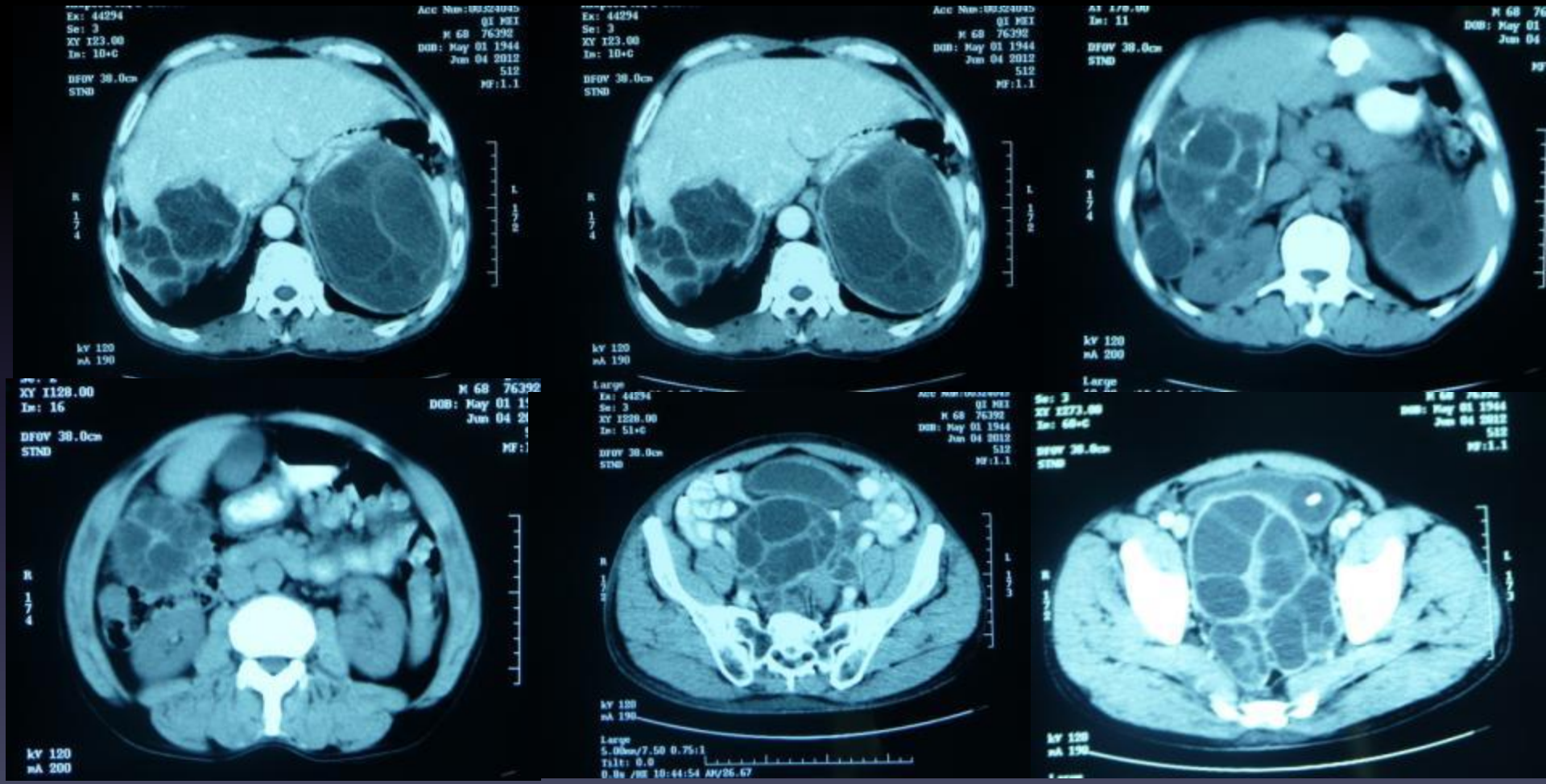
Infections in Humans

E. granulosus

Treatment: SURGERY

- only curative option for most cases = cornerstone of treatment
- preoperative steroids (prior intubation), albendazole (3 days)
- conservative versus radical surgery (liver)
- radical: anatomical and non-anatomical liver-resection (rare)
- conservative:
  - inactivation of protoscolices (20% saline for 6 minutes kills 100%)
  - removal of cyst content without spillage
  - removal of pericyst layer towards abdominal cavity / pleural space

Infections in Humans



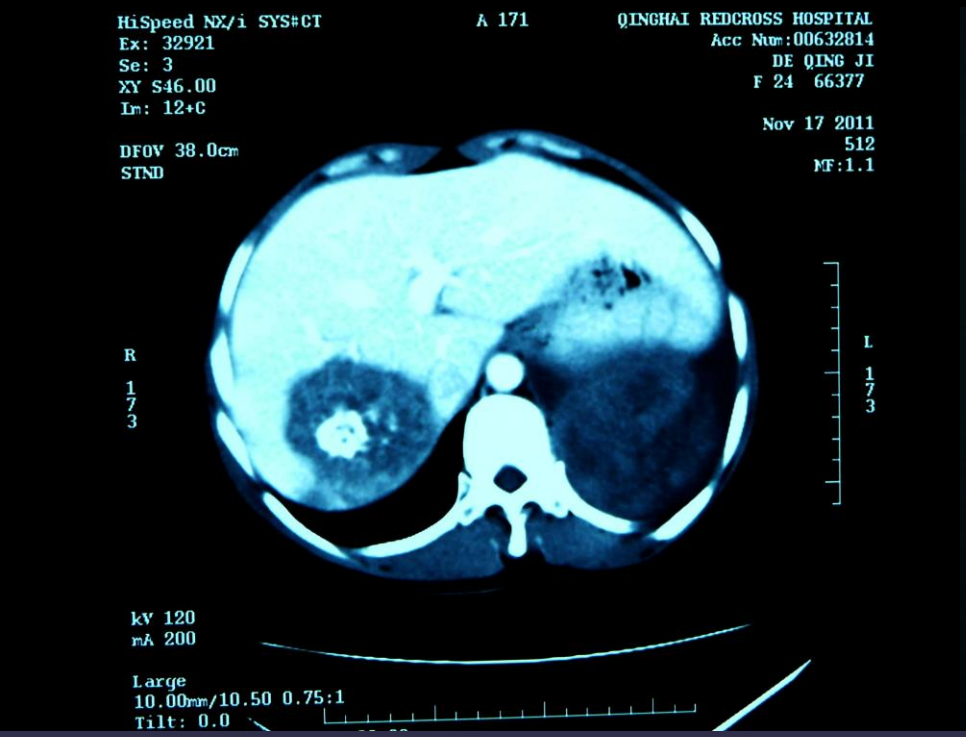
Infections in Humans

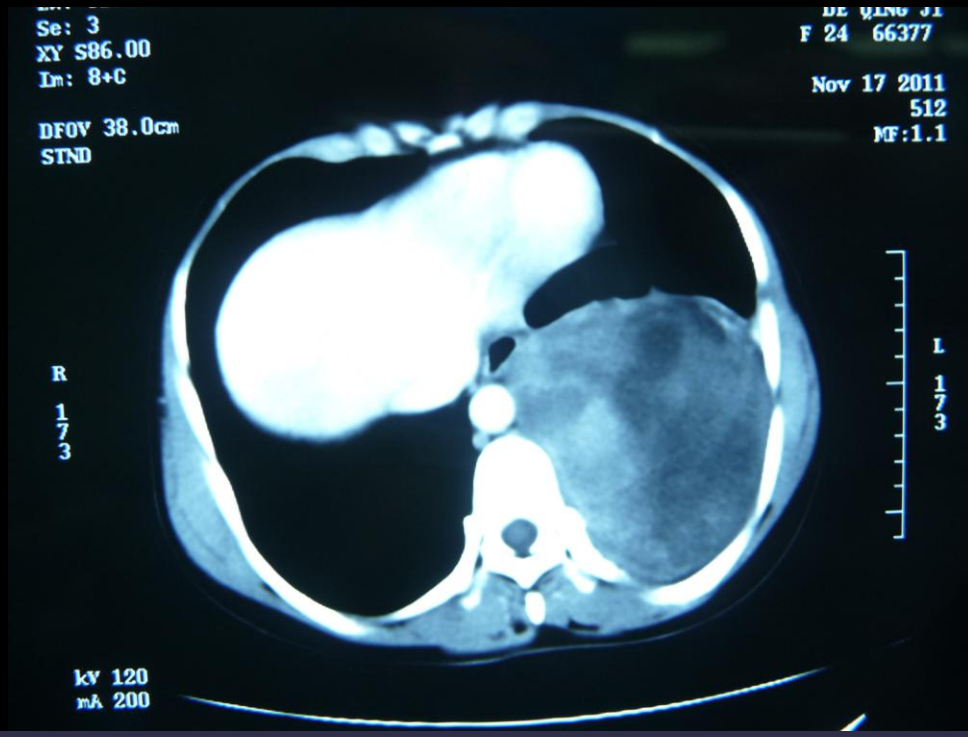
Infections in Humans

E. multilocularis

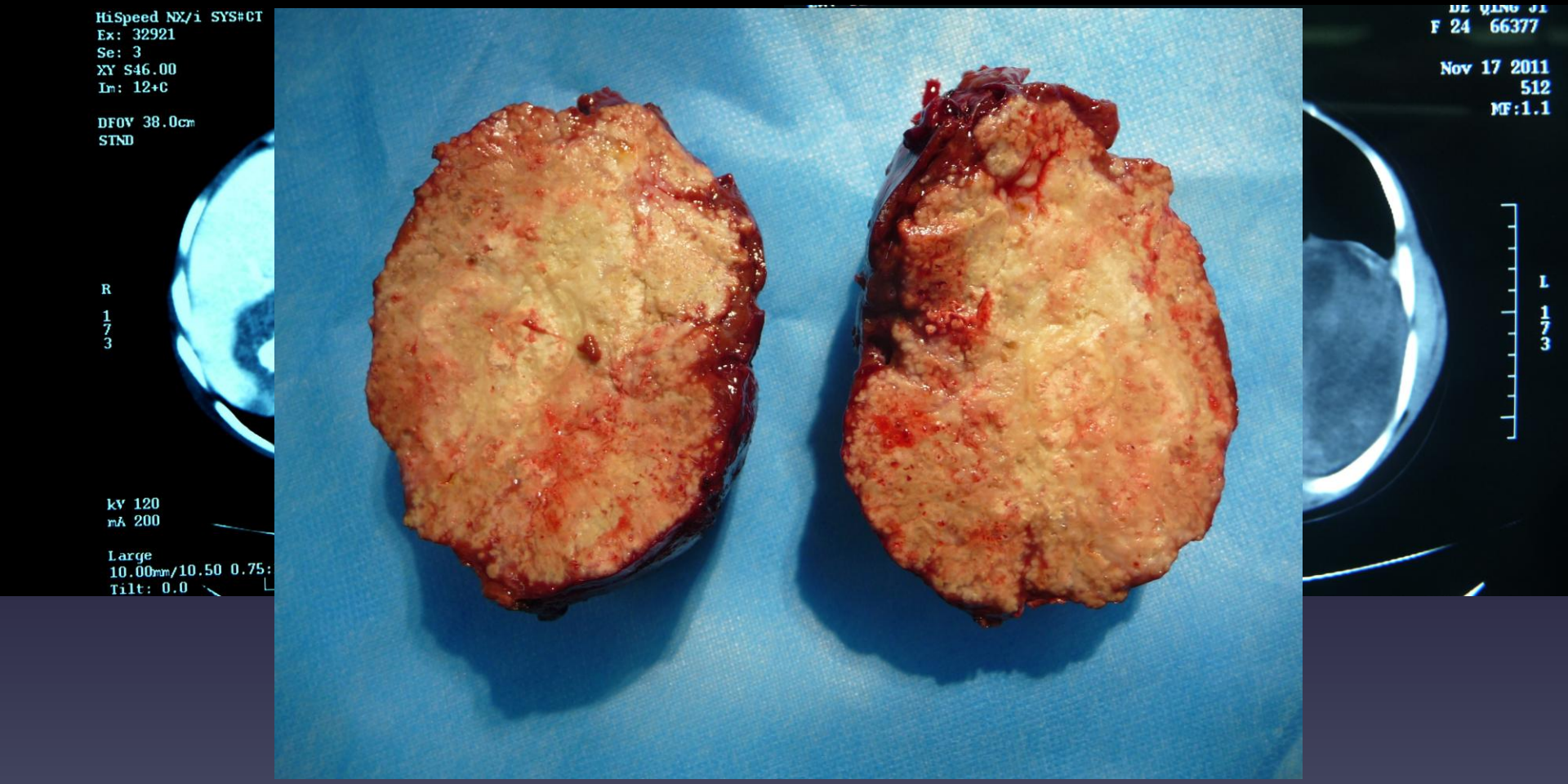
- almost always in the liver
- course of disease is slow
- larger tumors: hepatomegaly, epigastric pain
- ascites, malnutrition, jaundice, hepatic failure, splenomegaly
- no enclosing membrane, invades tissue by budding out: progressive – ‘malignant’
- treatment: radical resection (liver transplantation)
  for patients already in liver failure: albendazole for 6 month (after that some can be operated, however response rate to albendazole is low)

Infections in Humans





Infections in Humans



Hydatid Disease

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