

[Vet Parasitol.](#) 2001 Jul 12;98(1-3):65-87.

Veterinary aspects of alveolar echinococcosis--a zoonosis of public health significance.

[Deplazes P](#), [Eckert J](#).

Source

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Abstract

Human alveolar echinococcosis (AE), caused by the metacystode stage of *Echinococcus multilocularis*, is a serious zoonosis which caused up to 100% lethality in untreated patients before the 1970s, when modern methods of treatment were not yet established. AE occurs in large areas of the northern hemisphere mostly with low country-wide prevalences, but high prevalences of up to 4% have been reported from small population groups in highly endemic foci, e.g. from China. AE includes many veterinary aspects which are the topic of this review. Recent studies have shown that *E. multilocularis* has a wider geographic range than previously anticipated. There is evidence for growing populations of red foxes (*Vulpes vulpes*) in some areas, for increasing invasion of cities by foxes and also for establishment of the parasite cycle in urban areas. These and other factors may lead to an increased infection risk for humans. Significant progress has been made in the development of sensitive and specific new techniques for the intra vitam and post mortem diagnosis of intestinal *E. multilocularis* infection in definitive hosts, notably the detection of coproantigen by enzyme-linked immunosorbent assay and of copro-DNA by PCR. Both tests can also be used for the identification of *E. multilocularis* in faecal samples collected in the environment. Recommendations are given for chemotherapy and chemoprophylaxis of the intestinal infection in definitive hosts. In recent years, infections with the metacystode stage of *E. multilocularis* have not only been diagnosed in humans in several regions, including at least eight countries in central Europe, but also in animal species which do not play a role in the transmission cycle (wild and domestic pigs, dogs etc.). From 1987 to 2000 our group in Zurich has diagnosed 10 cases of AE in dogs and 15 in captive monkeys. In 2 dogs, concurrent infections of the intestine and of the liver with adult and larval stages of *E. multilocularis*, respectively, were observed for the first time. Clinical data are presented, and methods of diagnosis and treatment (surgery, chemotherapy) are described. Furthermore, small liver lesions caused by *E. multilocularis* were diagnosed in 10% of 90 slaughter pigs, and 2.9% of 522 breeding sows had specific serum antibodies against parasite antigens. In view of the unpredictable epidemiological situation, all possible measures for preventing *E. multilocularis* infections in humans and in domestic animals should be initiated by the veterinary and health authorities.

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[Parasitology.](#) 2003;127 Suppl:S159-72.

Perspective on control options for *Echinococcus multilocularis* with particular reference to Japan.

[Ito A](#), [Romig T](#), [Takahashi K](#).

Source

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Abstract

Following a brief introduction of recent advances in molecular and immunological technology for detection of persons and animals infected with *Echinococcus multilocularis* and an overview of the current situation of alveolar echinococcosis (AE) in Japan, perspectives on control options are discussed with reference to different epidemiological situations. AE is considered the most serious parasitic zoonosis in temperate and arctic regions of the northern hemisphere. The number of human cases differs drastically among regions. While high numbers

of patients are apparently associated with high *E. multilocularis* prevalence in domestic dogs, e.g. in parts of Alaska and western China, the number of cases is moderate or low in areas where the parasite is mainly transmitted by wild canid species (e.g. in central Europe or temperate North America). However, the severity of the disease, the absence of curative treatment for most cases, the high cost of long-term chemotherapy and the anxiety caused for the population in highly endemic areas call for the development of preventive strategies even in regions where human AE is rare. Furthermore, in view of (1) drastically increasing numbers and infection rates of foxes involved in transmission of *E. multilocularis*, and (2) increasingly close contact between humans and foxes e.g. in Europe and Japan, there is considerable concern that AE incidences may in future increase in these regions. Control options depend on a variety of factors including the species of canid principally responsible for transmission and the socio-economic situation in the region. Where domestic dogs (stray or owned) are the principal hosts for *E. multilocularis*, control options can include those applicable to *E. granulosus*, i.e. reduction of the number of stray dogs, registration and regular preventive chemotherapy of owned dogs, and information campaigns for the population promoting low-risk behaviour for man and dogs. Where *E. multilocularis* is mainly transmitted by wild canids, the situation is far more difficult with preventive strategies still being in trial stage. Integrated control measures could include prevention information campaigns, **restricting access of pet animals (dogs and cats) to rodents**, chemotherapy of foxes on local or regional scales, and strategies to minimize contacts between people and foxes.

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[PLoS Negl Trop Dis](#). 2010 Jun 22;4(6):e722.

The global burden of alveolar echinococcosis.

[Torgerson PR](#), [Keller K](#), [Magnotta M](#), [Ragland N](#).

Source

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Abstract

BACKGROUND:

Human alveolar echinococcosis (AE) is known to be common in certain rural communities in China whilst it is generally rare and sporadic elsewhere. The objective of this study was to provide a first estimate of the global incidence of this disease by country. The second objective was to estimate the global disease burden using age and gender stratified incidences and estimated life expectancy with the disease from previous results of survival analysis. Disability weights were suggested from previous burden studies on echinococcosis.

METHODOLOGY/PRINCIPAL FINDINGS:

We undertook a detailed review of published literature and data from other sources. We were unable to make a standardised systematic review as the quality of the data was highly variable from different countries and hence if we had used uniform inclusion criteria many endemic areas lacking data would not have been included. Therefore we used evidence based stochastic techniques to model uncertainty and other modelling and estimating techniques, particularly in regions where data quality was poor. We were able to make an estimate of

the annual global incidence of disease and annual disease burden using standard techniques for calculation of DALYs. Our studies suggest that there are approximately 18,235 (CIs 11,900-28,200) new cases of AE per annum globally with 16,629 (91%) occurring in China and 1,606 outside China. Most of these cases are in regions where there is little treatment available and therefore will be fatal cases. Based on using disability weights for hepatic carcinoma and estimated age and gender specific incidence we were able to calculate that AE results in a median of 666,434 DALYs per annum (CIs 331,000-1.3 million).

CONCLUSIONS/SIGNIFICANCE:

The global burden of AE is comparable to several diseases in the neglected tropical disease cluster and is likely to be one of the most important diseases in certain communities in rural China on the Tibetan plateau.

[Langenbecks Arch Surg.](#) 2003 Sep;388(4):209-17. Epub 2003 Aug 22.

Epidemiology of echinococcosis.

[Romig T.](#)

Source

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Abstract

BACKGROUND:

Various species and infraspecific forms of the cestode genus *Echinococcus* are causative agents of human echinococcosis. Pathology, epidemiology and geographical occurrence vary widely between the different *Echinococcus* taxa. As a general rule, those forms of echinococcosis that are transmitted mainly by wild animals are rather rare, due to limited contact between humans and wildlife. This is the case with alveolar echinococcosis (AE) caused by *Echinococcus multilocularis*, the 'fox tapeworm' (except in regions where domestic dogs are heavily involved in the lifecycle), and for the South American endemic species *E. oligarthrus* and *E. vogeli*. On the other hand, most forms of cystic echinococcosis (CE) are transmitted in domestic lifecycles involving dogs and livestock and constitute an emerging public health problem, especially in regions with extensive livestock husbandry and non-supervised slaughter.

METHOD:

This review focuses on two fields where a wealth of new information became available in recent years.

RESULTS AND CONCLUSIONS:

New data demonstrate that '*E. granulosus*', the causative agent of CE, is an assembly of several, rather diverse, species and genotypes that show fundamental differences, not only in their epidemiology, but also in their pathogenicity to humans. This fact may explain the unequal distribution of high-endemicity areas for human CE on regional scales, which previously, has been attributed to differences in human behaviour. In addition, new data suggest that *E. multilocularis* is expanding its geographical range in the northern hemisphere, and its transmission is intensifying, e.g. in central Europe. Moreover, the lifecycle (involving wild foxes and rodents) is rapidly becoming 'urbanised' due to the recent establishment of fox populations in cities and towns. This shift from sylvatic to synanthropic occurrence is likely to result in an increased pressure on the human population of infection from AE.

[Parassitologia.](#) 1997 Dec;39(4):337-44.

Epidemiology of *Echinococcus multilocularis* and *E. granulosus* in central Europe.

[Eckert J.](#)

Source

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Abstract

Two species of Echinococcus are known to occur in central Europe, namely *E. multilocularis* and *Echinococcus granulosus*, causing the alveolar and the cystic form of echinococcosis in humans, respectively. Recent studies have shown that in central Europe *E. multilocularis* occurs further north, south and east than previously anticipated. This parasite is endemic in Belgium, Luxembourg, France, Switzerland, Liechtenstein, Austria, Germany, Poland, and the Czech Republic. The prevalence rates of *E. multilocularis* in foxes are alarmingly high in some areas with average rates > 40%. Infection rates in dogs and cats are much lower. In recent years accidental infections with the metacestode stage of *E. multilocularis* have been observed in various animal species (dog, domestic pig, wild boar, nutria and monkeys) and in humans. The mean annual incidence rates of alveolar echinococcosis in humans are low varying between 0.02 and 1.4 cases per 100,000 inhabitants in several European countries and regions. For monitoring of the infection in final host populations new techniques are now available, notably the coproantigen ELISA and for selected cases also egg detection by the Polymerase Chain Reaction. *E. granulosus* has an uneven geographical distribution in Europe with very low prevalence rates in some of the northern and central European countries, with medium endemicity in others and high endemicity in areas of southern and eastern Europe. Cystic echinococcosis in humans is still a significant public health problem, predominantly in the Mediterranean area. Up to now five strains of *E. granulosus* have been identified in central Europe which differ in their life cycles as well as in morphological, biochemical, genetic and some other features. Several molecular techniques are now available which allow the identification of *Echinococcus* species and certain strains using genetic markers. Epidemiological evidence and molecular studies indicate that the so-called sheep, cattle, and cervid strains of *E. granulosus* are infective to humans whereas the horse strain may have no or low infectivity. Polish patients were found to be infected with *E. granulosus* similar to a pig strain.

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[Acta Vet Scand.](#) 2011 Feb 11;53:9.

Combining information from surveys of several species to estimate the probability of freedom from *Echinococcus multilocularis* in Sweden, Finland and mainland Norway.

[Wahlström H](#), [Isomursu M](#), [Hallgren G](#), [Christensson D](#), [Cedersmyg M](#), [Wallensten A](#), [Hjertqvist M](#), [Davidson RK](#), [Uhlhorn H](#), [Hopp P](#).

Source

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Abstract

BACKGROUND:

The fox tapeworm *Echinococcus multilocularis* has foxes and other canids as definitive host and rodents as intermediate hosts. However, most mammals can be accidental intermediate hosts and the larval stage may cause serious disease in humans. The parasite has never been detected in Sweden, Finland and mainland Norway. All three countries require currently an anthelmintic treatment for dogs and cats prior to entry in order to prevent introduction of the parasite. Documentation of freedom from *E. multilocularis* is necessary for justification of the present import requirements.

METHODS:

The probability that Sweden, Finland and mainland Norway were free from *E. multilocularis* and the sensitivity of the surveillance systems were estimated using scenario trees. Surveillance data from five animal species were included in the study: red fox (*Vulpes vulpes*), raccoon dog (*Nyctereutes procyonoides*), domestic pig, wild boar (*Sus scrofa*) and voles and lemmings (*Arvicolinae*).

RESULTS:

The cumulative probability of freedom from EM in December 2009 was high in all three countries, 0.98 (95% CI 0.96-0.99) in Finland and 0.99 (0.97-0.995) in Sweden and 0.98 (0.95-0.99) in Norway.

CONCLUSIONS:

Results from the model confirm that there is a high probability that in 2009 the countries were free from *E. multilocularis*. The sensitivity analyses showed that the choice of the design prevalences in different infected populations was influential. Therefore more knowledge on expected prevalences for *E. multilocularis* in infected populations of different species is desirable to reduce residual uncertainty of the results.

[Parassitologia](#). 2006 Jun;48(1-2):37-9.

Ecology and epidemiology of *Echinococcus multilocularis* in Europe.

[Deplazes P.](#)

Source

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Abstract

Human alveolar echinococcosis (AE), caused by the larval stage of *Echinococcus multilocularis* has a high mortality rate in untreated patients. The life-cycle of *E. multilocularis* in Europe predominantly involves foxes as definitive hosts. However, experimental studies demonstrated a comparable biotic potential of *E. multilocularis* in dogs and raccoon dogs but an insignificant potential in cats. AE occurs in central and eastern Europe at low incidence rates. Recent studies in foxes have shown that *E. multilocularis* has a wider geographic range (including Italy) than previously thought. In recent years, increases in fox populations have been observed in many European countries, especially in urban areas. As a result, the *E. multilocularis* cycle is now established in the urban environment. This presents an increased risk of infection for a large human population. Based on these facts and new epidemiological data, possible intervention strategies are presented.

[Angew Parasitol](#). 1992 Nov;33(4):193-204.

[The occurrence of *Echinococcus granulosus* and *E. multilocularis* in Thuringia].

[Article in German]

[Worbes H.](#)

Source

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Abstract

The occurrence of *E. granulosus* and *E. multilocularis* in the region of Thuringia is reported. Parasitological investigations showed 1421 *E. granulosus* metacestodes, 91.7% of them in lungs and 1.3% in livers of cattle, 6% in lungs and 1% in livers of pigs; that means an infestation rate at slaughter of 0.1%-0.3% in cattle and 0.001-0.004% or less in pigs resp. 90.1% of the hydatid cysts proved to be fertile even in a size of 1.5 cm diameter. Adult *E. granulosus* was found post mortem in 2 of 324 dogs. In the period from 1985 to 1988, only 11 dogs were infested with *E. granulosus* as found at autopsy all over the GDR. Out of 23,325 faecal samples 270 samples (1.2%) were positive for eggs of *Taenia* spp. The animals with egg-shedding were treated as infected with *Echinococcus*. In experimental infections of 12 Beagles the prepatent period ranged from the minimum of 34 days up to the maximum of 40 days. The detected *E. granulosus* strain could be identified as a dog-cattle strain. The microscopical examination of the intestine of 805 red foxes (*Vulpes vulpes*) revealed the presence of *E. multilocularis* in 12.7% of the animals. Thuringia is one of the endemic distribution area of *E. multilocularis* in Central Europe. In the west of Thuringia 25% of the foxes were found with *E. multilocularis*, in the remaining area (lowlands) only 3.3%. In some of mountainous areas, 40% of the foxes were infected with *E. multilocularis*. 2 cats of 58 from this region were infected with *E. multilocularis*.

[Parasitol Int](#). 2006;55 Suppl:S187-91. Epub 2005 Dec 13.

The present situation of echinococcosis in Europe.

[Romig T](#), [Dinkel A](#), [Mackenstedt U](#).

Source

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Abstract

The taxonomy of *Echinococcus* is presently undergoing major changes, the paraphyletic *Echinococcus granulosus* being split into several distinct species. In this review, an attempt is made to assess the present epidemiological situation in Europe separately for each species (*Echinococcus multilocularis*, *Echinococcus granulosus sensu stricto*, *Echinococcus equinus*, *Echinococcus ortleppi*, and *Echinococcus* sp.). For *E. multilocularis*, an increasing density of infected host animals is apparent in central Europe, and, possibly, a range increase has occurred. Prevalence rates in foxes have risen in many agriculturally dominated landscapes of France, The Netherlands, Germany, Austria, Slovakia and Poland, but the lifecycle is now also established in many urban areas, where red foxes occur with high population densities. *E. granulosus* s. s. (the former 'sheep strain') is still frequent and a public health problem in many parts of the Mediterranean region and re-emergence after failed control campaigns is observed or suspected in Bulgaria and Wales. No recent data on the cattle-transmitted *E. ortleppi* and the horse-transmitted *E. equinus* are available, but their relevance for human health seems to be minor. The same may apply to the 'pig strain' and the newly described 'European cervid strain', which both belong to a cluster of genotypes whose taxonomy is not yet resolved (*Echinococcus* sp.).

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16352465

[PubMed - indexed for MEDLINE]

[Gastroenterol Res Pract](#). 2010;2010. pii: 583297. Epub 2010 Aug 31.

Human echinococcosis: a neglected disease.

[da Silva AM](#).

Source

General Surgery, Pulido Valente Hospital, Lisbon, Portugal.

Abstract

Echinococcosis is among the most neglected parasitic diseases. Development of new drugs and other treatment modalities receives very little attention, if any. In most developed countries, Cystic Echinococcosis (CE) is an imported disease of very low incidence and prevalence and is found almost exclusively in migrants from endemic regions. In endemic regions, predominantly settings with limited resources, patient numbers are high. Whole communities do not have access to appropriate treatment. The choice of treatment modalities is limited because of poor infrastructure and shortage of equipment and drugs. In this context, CE meets the criteria for a neglected disease. Furthermore, the terminology related to the designations around the parasite, its evolution and some therapeutic procedures is not uniform and sometimes inappropriate terms and wrong designations are used based on incorrect concepts. Although all of us know the different aspects of the disease it is pertinent to remember some important points and, above all, to clarify some aspects concerning the hydatid cyst's nomenclature in order to understand better the therapeutic options in the liver locations, particularly the different surgical approaches.

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