Despite of these favourable results, the administration of the second
dose of the MMR vaccine must be strengthened to achieve the very high
levels of coverage recommended by the WHO in each of the two doses
(>95%), and to avoid the accumulation of susceptible people and the
threat of future outbreaks [1].

The changes produced in Gipuzkoa are probably representative of the
progress toward measles control obtained in Spain in the last two decades.
In Spain, each autonomous community has the power to decide its
vaccination policy. Overall, the trend in Spain is towards a reduction: the
incidence of measles since 1999 has been <1 case per 100 000 inhabitants
and in 2002 only 64 cases were confirmed by laboratory analysis or
epidemiological link [4]. In Catalonia, interruption of indigenous measles
transmission was confirmed between June 1999 and July 2000 [5]. Indeed,
the prevalence of immunity to measles in the Spanish population
in 1996 was encouraging, with the percentage of immune individuals in
almost all age groups above the levels recommended by the WHO for
interruption of viral transmission; only the 1977-81 cohort, composed
of individuals born prior to or at the time when vaccination was being
introduced, failed to reach these levels [6]. Nevertheless, measles outbreaks
still occur in Spain [4], indicating that there are still groups within the
Spanish population whose level of immunity allows viral circulation.

Decreases in vaccine coverage have also been observed throughout
these years in Gipuzkoa, when changes in the vaccination strategy were
implemented (1992 and 2000). Measles is one of the most infectious
diseases known to man, and consequently decreases in vaccine coverage
should be detected and corrected as soon as possible. Reintroductions
are frequent in Spain [4,5], a finding confirmed in the present study. It
is therefore essential that surveillance systems be kept active and that all
physicians suspecting a case of measles contact the relevant health
authorities as soon as possible for laboratory confirmation [1].

The results obtained in the present study confirm that the two dose
MMR vaccine strategy introduced in our region has been effective. This
strategy, which has achieved high coverage, can interrupt indigenous
viral circulation within a few years. Nevertheless, given that measles
virus is highly contagious and continues to be endemic in many regions
throughout the world, it is essential to maintain high vaccine coverage
in the two doses of the MMR vaccine (>95%) so that the percentage of
susceptible individuals in the population remains very low.

Acknowledgements

We thank Rosa Sancho for her helpful data on vaccination coverage.

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Diphyllobothriasis, a parasitosis caused by the flatworm
Diphyllobothrium latum, is contracted by consuming raw or
undercooked freshwater fish. The aim of this study was to evaluate
the situation of this parasitosis during the past 20 years in Europe
through the analysis of databases and search engines (Medline, CABI
Helminthological abstracts, Yahoo, Google), and through a questionnaire
sent to a network of European parasitologists and to microbiological
laboratories located on the shores of the large Alpine lakes. This study
has shown that several dozen cases have been reported each year
in Finland and Sweden, that there have been numerous cases in the
French or Italian speaking areas of subalpine lakes, and that
sporadic cases only have been observed in Austria, Spain, Greece,
Romania, Poland and Norway. Over 30 cases have been identified
on the Swiss shores of Lake Maggiore since 1990, and 70 cases

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Original Articles

Euroroundup

Current Situation of Human Diphyllobothriasis
in Europe

J Dupouy-Camet1, R Peduzzi2

Diphyllobothriasis, a parasitosis caused by the flatworm
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1. Laboratoire de Parasitologie-Mycologie, CHU Cochin, Paris, France
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parasite is complex and involves several hosts [1,2]. Released in water, the eggs mature within eight to 12 days at a water temperature of 16-20°C, and yield a procercoid larva that is ingested by a zooplanktonic copepod crustacean [FIGURE 1]. About 40 copepod species of the Eudiaptomus or Cyclops genus are likely to be the first intermediate hosts. This larva develops into a procercoid larva within the general cavity of the copepod. When carnivore fish ingest planktonic crustaceans, the larva develops into a plerocercoid larva a few millimetres long. It migrates into the fish musculature or viscera where it can remain inactive for several years, but can re-encyst several times in other predatory fish. In Europe, the types of fish susceptible to host the larvae are perch (Perca fluviatilis), pike (Esox lucius), char (Salvelinus alpinus), and burbot (Lota lota). The Coregonidae (fers) and probably the Salmonidae of Salmo genus (except for the Canadian Salmonidae of the genus Oncorynchus) do not host D. latum larvae (TABLE 1). Man and other ichtyophagous mammals become contaminated by ingesting this undercooked fish. The plerocercoid larva can grow between 5 and 20 cm a day [2], and develops into an adult that yields its first eggs about one month after infestation. D. latum is the longest human parasite known (about 10 metres long) and can live for several years. Its symptomatology, although limited, is polymorphous: manifestations may include abdominal discomfort (abdominal pain, diarrhoea), weight loss, asthenia, and vertigo. Anaemia due to vitamin B-12 deficiency has been described in case of prolonged infestation [1]. Human experimental infestations have been practised [4]. Three volunteers, infected by two to three plerocercoid larvae, did not present any obvious clinical symptoms except for the release of proglottis. The two non-treated subjects dewormed spontaneously seven months (in the first case), and four years and six months (in the second case) after being infected. The parasite is sensitive to praziquantel (15 mg/kg in the first case), and four years and six months (in the second case) after being infected. The parasite is sensitive to praziquantel (15 mg/kg in the first case), and four years and six months (in the second case) after being infected. The parasite is sensitive to praziquantel (15 mg/kg/day in one dose) and to niclosamide (2 g on an empty stomach in two doses an hour apart). In 1999, the world prevalence of diphyllobothriasis was estimated at 9 million cases [3], despite the difficulty of making precise evaluations because of the existence of other species either morphologically close or undistinguishable, such as D. pacificum in Peru, and D. nihonkaiense in Asia [4]. The earliest description of diphyllobothriasis prevalence in western Europe goes back to Von Bonndorf’s monograph of 1977 [1]. The objective of our study is to report the current situation of diphyllobothriasis in western European countries.

![Figure 1](image)

**Figure 1**

Diphyllobothrium latum Cycle

1: egg, 2: embryonated egg, 3: coracidium, 4: procercoid larva in a copepod, 5: plerocercoid larva in fish

<table>
<thead>
<tr>
<th>Name of fish species in some European languages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latin name</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Perca fluviatilis</td>
</tr>
<tr>
<td>Esox lucius</td>
</tr>
<tr>
<td>Lota lota</td>
</tr>
<tr>
<td>Coregonus fera</td>
</tr>
<tr>
<td>Salvelinus alpinus</td>
</tr>
<tr>
<td>Salmo trutta</td>
</tr>
<tr>
<td>Oncorhynchus mykiss</td>
</tr>
</tbody>
</table>

**Material and methods**

The analysis was carried out with data from literature published since 1980 using the following databases: Medline, CABI Helminthological abstract, INIST Pascal, and the Yahoo and Google internet search engines. Information was collected for each of the 25 countries of the European Union (with the exception of Malta and Cyprus), and some adjacent European countries (Switzerland, Hungary, Croatia and Yugoslavia). In March 2003, we also contacted or sent a questionnaire to a network of European parasitologists (specialising mainly in food safety), to microbiological laboratories (those located near lakes and identified through professional directories) in Savoie, Isère, and Haute-Savoie (France), and Switzerland, and to university hospital parasitology laboratories in Besançon, Lyons and Grenoble. The questionnaire concerned the number of human cases observed in the course of the past 20 years as well as possible veterinary data (fish and mammal), either personal or published data.

**Results**

Information was obtained from a network of parasitologists, and from databases from 23 European countries. For France and Switzerland, data was completed by the network of laboratories that were contacted. There are three types of epidemiological situation in Europe: areas where parasitosis is frequent or relatively frequent, areas where sporadic or imported cases have been observed, and areas where no parasitosis was reported [FIGURE 2]. Specific surveillance of diphyllobothriasis exists only in Estonia, Lithuania, and Poland. In Finland, at least 20 cases are reported each year [S Meri, personal communication]. A study carried out between 1978-1989 by hospital practitioners showed that prevalence varied between 0.3 and 3.8% of patients [5]. In Sweden, 10 to 50 cases are observed each year [D Christenson, personal communication]. In Estonia, 440 cases were reported in 1997, compared with 715 cases in 1990 [6]. Cases are numerous in French and Italian speaking areas surrounding the Swiss, Italo-Swiss, and Franco-Swiss Alpine lakes. In 1990, one of the authors reported 18 cases on the Swiss shores of Lake Maggiore [7], bringing the total to 33 cases over the last 20 years [8]. Golay and Mariaux retrospectively identified seventy three cases around Lakes Léman, Bienne, and Morat between 1980 and 1994 [9]. Alpine lakes in northern Italy are subject to frequent contamination: in 1987, Magatelli [10] described eight cases on Lake Iseo [10], and in 2000, Terramocci et al [11] reported six cases on Lake Como [11]. Several further cases were reported on Lakes Como and Iseo in 2003 [A Raglio, E Pozio, personal communication]. On the French shores of Lake Léman, Gregory et al [12] diagnosed two cases in St Julien en Genevois and, in 2001, the authors published 22 cases diagnosed between 1993-2000 following a survey carried out in 50 laboratories located in Haute-Savoie [13]. Lake Léman seems to be particularly affected, with 48 cases identified on its shores in 2001 and 2002. The parasitosis is absent in Lake du Bourget, and the last case observed was in a professional fisherman six years ago [C Bernot, personal communication], Lake d’Annecy, Lake d’Aiguebelette and Lake de Paladru. Rare studies published on the
prevalence of fish infection [7,9,14] have concerned only the Swiss and Italian Alpine lakes (TABLE 2), and showed a sometimes high infestation of pikes and perch. In other European countries, parasitosis is reported less frequently. In Romania, the historical foci of the Danube delta were subject to massive treatment campaigns, although cases continue to be reported [CM Cretu, personal communication]. A few cases are reported each year in Poland [15] and in Lithuania [V Jasulaite, personal communication]. Five cases were observed in Vienna between 1991 and 2003 [H Aspock and H Auer, personal communication]. To our knowledge, no autochthonous human case was reported in Denmark, Croatia, Belgium, the United Kingdom, the Netherlands, Yugoslavia, Macedonia, Hungary or Germany.

Discussion

The methodology used in this study, without being exhaustive, is original and could be used as a basis for further studies to evaluate evolution trends. Human diphyllobothriasis is still present in western Europe, but when compared with previous studies [1,5,6], can be seen to be decreasing in Baltic and Scandinavian countries. It seems to be either emerging or better diagnosed in the French and Italian speaking areas around Alpine lakes, as shown by the more than 200 cases that have been reported or published around Lake Léman, Lake de Morat, Lake de Bienne, Lake Maggiore, Lake Como, Lake Iseo, and Lake Gardia since 1987. German speaking areas around Alpine lakes did not seem to be affected: Golay and Mariaux [7] identified only rare cases in the cantons of Freiburg and Bern compared with around 30 cases in the cantons of Geneva and Vaud. In 1963 [22], human diphyllobothriasis was rare around Lake Léman: no cases had been reported for five years at the Lausanne Institute of Hygiene (Institut d’hygiène de Lausanne), four cases reported in nine years at the Lausanne Badoux, Bauer and Rochat Laboratory, one case in four years at the Geneva University Polyclinic (Polyclinique Universitaire de Genève).

Diphyllobothriasis is associated with ancestral eating habits: consumption of raw salted or marinated fish fillets in Baltic or Scandinavian countries, ‘carpaccio di persico’ in northern Italy, ‘carpaccio d’ombre chevalier’ and ‘poissons du lac façon nordique’ in French-speaking areas. Faddish and extreme food choices such as ‘instinctotherapy’ (a type of raw food diet) and the increasing popularity of sushi could also be contributory factors. The prevalence of fish infestation in the Alpine lakes is between 3.7% and 33% (TABLE 2).

The continuation of the diphyllobothriasis cycle is an indicator of the faecal pollution of lakeside environment. The complex cycle is compensated by the prolificness of the parasite: one worm alone can yield between one and several million eggs a day that can infect zooplanktonic crustaceans, the first intermediary host. No data was found on zooplanktonic species involved in the transmission or on their level of infestation. Building waste water treatment plants contributes to fighting the parasitosis [6] but there are other unrelated habitats. For instance, around Lake Léman, 89% to 98.6% (according to sources) of the inhabitants of the drainage basin are connected to 159 wastewater treatment plants [23,24]. These treatment plants purify only between 95% and 99% of eggs. The eggs not caught are viable, and the treatment plants may overflow during storms [1,2].

There is professional and leisure fishing on and around lakes. There are about 150 professional fishermen and 5000 fishermen on Lake Léman, who caught around 1000 tons of fish in 1999, of which 47% was perch and 6.5% was carp [25]. The fish is consumed directly by fishermen, or sold to fishmongers or to the many restaurants located on the shores of the lakes, which sometimes offer dishes made with raw fish. Veterinary data on fish infestation in Lake Léman is scarce and very old: 58% of perch and 95% of burbot were carriers of plerocercoid larvae in 1909 versus 12.5% of burbot in 1963 [22]. In 2003-2004, we found plerocercoid larvae in 8% to 12% of fish fillets analysed and the precise identification of the larvae was carried out with molecular biology techniques (polymerase chain reaction and sequencing). Faecal pollution of lakes by the many yachts that sail there can also be considered in the continuation of the cycle although regulations require that faecal matter is disposed of in appropriate sanitary facilities [26]. There is also the issue of faecal pollution of shores by fishermen or by wild or domesticated carnivores that are numerous on those shores. Cases of infestation of dogs have been reported in the Geneva area [B Gottstein, personal communication]. In 1963, around Lake Léman, Bouvier et al [22] found only two infected dogs out of the 259 one they had examined. No infestation was found in 179 cats and 31 foxes examined, but the incidence of
parasitosis in man was low at that time. Some cases of fox infestation have recently been reported in the Tessin, Grisons and Geneva areas [Deplazes, personal communication]. A wild cycle would be ensured by trouts and foxes [D Gerdeaux and M Morand, personal communication]; the latter consuming dead genets on spawning grounds. Elsewhere, diphyllobothriasis was found in 0.5% of foxes captured in Karlsruhe in Germany [27] and in 0.2% of dogs captured in Finland [28]. However, it seems that the parasite does not develop very well in those carnivores who, unlike man, may only play a minor role in the continuation of the cycle [1,2].

Our study has also shown the relative frequency of imported cases (contracted during travel abroad or after consumption of imported fish) that could in certain cases help to maintain the parasite, or to reintroduce it in areas it had previously disappeared from. This survey is certainly limited since we can not pretend to have made an exhaustive collection of cases. In fact, some laboratories from German speaking Switzerland did not respond to the invitation to participate in the survey. Moreover, many cases are likely to be treated by general practitioners either for diphyllobothriasis or for Taenia saginata taeniasis considering the relative similarity of the proglottis of both species. An in-depth study of eight clinical cases has shown that severe clinical symptoms can lead to specialised consultations and expensive complementary analyses, resulting in an average cost of 400 for the management of a single diphyllobothriasis case [13]. Finally, comparing the incidence of different countries is difficult since it would be necessary to know the size of the exposed populations to calculate the risk. For example, in France and Italy, exposed populations are limited to the shores of the lakes, whereas in Finland, the entire population is at risk of exposure. Consumption studies could be carried out in each of the countries to learn about eating habits and therefore evaluate a possible risk behaviour.

Conclusion

Diphyllobothriasis is decreasing in Baltic and Scandinavian countries, but is emerging in French and Italian speaking Alpine areas. The fashion for carpaccio, sushi and recipes based on fresh fish, as well as the proliferation of restaurants serving these kinds of dishes, will certainly not slow down this emergence. Work towards ending the parasitic cycle is essential, especially when such habits are ancestral as shown by the discovery of the fish does not kill the parasite [30]. Changing food habits is illusory therefore necessary to inform consumers of the risks linked to the consumption of raw or undercooked fish as well as prophylactic measures [29]. Smoking fish does not kill the parasite [30]. Changing food habits is illusory especially when such habits are ancestral as shown by the discovery of diphyllobothriasis eggs in the archaeological sediments of neolithic lakeside villages of these areas [31]. Finally, it would be interesting to monitor the infestation in man and in fish with regular prevalence surveys to study the evolutive nature of diphyllobothriasis.

Acknowledgements

We wish to thank the numerous French medical analysis laboratories of Haute-Savoie, Savoie and Isère, and the Rivotton Biomedical Laboratory (Geneva), for their collaboration. We also thank those in the lakeside villages of these areas [31]. Finally, it would be interesting to monitor the infestation in man and in fish with regular prevalence surveys to study the evolutive nature of diphyllobothriasis.

References

Proposed recommendations for the management of HIV post-exposure prophylaxis after sexual, injecting drug or other exposures in Europe

J Almeda1, J Casabona1, B Simon1, M Gerard2, D Rey3, V Puro4, T Thomas5, on behalf of the Euro-NONOPEP Project group*.

Post-exposure prophylaxis (PEP) is the standard of care for a healthcare worker (HCW) accidentally exposed to an HIV infected source person (occupational exposure), but this is not the case for non-occupational exposures. Very few national guidelines exist for the management of non-occupational exposures to HIV in Europe, contrarily to the occupational ones. The administration of non-occupational post-exposure prophylaxis (NONOPEP) for HIV may be justified by: a biological plausibility, the effectiveness of PEP in animal studies and occupational exposures in humans, efficacy in the prevention of mother to child HIV transmission, and cost effectiveness studies. These evidences, the similar risk of HIV transmission for certain non-occupational exposures to occupational ones, and the conflicting information about attitudes and practices among physicians on NONOPEP led to the proposal of these European recommendations.

Participant members of the European project on HIV NONOPEP, funded by the European Commission, and acknowledged as experts in bloodborne pathogen transmission and prevention, met from December 2000 to December 2002 at three formal meetings and a two day workshop for a literature review on risk exposure assessment and the development of the European recommendations for the management of HIV NONOPEP.

NONOPEP is recommended in unprotected receptive anal sex and needle or syringe exchange when the source person is known as HIV positive or from a population group with high HIV prevalence. Any combination of drugs available for HIV infected patients can be used as PEP and the simplest and least toxic regimens are to be preferred. PEP should be given within 72 hours from the time of exposure, starting as early as possible and lasting four weeks. All patients should receive medical evaluation including HIV antibody tests, drug toxicity monitoring and counseling periodically for at least 6 months after the exposure.

NONOPEP seems to be a both feasible and frequent clinical practice in Europe. Recommendations for its management have been achieved by consensus, but some remain controversial, and they should be updated periodically. NONOPEP should never be considered as a primary prevention strategy and the final decision for prescription must be made on the basis of the patient-physician relationship. Finally, a surveillance system for these cases will be useful to monitor NONOPEP practices in Europe.

Key words: Europe, HIV, Post exposure prophylaxis, non occupational exposure, recommendations

Introduction

Post-exposure prophylaxis (PEP) is now the standard of care when a healthcare worker (HCW) is accidentally exposed to a source person known to be infected with HIV (occupational exposure), but this is not the case for non-occupational exposures.

We considered as non-occupational exposure all accidental and sporadic incidents in which contact with blood or other body fluids (semen, vaginal secretions, etc.) that pose a potential risk for HIV infection occurred, excluding exposures of HCWs in a healthcare or laboratory setting. Non-occupational exposure includes unprotected sexual exposure, sexual exposure involving a broken or slipped condom, injecting drug users (IDUs) sharing equipment, accidental needlestick injuries, bite wounds, mucosal exposure, etc. Exposure to tears or sweat is not considered to be a risk for HIV transmission.