**THE RETURN OF VIVAX MALARIA IN CYPRUS**

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Malaria elimination in Europe has been the focus of significant national and international effort, and in 2015 the World Health Organisation declared for the first time that there were no indigenous cases of malaria in the WHO European region.[1] However, since that time there have been several localised outbreaks of malaria in countries throughout Europe. We report two cases of vivax malaria in individuals returning from Northern Cyprus, which was declared malaria-free in 1967. One further case of vivax malaria, also in an individual returning from the Cyprian resort of Esentepe in August 2017, has been highlighted by the Center for Disease Control.[2]

Our patients were 10 and 12-year old siblings who returned from a trip to the resort of Esentepe, Northern Cyprus, in August 2017. Neither had a history of travel to malaria-endemic areas, and both developed symptoms shortly before returning to the UK. One sibling reported multiple insect bites, whereas the other had no evidence of this. Both patients presented with a short history of fatigue, headache, vomiting and cyclical fevers which tended to peak in the mid-afternoon and early hours of the morning. Initial investigations showed elevated inflammatory markers with deranged liver function tests and a significant thrombocytopaenia. Examination of blood films and polymerase chain reaction of blood samples confirmed *Plasmodium vivax* infection (Figure 1, Figure 2). The patients were treated with anti-malarial medication, including primaquine which is needed to clear malaria parasites in the dormant liver stage, and made a good recovery.

The cases of malaria reported here have not occurred in isolation but represent one of a number of outbreaks seen across Europe since malaria elimination was declared. Localised outbreaks have been reported in Georgia, Greece, Italy and France,[3] and both *P. vivax* and *P. falciparum* malaria have been recorded. In light of these several outbreaks, a concerted effort to prevent malaria reintroduction is required across European nations. Reintroduction, defined as first-generation local transmission of malaria in a country where it is not endemic, is influenced by receptivity, i.e. the presence of vectors capable of malaria transmission, and vulnerability, which is the likelihood of malaria parasites being imported into a country. Parts of Cyprus are receptive to malaria introduction due to its Mediterranean climate and the presence of multiple mosquito vectors, including *Anopheles claviger,* and less abundantly *Anopheles algerienses, Anopheles sacharovi* and *Anopheles superpictus*.[4] The more recent development is that vulnerability is now increasing, as the importation of malaria parasites into non-endemic countries becomes more common. This is partly due to increasing ease of foreign travel and rising immigration rates.

The three cases of *P. vivax* malaria recorded in Northern Cyprus represent a small but significant outbreak. Cyprus is a popular tourist destination for British travellers, receiving over 1.25 million tourists from the United Kingdom in 2017. Travellers to Cyprus should be aware of the potential risk of malaria infection [5], and clinicians treating returning travellers should be aware of the possibility of malaria and offer prompt treatment if the disease is confirmed.

**Figure Legends**

Figure 1: blood film showing *Plasmodium vivax* trophoziotes

Figure 2: blood film showing *Plasmodium vivax* gametocytes

**References**

1 From over 90000 cases to zero in two decades: the European Region is malaria free (<http://www.euro.who.int/en/media-centre/sections/press-releases/2016/04/from-over-90-000-cases-to-zero-in-two-decades-the-european-region-is-malaria-free>) (accessed November 2018)

2 Malaria reported in travelers in Cyprus (<https://www.cdc.gov/malaria/new_info/2017/Cyprus_2017.html>) (accessed November 2018)

3 Multiple reports of locally-acquired malaria infections in the EU (<https://ecdc.europa.eu/sites/portal/files/documents/RRA-Malaria-EU-revised-September-2017_0.pdf>) (accessed November 2018)

4 Violaris M, Vasquez MI, Samanidou A, et al. The mosquito fauna of the Republic of Cyprus: a revised list. *J Am Mosq Control Assoc* 2009;25(2):199-202.

5. National Travel Network and Centre (NaThNaC). Cyprus. <https://travelhealthpro.org.uk/country/61/cyprus#Malaria> (accessed November 2018)

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