

# Dengue virus infection in a traveller returning from Croatia to Germany

J Schmidt-Chanasit (jonassi@gmx.de)<sup>1</sup>, M Haditsch<sup>2</sup>, I Schöneberg<sup>3</sup>, S Günther<sup>1</sup>, K Stark<sup>3</sup>, C Frank<sup>3</sup>

1. Bernhard Nocht Institute for Tropical Medicine, Department of Virology, Hamburg, Germany

2. Labor Hannover MVZ GmbH, Hannover, Germany

3. Robert Koch Institute, Department for Infectious Disease Epidemiology, Berlin, Germany

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**Dengue virus (DENV) is endemic in south-east Asia and Central to South America. In August 2010, a DENV infection was diagnosed in a German traveller returning from a trip to Croatia in south-east Europe. The patient presented with fever and other typical symptoms of DENV-infection. Virological investigation revealed the presence of DENV-specific IgM, a rise in DENV-specific IgG and the presence of DENV NS1 antigen in the patient's blood.**

Dengue virus (DENV) is an arthropod-borne RNA virus of the Flaviviridae family causing dengue fever in humans. Since 2001 dengue fever has been mandatorily reported to the German public health authorities, in accordance with the Federal Protection against Infection Act [1]. According to German notification data, between 60 and 387 imported DENV infections are reported annually (Table).

The DENV infections in imported cases are mainly acquired in south-east Asia as well as South and Central America. Very recently, autochthonous DENV

infections were reported in southern France, diagnosed for the first time ever in Europe [2]. Here we report on a case of DENV infection that was apparently acquired in Croatia and imported to Germany by a traveller.

## Case report

A 72-year-old man from Germany visited Croatia in August 2010: he left on 1 August and returned on 15 August. He was accompanied by seven family members, including grandchildren. The family travelled by car from Germany via Austria and Slovenia to Croatia without overnight stops. The group stayed the entire time around Podobuce close to Orebić on the Peljesac peninsula and on the isle of Korčula in the south of Croatia. Podobuce and Korčula are located approximately 100 km north-west of the city of Dubrovnik, which was also visited. Temperatures were reported to be very high (approximately 30 °C at night). After returning to Germany, on 16 August, the patient developed a febrile illness with a temperature of up to 39 °C, chills, arthralgia, headache, and retro-orbital pain. Following a short period of improvement, his temperature rose again to 39 °C on 21 August, and he continued to have arthralgia, myalgia, weakness and dyspnoea. Among several other diseases, dengue fever was suspected by the general practitioner, because of the clinical picture.

## Laboratory results

Serum samples were taken from the patient for virological investigation on 23 and 30 August and on 2 September. The sample from 23 August was positive for DENV-specific IgM, but negative for IgG in an enzyme-linked immunosorbent assay (ELISA). On 30 August, DENV-specific IgM and IgG was positive with a titre of 1:2,560 (cut-off 1:20) and 1:80 (cut-off 1:20), respectively, in an indirect immunofluorescence assay based on DENV-infected cells. In addition, the serum sample tested positive for DENV NS1 antigen (Dengue Early ELISA, Panbio). Real-time reverse transcription-polymerase chain reaction (RT-PCR) for DENV [3] was negative. The detection of DENV NS1 antigen and the simultaneous absence of DENV RNA during this

## TABLE

Imported cases of dengue fever per year, Germany, 2001–2010<sup>a</sup>

Year	Number of recorded cases
2001	60
2002	213
2003	131
2004	121
2005	144
2006	175
2007	264
2008	273
2009	298
2010	387

Source: Robert Koch Institute, SurvStat (<http://www3.rki.de/SurvStat>).

<sup>a</sup> As of 4 October 2010.

phase of dengue fever are in line with previous studies demonstrating an acute DENV infection [4]. The sample taken on 2 September showed an increase in the DENV-specific IgG titre (1:1,280), while the IgM titre remained unchanged and the ELISA for NS1 antigen was negative. In this sample, immunofluorescence assay titres for related flaviviruses were lower than for DENV: West Nile virus (IgM negative, IgG 1:160) and tick-borne encephalitis virus (IgM 1:80, IgG 1:80). The patient did not report vaccination against tick-borne encephalitis or yellow fever. A temporary thrombocytopenia with a minimal platelet count of 97,000/ $\mu$ l (norm: 150,000–440,000/ $\mu$ l) on the eighth day of the illness resolved without complications and the patient recovered within two weeks after disease onset.

## Conclusions

The clinical suspicion of dengue fever was confirmed by the laboratory tests. As the incubation period for dengue fever ranges from three to 14 days, the infection was probably acquired in southern Croatia and not en route. The Croatian authorities were given all available information about the case, enabling them to investigate this further at local level. To our knowledge, this is the second report on an autochthonous DENV transmission in Europe after France. Antibodies against DENV have been previously detected in Croatian individuals in the context of international travel; however, the specificity of the assay is questionable [5]. The presence of *Aedes albopictus* as a potential DENV vector in Croatia [6] and the importation of confirmed dengue fever cases from endemic areas into Croatia [7,8] allow autochthonous DENV transmission within this country. The mosquito season in parts of the northern Mediterranean coast may last from May to November. Therefore, dengue fever should be considered in patients with fever of unknown origin and relevant clinical symptoms who stayed in areas in Europe where *Ae. albopictus* occurs.

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