Fatal e-cigarette or vaping associated lung injury (EVALI): a first case report in Europe

To the Editor:

Numerous cases of e-cigarette, or vaping, associated lung injury (EVALI) have recently prompted an investigation of the outbreak in the USA [1]. Only two non-fatal cases have been reported so far in Europe: one case of hypersensitivity pneumonia in the UK after the use of flavoured e-cigarette liquid by a young adolescent [2], and one US imported case recently described in Spain [3]. To our knowledge, this is the first report of a fatal EVALI case in Europe.

An 18-year-old previously healthy man was admitted to the infectious diseases ward presenting with haemoptysis, coughing and progressive dyspnoea evolving for 5 days. He reported regular tobacco and cannabis smoking for the past 6 months and the use of e-cigarette containing nicotine and cannabidiol (CBD; 5 mg·mL⁻¹) for three consecutive days in the three weeks prior to the onset of symptoms. The e-liquid used had been bought over the counter in a Belgian shop, but its country of production is unknown. On admission, lung computed tomography images showed bilateral poorly defined centrilobular nodular infiltrates with bronchial wall thickening. Blood tests showed neutrophilic leukocytosis (13 890 neutrophils per µL) and moderate elevation of C-reactive protein levels (86.3 mg·L⁻¹). Extensive infectious workup performed early during hospitalisation (blood, sputum and bronchoalveolar lavage (BAL) cultures, urinary Streptococcus pneumoniae and Legionella antigens, multiplex PCR assay for bacterial, fungal and viral pathogens on BAL) was unrevealing. The BAL was not well tolerated by the patient and had to be rapidly interrupted due to severe oxygen desaturation. Priority was thus given to the microbiology and virology samples. Analyses of bronchial lavage showed 45% of macrophages, 42% of neutrophils, 7% of lymphocytes and 6% of eosinophils. The pathologist did not see any giant cells nor foamy, iron- or haemosiderin-laden macrophages, and Pneumocystis jirovecii was not detected by microscopy with staining. HIV and autoimmune serologic testing (antinuclear antibodies, antineutrophil cytoplasmic autoantibodies, rheumatoid factor) were negative and the cardiac ultrasound was normal. After a 5-day course of empirical antibiotic therapy, the patient presented respiratory failure and was transferred to the intensive care unit. He underwent intubation, mechanical ventilation and finally veno-venous extracorporeal membrane oxygenation (ECMO). At that time, a lung biopsy was performed, immediately followed by the initiation of glucocorticoids (methylprednisolone 3 mg·kg⁻¹ for 3 days followed by tapering doses over 14 days). Biopsy samples showed acute diffuse alveolar damage with fibrosis (figure 1). Despite a slight transient improvement, the patient developed ECMO bleeding complications and ventilator-associated pneumonia, requiring the conversion of veno-venous ECMO to central veno-arterial ECMO. He improved slightly under piperacillin-tazobactam but shortly after presented Wautersia paucula bacteraemia. Despite adequate antibiotic coverage, he developed refractory septic shock and died 4 weeks after admission from multiple organ failure. The consumption of e-cigarettes containing nicotine and CBD 3 weeks before the onset of symptoms appears to be the most probable cause of lung injury developed by this patient.

This patient meets the criteria proposed by Layden et al. [4] for confirmed cases of EVALI: the use of an e-cigarette within the 90 days preceding onset of symptoms, a compatible radiological picture [5] and the exclusion of alternative diagnoses. The pathological [6] pattern was also consistent with this diagnosis. Of interest, vitamin E (alpha tocopherol) and vitamin E acetate were not detected in the vaping fluid by

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Numerous cases of e-cigarette or vaping associated lung injury (EVALI) have been described, mainly in the US and Canada. However, public health and medical communities need to be aware that this deadly disease may occur outside North America.  


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ultraperformance liquid chromatography coupled with UV detection (Waters Acquity, Milford, MA, USA).

Vitamin E acetate, a substance used as diluent in e-liquids, has recently been suggested as a potential cause of EVALI in the USA [7].

The EVALI outbreak may now be affecting Europe and public health and medical communities need to be aware of this finding. We urge European clinicians to report suspected cases to local health authorities. Moreover, we suggest a coordinated European effort to register EVALI cases across different countries. The absence of vitamin E acetate in vaping fluid used by our patient is intriguing and highlights the need for further research, as different substances may play a role in triggering EVALI. The creation of a European registry would enable quick and coordinated research on the aetiology and the biological mechanisms of this new and deadly disease.

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