

## The many faces of a lung virus

### Keywords

human metapneumovirus; lower respiratory tract infection; symptomatic treatment

### Case summaries

Case 1: A 65-year-old man presented with a 3-day history of cough and sputum production. His personal history included severe congestive heart failure. His body temperature was 38.2 °C and oxygen saturation was 92 % on room air. Fine rales in the lower left lung field were detected on auscultation. Blood test results revealed lymphocytopenia ( $0.9 \times 10^9 \text{ l}^{-1}$ ; normal range  $1.1\text{--}3.5 \times 10^9 \text{ l}^{-1}$ ) and elevated C-reactive protein ( $15 \text{ mg l}^{-1}$ ; normal  $<5 \text{ mg l}^{-1}$ ). A chest computed tomography (CT) scan revealed a 'tree-in-bud' sign and multifocal consolidations (Fig. 1a).

Case 2: A 78-year-old woman presented with a 6-day history of fever, cough, bloody sputum production and shortness of breath. Her personal history included chronic lymphocytic leukaemia, for which she was recently treated with chemotherapy. Her body temperature was 39.3 °C and oxygen saturation was 88 % on room air. Her leukocyte count was  $0.7 \times 10^9 \text{ l}^{-1}$  (normal range  $4.0\text{--}10.0 \times 10^9 \text{ l}^{-1}$ ) and her C-reactive protein level was elevated ( $102 \text{ mg l}^{-1}$ ). A chest CT scan showed bilateral infiltrates (Fig. 1b). After recovery from aplasia, she gradually recovered.

Case 3: A 64-year-old women presented with a 5-day history of cough, dyspnea, sputum production, myalgias and fatigue. Her personal history included orthotopic heart transplantation 5 months prior to admission, requiring

Abbreviations: CT, computed tomography; hMPV, human metapneumovirus.

### Question

Which of the following viruses can potentially cause the diseases described in these three cases?

### Answer options

1. Adenovirus
2. Influenza
3. RSV
4. Human metapneumovirus
5. Herpes simplex causing pneumonitis

triple-drug immunosuppression. Her body temperature was 37.8 °C and oxygen saturation was 94 % on room air. Her leukocyte count was  $7.2 \times 10^9 \text{ l}^{-1}$  (normal range  $4.0\text{--}10.0 \times 10^9 \text{ l}^{-1}$ ) and her C-reactive protein level was  $68 \text{ mg l}^{-1}$ . A chest CT scan showed ground-glass opacities (Fig. 1c).

In all three cases, the diagnosis was made by PCR analysis of nasopharyngeal swabs or bronchoalveolar lavage fluid. In none of the patients was an antiviral treatment applied and all of them recovered from their disease.

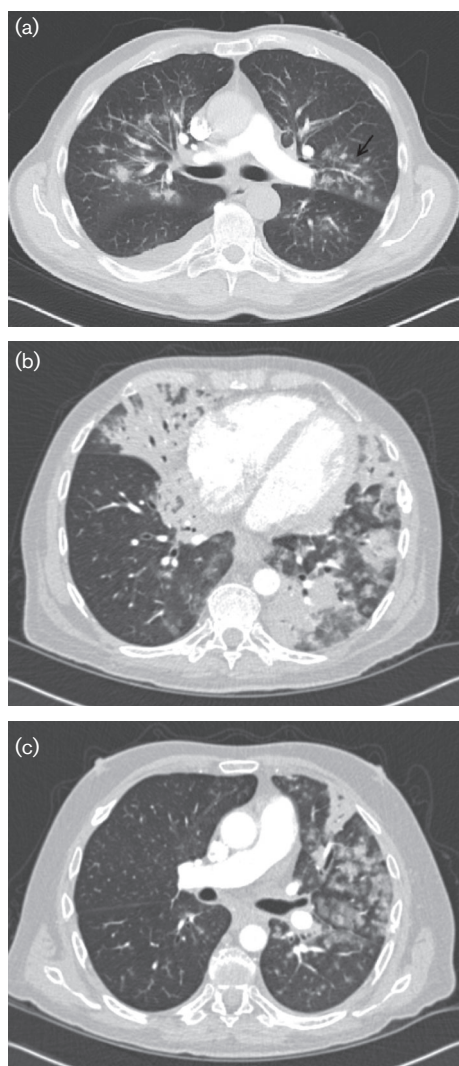
### Discussion

**Correct answer:** 4. Human metapneumovirus (hMPV).

Human metapneumovirus (hMPV) was first reported in children in 2001 (van den Hoogen *et al.*, 2001). Transmission most likely occurs by close contact with body secretions. Seroprevalence in adults is almost 100 %, and reinfections can occur in all age groups. In temperate climates, hMPV circulates in late winter, but the timing varies from year to year (Okamoto *et al.*, 2010). Considering

that the number of patients with chronic diseases and elderly people is growing, it is important to note that hMPV is capable of causing severe infections, in particular in immunocompromised hosts. All three cases included either a patient over 65 years old or an immunocompromised host. In case 2, the course was severe.

The clinical presentation can vary from mild symptoms to severe pneumonia. Involvement of the lower respiratory tract is frequent. Severe pneumonia occurs in particular in patients with malignancy, or haematopoietic stem cell or solid-organ transplants (Schildgen *et al.*, 2011). All patients claimed to have typical symptoms consistent with lower respiratory tract infection. In contrast, fever is not always reported in adults (Reiche *et al.*, 2014). The diagnosis is made by PCR analysis of nasopharyngeal swabs or bronchoalveolar lavage fluid, together with an assessment of clinical and radiological features. The typical radiological features are 'tree-in-bud' signs (in one study, 21 % of patients had this sign), multifocal consolidations (19 %) and



**Fig. 1.** Axial CT image showing 'tree-in-bud' signs (a), multifocal consolidations (b) and ground-glass opacities (c) in patients with lower respiratory tract infection or pneumonia caused by human metapneumovirus.

ground-glass opacities in (19 %). Of note, 21 % of the imaging study results were normal despite a clinical diagnosis of viral lower respiratory tract infection (Shiley *et al.*, 2010). The majority of patients infected with

hMPV are managed with supportive care. Immunocompromised hosts with severe pneumonia are often treated empirically with broad-spectrum antibiotics and antifungals. If hMPV is identified as the causative

pathogen, ineffective antimicrobial treatment should be stopped accordingly. No evidence for significant efficacy has been shown for ribavirin or polyclonal human immunoglobulins. Hence, there are no recommendations for the treatment of hMPV infections.

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