(See page 64)

Part one

1. (a) and (e). Oliver has measles. The decisive diagnostic sign is the rash inside the mouth – Koplik's spots. They appear about 2 to 3 days before the rash. The constancy of the symptoms differentiates it from malaria, in which the initial symptoms vary considerably. Measles does affect the lymphatic system and the spleen, but enlarged glands and splenomegaly are not exclusive to measles.

Part two

2. (a) and (b). Intensive vaccination drives throughout the Americas have eradicated endemic strains of the virus there. However the US must remain vigilant: in the first 5 months of 2011 the US authorities recorded 119 cases, the most since 1996. Africa is not improving as was hoped: from 2009 to 2010 the numbers of cases rose from 36 000 to 172 800. There were large outbreaks in countries that had previously controlled measles very well. Malawi is a case in point, with 533 cases in 2009 and 73 727 cases in 2010. WHO is looking towards 2025 as its year for probable eradication. A population needs to be 90%, not 70%, protected against it to stop measles spreading.

Part three

3. (a) Vitamin A (200 000 IU per day for 2 days for children over 12 months old and less for younger children) reduces morbidity and mortality. It also protects against post-measles blindness. Antivirals and antibiotics are reserved for severe cases with complications. Antibiotics are recommended for children with pneumonia and otitis media.

Part four

4. (a), (b), and (e). The most common complication is severe infection in the respiratory tract. The virus itself suppresses immunity in the lungs, causing pneumonia, which along with bacterial pneumonia is the commonest cause of fatality in small children and babies. Central nervous system (CNS) complications are much rarer – post-measles encephalomyelitis occurs in one in 1000 patients, mostly in older children and adults. Measles in the very old is more severe than in younger adults, and can be fatal. Blindness from keratoconjunctivitis is common in children deficient in vitamin A, one of the reasons for giving the vitamin to all children with measles.

Part four

5. (c), (d), and (e). Most babies are protected by their maternal antibodies until they fade from around 6 months onwards. In higher risk areas, the optimum time for vaccination is 9 months: in countries where the risk is low, a higher proportion of children develop an immune response to the vaccine at 12 to 15 months than at 9 months. A balance has to be struck between the optimum age for seroconversion and the chance that the child will catch measles before then. Two doses are needed: a single dose is not enough to attain enough immunity in the population to prevent spread of the disease.

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