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Metapneumovirus and acute wheezing in children

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A new respiratory virus, human metapneumovirus, was recently identified. We detected this virus by PCR in ten (8%) of 132 consecutive children admitted to Turku Hospital, Finland, for acute expiratory wheezing (median age 7 months, range 4–25). The mean duration of hospital stay was 2·5 days (SD 1·6) and mean duration of respiratory symptoms was 19 days (8). The white blood cell count, C-reactive protein, and regulated upon activation, normal T-cell-expressed and T-cell-secreted (RANTES) concentrations in nasopharyngeal aspirates were not confounded by use of prednisolone because the samples were not taken before treatment. Clinically, the median age of the children with human metapneumovirus was 7 months (range 4–25). Five children had bronchiolitis, four wheezy bronchitis, and one newly detected asthma. No child had previously used glucocorticoids.

On admission, in children with human metapneumovirus, cough had lasted for a mean of 9 days (SD 10), rhinorrhea for 4 days (5), expiratory wheezing for 3 days (2), and fever for 3 days (2). Two of the seven children with human metapneumovirus alone were diagnosed with acute otitis media. The mean axillary temperature was 37·8ºC (1·0) and the mean oxygen saturation was 96% (2). Children had a mean of 9·5×10⁹ white blood cells/L (3·0–10⁹) and a mean serum C-reactive protein concentration of 9 mg/L (11). The mean interleukin 8 concentration in nasopharyngeal aspirates obtained from six children was 480 ng/L (360) and the mean concentration of regulated by activation, normal T-cell-expressed and secreted (RANTES) was 50 ng/L (31). All patients were given nebulised salbutamol. The patients were randomly allocated to receive 2 mg/kg oral prednisolone per day for 3 days or placebo. The study code has not yet been opened. The mean duration of hospital stay was 69 h (45). After hospital stay, the cough had lasted for a mean of 7 days (4), dyspnoea for 6 days (5), and low fever for 0·4 days (0·9).

One of the seven patients was readmitted to hospital within 2 weeks because of recurrent breathing difficulties. In our study, the clinical diagnosis and age of the patients was closely similar to those seen in studies of infection with respiratory syncytial virus. However, human metapneumovirus arose at a different time from respiratory syncytial virus infections. Human metapneumovirus was identified from the middle of winter to spring—a time when a limited spring epidemic of respiratory syncytial virus had just started in Finland. From January to April, 2001, we identified human metapneumovirus in ten (32%) of the 31 children with wheezing.

We identified a potential causative viral agent in 116 (88%) of the 132 children; 31 (27%) had rhinovirus, 26 (22%) had enterovirus, 19 (16%) had non-typable picornavirus, 16 (14%) had respiratory syncytial virus, and ten (9%) had human metapneumovirus. Seven of these ten children had human metapneumovirus alone; the other three children also had other respiratory viruses. Human metapneumovirus was detected in children only from January to April, 2001. The median age of the children with human metapneumovirus was 7 months (range 4–25). Five children had bronchiolitis, four wheezy bronchitis, and one newly detected asthma. No child had previously used glucocorticoids.

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The chemokine profile of interleukin 8 (mainly a chemotactic factor for neutrophils) and RANTES (chemotactic factor for eosinophils) in nasal secretions was different to that reported in infections with respiratory syncytial virus. Patients with respiratory syncytial virus had high concentrations of RANTES and varying concentrations of interleukin 8, whereas in our study, children with human metapneumovirus had low concentrations of RANTES and high concentrations of interleukin 8. The cytokine concentrations and blood samples were not confounded by use of prednisolone because the samples were taken after treatment. Clinically, the efficacy of systemic glucocorticoids in bronchiolitis remains unknown.

Our results suggest that human metapneumovirus is a causative agent of acute wheezing in young children. During the study period, Sweden
the study period, this virus was identified in children at a time when other common causative agents, rhinovirus and respiratory syncytial virus, were not epidemic. Although the white blood cell counts and concentrations of C-reactive protein remained low, as usually found in viral infection, the inflammatory response to human metapneumovirus was different from that seen in respiratory syncytial virus infection.

Contributors
All authors participated in design of the study; collection, analysis, and interpretation of data; and in the writing of the report.

Conflict of interest statement
None declared.

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Management of profound hypothermia in children without the use of extracorporeal life support therapy
Allan de Caen

Profound hypothermia is managed more and more with extracorporeal life support technology, especially when a patient’s circulation is compromised. Many centres do not have rapid access to this service, however, and are still dependent on active internal rewarming techniques—e.g., peritoneal and pleural lavage. Such interventions are invasive, and associated with inherent risk. Here, we report our successful experience with an active external rewarming technique in children with profound hypothermia (core temperature <20°C).

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Case series of seven hypothermia are infrequently reported, and those that are generally involve use of extracorporeal life support (ECLS) therapy for resuscitation. Here, we report three case studies of children with severe environmental hypothermia treated with an active external rewarming technique.

In the first example, a 1-year-old child was found in the snow in temperatures of –30°C. She had apnoea with pulseless electrical activity (heart rate 20 beats per min). Paramedics did cardiopulmonary resuscitation (CPR) and endotracheal intubation, and administered intravenous epinephrine. On arrival at the emergency department, the patient was in ventricular fibrillation, and had a temperature of 16·2°C (taken with a rectal thermometer). Although CPR was ongoing, the patient was transferred to the paediatric intensive care unit for rewarming by ECLS. Active external rewarming (Bair-Hugger device, Augustine Medical, Eden Prairie, MN, USA) was begun, and warmed endotracheal gas delivered during preparation for cannulation. The Bair-Hugger surface rewarms by blowing air of up to 43°C into a blanket that lies on or surrounds the patient. After 90 min of CPR, the patient spontaneously converted to a sinus rhythm (heart rate 25 beats per min) at a core temperature of 17·5°C, as the surgeon prepared to insert the ECLS cannulae. Since the patient’s pulse was palpable, treatment with ECLS was postponed. Delivery of warmed endotracheal gas and active external rewarming was maintained. The patient required no further fluid boluses or inotropic support. Systolic blood pressure via the femoral line was greater than 70 mm Hg. Lactate concentration peaked at 7·3 mmol/L. Intravenous fluids were given at 100% of calculated maintenance dose. Her core temperature rose to 35·6°C over the next 3 h. She was discharged with severe frostbite, but no neurological sequelae, according to CT scan and neurological examination by a paediatrician, after 35 days in hospital.

In the second instance, a severely burned 4-year-old boy was found in the snow, adjacent to the burning remains of his family’s home. Paramedics noted that the boy had pulseless electrical activity (heart rate 20 beats per min) and a respiratory rate of 5 breaths per min. After 45 min of CPR, a weak pulse returned. On arrival at the hospital, however, his pulse had stopped and his heart rate was still only 20–30 beats per min. The boy’s temperature was 17·9°C (taken with a rectal thermometer). His pulse returned after administration of single boluses of epinephrine and atropine. He was taken to the operating room for ECLS rewarming. A sternotomy was done in preparation for cannulation. Direct observation of myocardial contractility and invasively assessed blood pressure by arterial line measurement, showing systolic pressure greater than 70 mm Hg, prompted continued rewarming via administration of endotracheal gas, active external rewarming (Bair-Hugger device), and use of heating lamps over the surgical field. Mediastinal irrigation was not done. Rewarming from 18°C to 35°C, took 3·5 h. No further inotropic therapy was required. The boy was discharged from hospital 6 weeks after admission with burns and frostbite, but no neurological sequelae, according to CT scan and neurological examination by a paediatrician.

In the last case, a 6-year-old girl fell into a lake in Northern Alberta after the boat she was in capsized. The child was wearing a life jacket, so her head was kept above water most of the time. While the mother swam, towing the child to shore, the girl became unresponsive. Bystanders at the lakeside started CPR when they noticed the child had no pulse and was apnoeic. On arrival, paramedics ventilated the child with a bag-valve mask, using 100% oxygen. After a short time, the girl’s pulse returned and she began to breath unaided. On arrival in the emergency room, her heart rate was 44 beats per min with irregular respiratory effort. Her temperature was 19·3°C (taken with a rectal thermometer). She was intubated, and low-dose dopamine was administered. She was rewarmed with an active external technique (Bair Hugger device). Her temperature rose 12°C over the next 3 h. She was discharged after 4 days in hospital.