test was performed. During GH therapy, growth velocity increased in all three patients and bone age advanced, but not as fast as the body height. After GH therapy, predicted adult height was in patient 1 higher, in patient 2 and 3 less than calculated before treatment (Table 1). None of the three children in our study has developed signs of acromegaly, glucose intolerance or hypertension. The Crohn disease activity index has not changed during the time of GH treatment.

There are only a few studies on GH replacement therapy in patients with Crohn disease. In 1974 McCaffery et al. [6] treated three adolescent patients with Crohn disease with human GH for a 6-month period and did not observe any effect on their height velocity. In 1985 Redmond et al. [8] also treated four patients with Crohn disease with human GH in a very small dosage (up to 6 I.U. three times a week). There was a definite increase in the growth rate in one of the patients. Follow up of the other patients was pending.

Part of the effect of GH therapy in our patients may have been caused by the onset of puberty. On the other hand, the attained body height is higher than expected. When a child is slowed he seldom achieves adult stature [1]. Besides, the catch-up growth depends on the length of time for which growth has been slowed [7]. Hence, when there is a decision for GH therapy in children with Crohn disease and growth failure, this therapy should not be started too late.

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Muscle rigidity causing life-threatening hypercapnia following fentanyl administration in a premature infant

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Sir: We recently treated a 32-week-premature infant boy, birth weight 1460 g, with mechanical ventilation because of a Giedion stage III respiratory distress syndrome. Because of agitation with decreasing transcutaneous oxygen saturation, midazolam (Dormicum) was administered intravenously (i.v.), first at a dose of 0.1 mg/kg per hour, then increased to 0.2 mg/kg per hour because of persisting agitation and hypercapnia (pCO_2 8–9 kPa). For reasons of still insufficient sedation, fentanyl i.v. was started 2 h later at a dose of 3 µg/kg per hour. In the subsequent 3 h his condition deteriorated: FiO_2 had to be increased from 50% to 100% and severe hypercapnia developed (pCO_2 22 kPa). The boy, now totally sedated, showed a generalised muscle rigidity with only minimal chest wall excursions. Respiratory minute volume had dropped from ± 0.40 to 0.06 l/min and increased only slightly to 0.08 l/min after increasing insufflation pressure from 18 to 24 mbar. Fentanyl was stopped 4 h after it had been started. After the main causes of respiratory deterioration had been excluded, nalaxone (0.015 mg/kg i.v.) was given 5 h after the fentanyl infusion had been stopped. There was an instantaneous reaction. The respiration amplitudes on the monitor screen returned immediately, as did chest wall excursions and spontaneous movements. Within 1 min FiO_2 decreased to 60% and transcutaneous pCO_2 to 9.9 kPa. Mechanical ventilation could then be weaned easily, followed by extubation on the 8 th day of life.

We conclude that our patient suffered from muscle rigidity as a side-effect of opioid use. This phenomenon has so far only twice been described in premature infants, by Huet et al. in 1992 [1] and Lajarrige et al. in 1993 [2] after a 1 µg/kg per hour fentanyl maintenance infusion and 3 µg/kg bolus dose, respectively.

Opioids are commonly used in neonatal intensive care units for sedation and analgesia. However, serious ventilation problems may occur with their use, the importance of which we want to stress. If so, naloxone should be administered intravenously to antagonise the opioid effects. Earlier recognition would have shortened the delay in our patient and reduced the time of exposure to severe hypercapnia. The immediate response to naloxone suggests a phenomenon induced at the opioid receptor site. Whether the magnitude of this phenomenon is dose-dependent is not certain but unlikely, since in all reported cases symptoms occurred very shortly after the administration of only moderate doses of fentanyl.

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