A neonate with recurrent tetany: questions

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Case summary

A 14-day-old male neonate was admitted with recurrent tetany for 1 week. He was born after an uncomplicated pregnancy at term with a birth weight of 3080 g. The maternal and family histories were unremarkable. He was fed with standard formula and no other supplements. Starting at age 7 days, he began

to develop intermittent focal twitching of all four limbs lasting for 5 to 10 s.

His pulse rate was 172 bpm, blood pressure 71/48 mmHg, respiratory rate 66 /min, and body temperature 36.8 °C. Physical examination showed an alert conscious infant without dysmorphic features, heart murmurs, or neurologic abnormalities. Laboratory studies were notable for profound hypocalcemia [total calcium (Ca^{++}) 5.0 mg/dl] and hyperphosphatemia [inorganic phosphate (iP) 10.2 mg/dl] with low urinary Ca^{++} and iP excretion (UCa^{++} /creatinine 0.06 mg/mg, fraction excretion of iP 3.5 %). The remainder of the blood tests showed white blood cells of 13,000/mm³ with 46 % lymphocytes, Na^{+} 136 mmol/l, K^{+} 5.6 mmol/l, Cl^{-} 105 mmol/l, HCO_3^{-} 22 mmol/l, BUN 5 mg/dl, creatinine 0.3 mg/dl, glucose 75 mg/dl, Mg^{++} 1.6 mg/dl, albumin 3.9 gm/dl, lactate 10 mg/dl, and C-reactive protein 0.5 mg/l. Hormone profiles revealed 25(OH) Vit D₃ 5 ng/ml (NR: 5–55), 1,25(OH)₂ Vit D₃ 57 ng/ml (NR: 15–55), intact PTH 28 pg/ml (NR: 7–53), free T4 1.53 ng/dl (NR: 0.85–1.58), and cortisol 12.2 µg/dl (NR: 4.2–38.4). Chest X-ray and renal ultrasonography were normal. His convulsions were controlled with intravenous calcium gluconate infusion (400 mg/kg/day) followed by oral calcium carbonate supplementation (50 mg/kg/day) for 6 weeks.

The answers to these questions can be found at <http://dx.doi.org/10.1007/s00467-015-3108-4>.

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Questions

1. What is the diagnostic approach to neonatal hypocalcemia?
2. What is the diagnosis?
3. What is the most likely mechanism for his hypocalcemia?
4. How should this patient be treated?