



NCCU CLINICAL GUIDELINES  
SECTION: 10

## METABOLIC MANAGEMENT

Section: 10 Metabolic management  
Metabolic bone disease  
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### **METABOLIC BONE DISEASE:**

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The features of metabolic bone disease MBD include decreased linear growth, skeletal deformity, radiological changes such as osteopenia, fractures and changes of rickets, and biochemical abnormalities such as raised alkaline phosphatase, hypophosphatemia and hypocalcemia.

MBD presents between 2-4 months of age. The infants most at risk are those who are born less than 28 weeks, in particular those who receive breast milk, those who have prolonged requirement for TPN, those who have long courses of diuretics and those who receive multiple courses of steroids.

MBD is predominantly caused by dietary phosphorus deficiency (and to a lesser extent calcium deficiency). Recently physical immobility has been suggested as a contributing cause to MBD.

#### **Prevention of MBD:**

This has largely focussed on dietary supplementation. The effect of adding fortifiers to breast milk to prevent MBD is controversial. MBD can occur even with fortification of breast milk.

Two small trials recently suggested that physical activity improved bone mineralisation in premature infants.

#### **Screening for metabolic bone disease:**

This is controversial. Measurements of bone alkaline phosphatase, serum phosphate and calcium have been suggested as screening tools for MBD, however some groups have not found them to be useful. Xrays changes do not occur until over 20% of bone mineral content is lost, and thus serial xrays are not recommended. Other measures of bone density such as dual xray absorbiometry are not readily available at WCHS.

#### **Suggested monitoring:**

Infants less than 28 weeks

Infants who require TPN for greater than 1 month

At the discretion of neonatal paediatrician in infants with prolonged courses of diuretics or steroids.

#### **When:**

Start at 4 weeks of age and repeat monthly (if results are normal) or fortnightly if results are abnormal until discharge

#### **Measure:**

Alkaline phosphatase

Serum phosphate

Calcium (note hypercalcemia and hypercalciuria may be present with low serum phosphate and low phosphate intake)

### **CONSIDER THE DIAGNOSIS OF MBD**

With Alkaline phosphatase levels greater than 1000 (some groups have used higher levels)  
Serum phosphate less than 1.3 mmol/L (some groups have used 1.8 mmol/L)

Other additional biochemical measures that may be considered on an individual basis (esp when alk phos more than 1000) include:

Serum:

- Parathyroid hormone (in MBD normal or increased)
- 25-OH-Vitamin D (in MBD normal)
- 1,25-OH-Vitamin D (increased in MBD)

Urinary measures

- Fractional excretion of Calcium (%) increased (>2%)
- Renal tubular reabsorption of phosphate Increased (>99-100%)

### **Treatment:**

Review calcium and phosphate intake  
Generally require phosphate supplementation only  
Some require additional calcium  
Vitamin D rarely needed.

### **Monitor treatment:**

Measure alkaline phosphatase, serum phosphate and calcium levels frequently at the beginning of treatment. This is particularly so if phosphate alone is prescribed as calcium levels may fall with treatment.

Urinary calcium and phosphate measures may be helpful in ensuring enough phosphate and calcium have been prescribed.