Longitudinal changes in lower limb length (LLL) and tibial speed of sound (tSOS) in preterm infants: relationship with gestation, birth weight standard deviation score and intake of calcium (Ca), phosphorous (P) and vitamin D (VitD)

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Introduction
We measured LLL (mm) using an electronic neonatal knemometer and tSOS (m/s) related to bone mineralization and elasticity, using the Sunlight Omnisense 7000 quantitative ultrasound device, in the same limb, weekly for median period of 4 weeks (2 to 14 weeks) in 84 preterm infants. The median (range) gestation and birth weight of infants was 26.8 weeks (23 to 35.2 weeks) and 869.5 grams (418 to 1481 grams), respectively.

Results
Birth weight standard deviation scores (BwSDS) were negatively associated with gestation (r=-0.456; p=0.001), suggesting that older babies had a tendency to be growth retarded. LLL increased (within-subject correlation, r = 0.96; p<0.001) whereas tSOS (within-subject correlation, r = -0.15; p=0.011) decreased with postnatal age. The rate of postnatal increase in LLL but not the change in tSOS was influenced by the amount of Ca (p=0.030), P (p=0.012) and VitD (p=0.030). Gestation was associated with both the initial LLL (r=0.757; p<0.001) and tSOS (r =-0.42; p< 0.001) but not their rate of change. BwSDS scores were significantly related to initial tSOS (r=-0.38, p=0.001) but not LLL measurements, suggesting that infants with low BwSDS had a higher initial SOS value compared to those with higher BwSDS. However, the rate of postnatal decline in tSOS was more rapid in infants with low BwSDS compared to those with higher BwSDS (p=0.012).

Conclusions
From these results we conclude that in preterm infants, gestation, BwSDS and intake of bone nutrients have different influences on the initial and postnatal changes in tibial growth and SOS.

Fig 1: Relationship of tSOS & postnatal weeks with BwSDS

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