High Resolution Peripheral Quantitative Computed Tomography (Xtreme CT)

What is high resolution?
Imagine your TV – the higher the resolution (number of pixels), the better the picture on the TV screen! The same applies to medical imaging – the higher the resolution, the more detail in a medical image of bone or any other tissue. HR-pQCT is considered high resolution as it images very precisely in a small range (0.041-0.243 mm). For human scans we scan bones at 0.082 mm resolution; which is 12 voxels per 1mm.

We use HR-pQCT
- to measure the bone mineral density of the forearm and lower leg
- to assess the geometry, strength and microstructure of bone in 3-dimensions

High Resolution Peripheral Quantitative Computed Tomography (HR-pQCT)
evaluates bones down to the level of the tiny individual elements that nature configures in a way that makes bones as strong as possible. HR-pQCT measures bone density and quantifies the three dimensional geometry, strength and microarchitecture of bone at the lower arm (radius) and lower leg (tibia).

We use HR-pQCT to measure the bone mineral density of the forearm and lower leg, to assess the geometry, strength and microstructure of bone in 3-dimensions.

BONES has an amazing capacity to adapt to weight bearing physical activity.
- Childhood is key time to develop a healthy skeleton as children lay down as much as 26% of adult bone mass during two years of adolescent growth.
- Exercising during childhood may be the best means to enhance bone health and to prevent osteoporosis in later life.

Fracture Study: Bone Microstructure and Forearm Fractures in Boys and Girls
Principal Investigator: Dr. Heather McKay
Funded by CIHR Operating Grant

There is compelling evidence that children and youth who fracture at a young age may be more likely to fracture in later life. The highest incidence of fractures occur at 2 time points: i) at older ages and ii) during adolescence. The higher risk for fracture in boys might be due to a difference in risk taking behaviour (boys can be daredevils!). However, the difference may also be due to a fundamental difference in how bone is structured in girls compared with boys. Therefore, we will compare bone structure between boys and girls and assess the role of risk-taking, lifestyle behaviours, body composition, balance in fracture.

HR-pQCT is a research tool – not currently used in clinical practice. It goes beyond current clinical methods and assesses bone microstructure to provide new insights into bone strength and why some bones are more susceptible to fracture.

Fractures Are No Accident – at Any Age.

Healthy Bone
Fractured Bone
Bone callus – thickened and enlarged bone connective tissue due to a fracture.

Image of the Tibia (Lower Leg)
Healthy 16 year-old boy
19 year-old boy with Pompe Disease

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Fractured Bone
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Cross Sectional Analysis - 3D Images

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