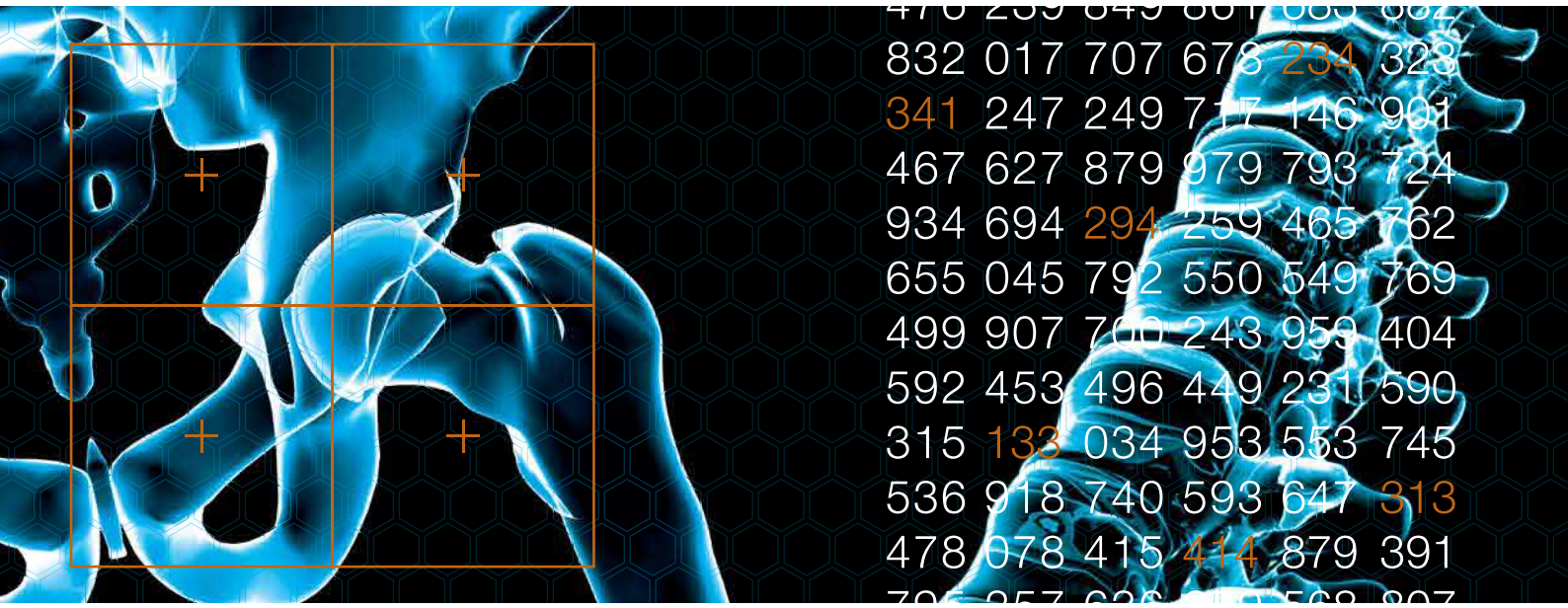
MINDWAYS CT
quantifiably better.



LOW-DOSE CT BONE DENSITOMETRY FOR ROUTINE AND SPECIALIST USE

- Clinically superior BMD solutions for physicians
- DXA equivalent hip measurements
- Innovative clinical trials & research applications

mindwaysaustralia.com.au

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MindwaysCT is an industry leader and innovator; providing physicians with technologies that fully enable the quantitative assessment of CT images.

Incorporated in 1997, the company can trace its origins to ground-breaking work at UCSF in the late 1970s leading to the development of the Cann & Genant QCT calibration standard in the early 80's. Today, our systems are based around the 3rd generation, solid version of the calibration phantoms that use this standard.

Since its inception, MindwaysCT has been a pioneer in the industry. We were the first to develop a fully volumetric 3D Spine QCT system in 1997 and introduced the first fully functional CTXA hip system for QCT bone mineral density measurement at the proximal femur in 2001. We were also the First in the market with a QCT system that could connect to and support the storage and viewing of QCT BMD reports on PACS infrastructure.

With a focus on the accurate determination of tissue densities, structures and types, MindwaysCT continues with its research and development efforts in order to advance Quantitative CT (QCT) technologies for new and innovative applications.

J Keenan Brown, Ph.D.
CEO

Only quantitative CT techniques of measuring bone density in the axial or peripheral skeleton, which measure actual volumetric density, can provide a true assessment of bone density when calibrated correctly.

Other methods including SXA, DXA and Radiographic Absorptiometry (RA) only provide estimates of true bone density. Because they are projectional techniques, the true value of the depth of the skeletal region is not measured, and an expression of area density (in gm/cm²) is generated.

Parameters of ultrasound transmission velocity or attenuation may reflect both bone mass and bone architecture and cannot be truly calibrated against a bone mineral standard. Thus, besides QCT, none of these techniques provide truly accurate measurements of "bone density".

MR McClung; Bone Mass Measurement in Osteoporosis and Other Bone Diseases; Quality Assurance in Bone Mass Measurements, National Osteoporosis Foundation; 1995.

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The QCT Pro™ Advantage

Low-dose Quantitative CT bone denistometry

If you need bone densitometry, have access to a CT scanner with five minutes per-patient capacity, a desire for the best technology and the most cost-effective solution, then QCT Pro™ is for you.

QCT Pro™ transforms your CT scanner into a bone densitometer with the best of both worlds: QCT trabecular spine BMD for sensitive early-detection of low bone mass; and DXA-equivalent hip BMD for use in the diagnosis of osteoporosis and low bone mass, as well as fracture risk assessment.

QCT Pro™ is the first system to exploit CT's inherent advantage for true 3-dimensional densitometry with volumetric BMD of the spine and hip. Volumetric BMD is faster, easier, clinically superior, and enables new densitometric capabilities not within the reach of DXA.

QCT Pro's scanner-independent, Windows® -based design enables clinicians and researchers without CT scanners access to QCT. QCT scans can be performed at any CT site and the data transferred to any PC running the QCT Pro™ system (via various methods such as network or CD) for convenient analysis and diagnostic control.

QCT Pro™ is the sensible financial investment in addition to the performance choice. DXA simply cannot compare with QCT Pro™ with its low purchase price and no site, room, personnel or recurring maintenance costs. Over the life of the solution, the cost of QCT Pro™ is a small fraction of DXA.

The Best of Both Worlds

Volumetric Spine BMD

» Measure only trabecular bone with the highest sensitivity for the earliest detection of bone loss and therapeutic response.

» Avoid DXA confounding factors such as DJD, osteophytosis, aortic calcifications, and scoliosis.

DXA-Equivalent Hip BMD

» Clinically interchangeable with DXA.

» Same areal (g/cm²) measurements and ROIs.

» Comparable T-scores.

» 0.7% precision.

Fast, Simple

» Helical scans in seconds.

» Highly automated analysis in 1–2 minutes.

Cost-Effective

» Reimbursable.

» Add-on to your existing CT scanner increases equipment utilization.

» DXA replacement at a fraction of the cost .

» Compatible with any DICOM CT or PET/CT scanner.

» No additional site, room, personnel or maintenance costs.

» Buy once, use indefinitely - survives scanner changes/upgrades.

The Spine Volumetric BMD Advantage

QCT's ability to assess trabecular, volumetric mineral density, independent of cortical bone, has long been recognized as advantageous because of the high metabolic activity of trabecular bone relative to cortical bone. Less commonly recognized is that volumetric mineral density measurements circumvent a number of factors that confound DXA area density measurements at the spine.

Common DXA-spine confounding factors include:

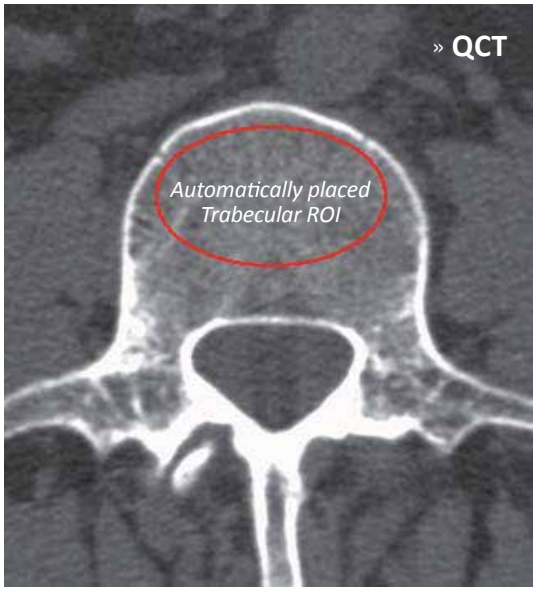
- The majority of mineral mass as measured by DXA at the spine is attributable to mineral mass in the posterior elements.
- Area density estimates increase as vertebral disc spaces narrow and/or vertebral heights decrease.
- Area density estimates increase as a result of osteophytosis associated with conditions such as osteoarthritis.
- Area density estimates increase as a result of aortic calcifications and other extraosseous sources of mineral.

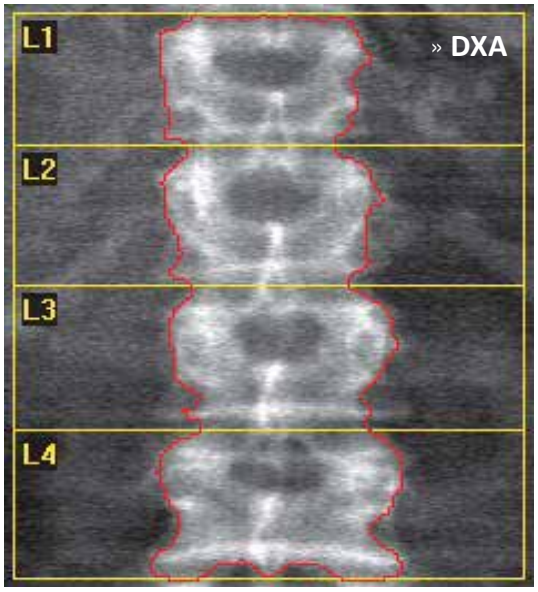
Collectively these factors degrade sensitivity and specificity when DXA is used to identify individuals at increased risk of fracture and assess the efficacy of treatments intended to reduce fracture risk.

By virtue of the anatomical detail intrinsic to CT images, QCT can be used to characterize metabolically important, trabecular bone in regions unaffected by common degenerative changes at the spine and aortic calcifications, and exclusive of cortical bone.

> "55% to 90% of osteoporosis-related fractures occur in individuals that would not be diagnosed with osteoporosis based on a DXA BMD test."
>
> **Stone, et al; 2003; J Bone and Mineral Research.**

» QCT vs DXA





The 3D Imaging Advantage

While conventional QCT relies upon single, thick CT images through each of multiple vertebrae, 3D QCT exploits CT's ability to construct a three dimensional representation of human anatomy using many thin images.

This results in a number of technical and clinical advantages, including:

» Ability to assess BMD in patients with scoliosis or other complex spinal deformities.

» Extension of QCT to complex anatomical regions such as the hip.

» Improved measurement precision because of decreased reliance upon the skill of a CT operator to precisely position a single, thick slice through a vertebra.

» Shortened scan times due to elimination of CT gantry tilt.

» Support for modern multi-slice CT scanners which no longer support gantry tilt.

Faster, Easier

» Define only start and end points.

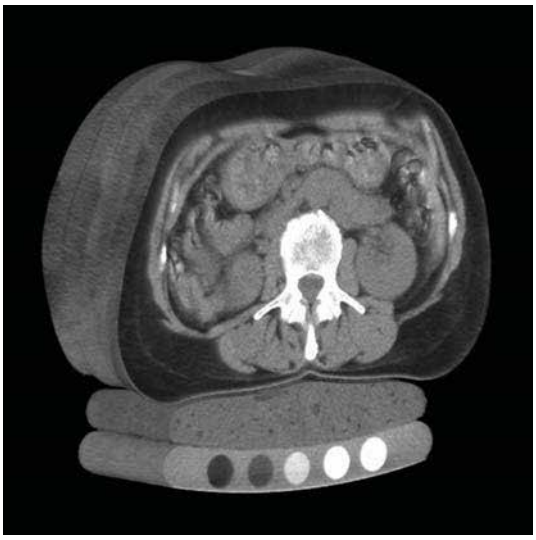
» No gantry tilt, no scan pauses.

» Helical/multi-slice scan in seconds.

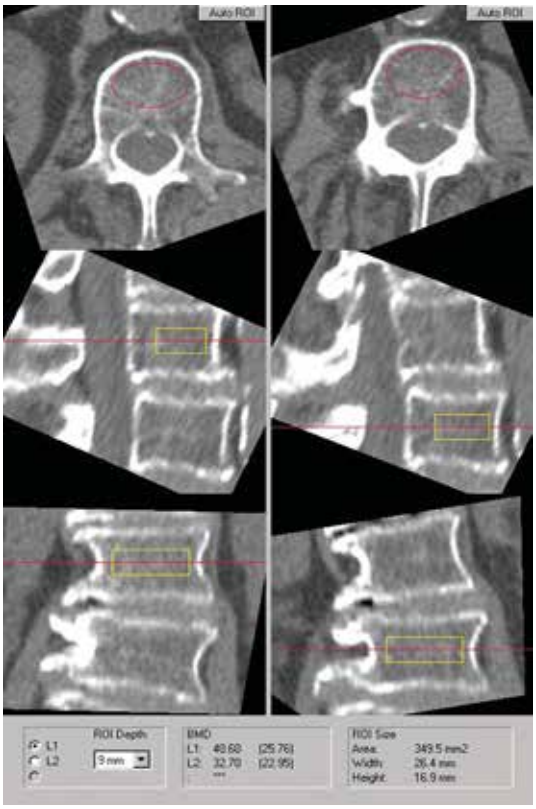
» Scan only 2 instead of 3 or 4 vertebra.

» Combine spine and hip in one fast scan.

» 3D Volumetric QCT



» Automatically Placed ROIs



CTXA-Hip™

Computed Tomography X-Ray Absorptiometry

CTXA enables you to produce DXA-equivalent hip measurements - including for usage with WHO criteria for fracture-risk assessment - from a CT volumetric data set.

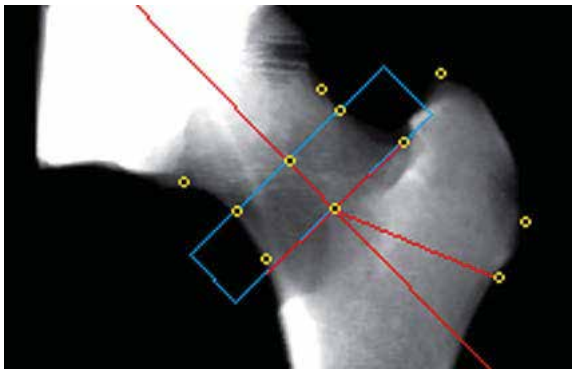
Physicians familiar with interpreting DXA reports will instantly understand how to use CTXA in the diagnosis of osteoporosis and low bone mass conditions.

A simple and cost-effective DXA replacement. CTXA uses equipment you already have. It is a fraction of the cost of DXA without the space, personnel, and maintenance requirements.

CTXA studies are fast and easy. Scan times are typically under ten seconds and the automated analysis takes about one minute. Total study times of less than ten minutes are easily attainable. The hip and spine can also be scanned at once for further efficiency.

Exploits the 3D data set to go beyond DXA. Besides areal BMD estimates, CTXA provides volume density in each of the standard DXA ROIs, along with separate cortical and trabecular bone compartment areal and volume density estimates (not available from DXA).

» **CTXA-Hip™ generates bone projections that look like those generated by DXA.**

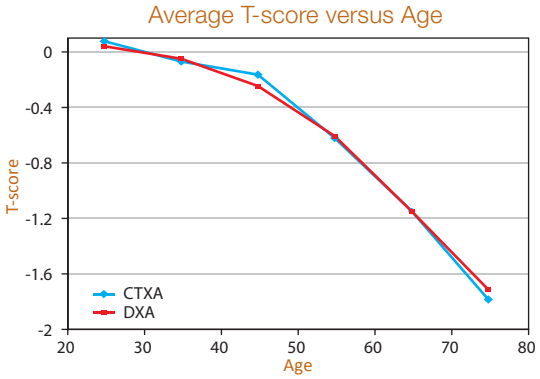


Features at a glance

- Bone mineral analysis of the proximal femur.
- Bilateral hips from a single scan.
- Helical scans in seconds.
- Highly automated analysis in 1–2 minutes.
- Clinically equivalent to DXA: Identical areal measurements and ROIs, as well as comparable T-scores.
- Precision: 0.7%; 1.1% long-term total hip; 1.2% long-term femoral neck.
- Volumetric BMD estimates provided in addition to standard DXA-equivlalent areal density measurements.
- Separate pseudo-cortical and pseudo-trabecular bone compartment density measurements (areal & volume estimates).

Comparison of CTXA and DXA Proximal Femur Reference Data

The graph below shows the comparison of measurements of the total hip made with CTXA and DXA*.



Normalizing the CTXA data to the DXA data results in an approximate relationship between CTXA and DXA BMD estimates of:

$$BMD_{DXA} = 0.998 * BMD_{CTXA} + 0.013\ g/cm^2$$

* Looker AC, Orwoll ES, Johnston CC, Lindsay RL, Wahner HW, Dunn WL, Calvo MS, Harris TB, Heyse SP. Prevalence of low femoral bone density in older U.S. adults from NHANES III. J Bone Miner Res 1997; 12: 1761-1768

QCT Pro™ PACS option

Increase physician access to BMD reporting

The QCT Pro™ PACS option provides for the integration of QCT Pro™ into your local PACS solution.

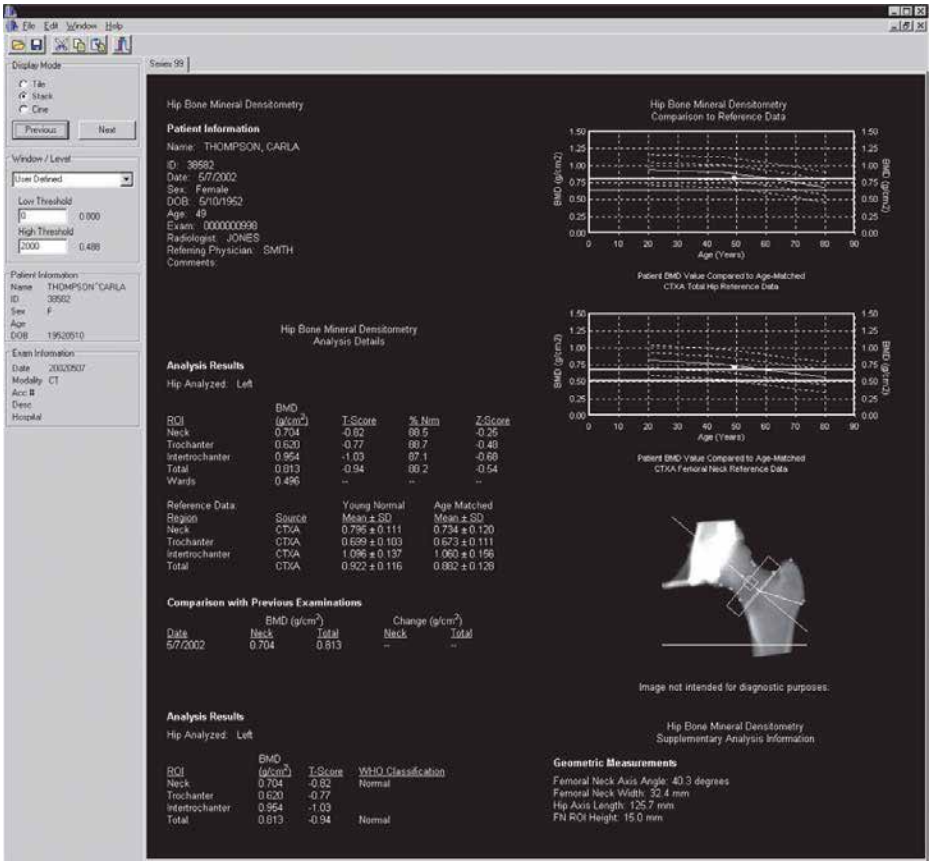
This integration allows you to exploit your local PACS infrastructure to work more efficiently by providing a paperless report that can be electronically archived and retrieved, reviewed locally or remotely, delivered in electronic form to your patients or physicians, or handled in other manners supported by your PACS.

After installation, PACS export is automatic and occurs during report printing.

Features at a glance

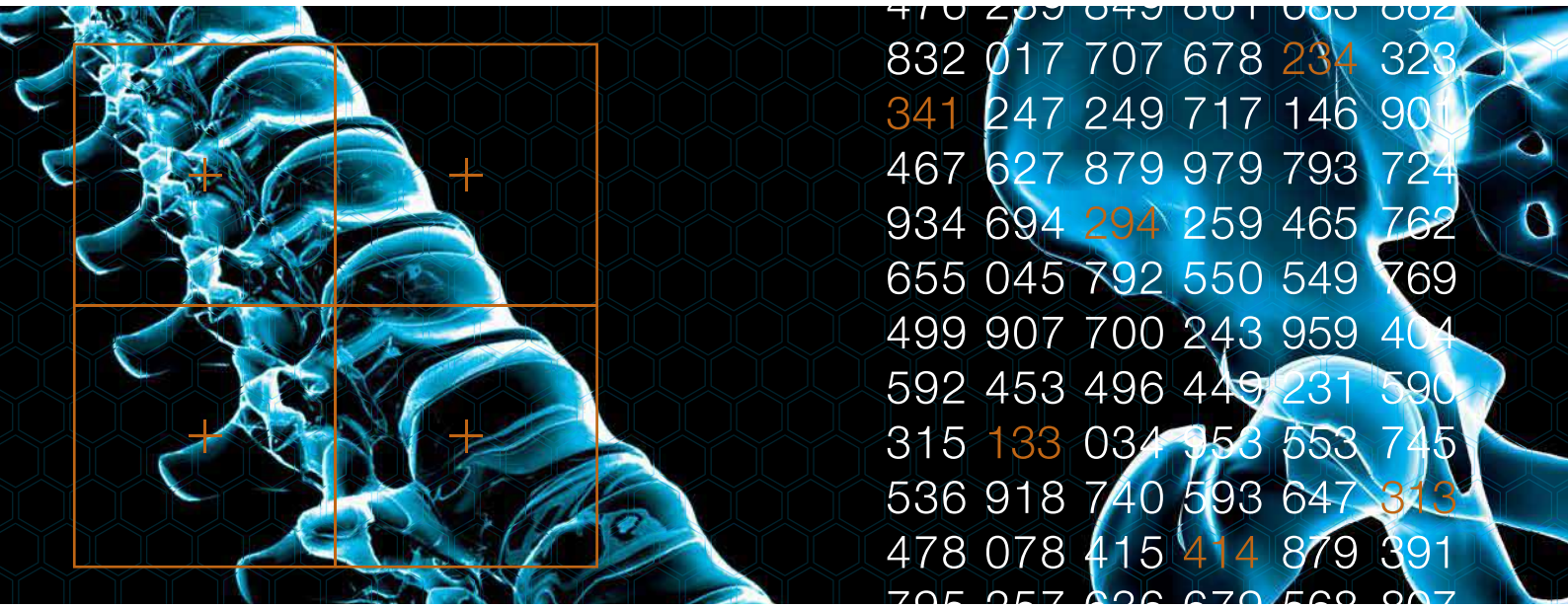
- Receipt via DICOM of data from multiple CT scanners.
- Export of QCT PRO Spine and/or Hip BMD reports to DICOM destinations.
- Multiple methods for selecting the destination(s) for a report, including:
  - *static list of one or more destinations;*
  - *selection from a drop-down list; and*
  - *automatic delivery based on CT scanner ID associated with an analyzed data set.*

» PACS export example



Exact display of information depends on your PACS system.

MindwaysCT is an industry leader and technology innovator, providing physicians with systems that enable the fully quantitative assessment of CT images.



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