Voxel Density Values of Cone Beam Computed Tomography: A Systematic Review

Thesis *submitted to*
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LIST OF ABBREVIATION

Abbreviation	*Term*
µCT	Micro-Computed Tomography
aBMD	Areal BMD
AEC	Automatic Exposure Control
ALARA	As Low As Reasonably Achievable
AMFPIs	Large-Area Active Matrix Flat-Panel Imagers
AMLCDs	Active Matrix Liquid Crystal Displays
ART	Algebraic Reconstruction Technique
a-Si	Amorphous Silicon
B.Ar	Bone Area
B.Pm	Bone Surface
BMC	Bone Mineral Content
BMD	Bone Mineral Density
BS/BV	Bone Surface to Volume Ratio
BV	Bone Volume
CBCT	Cone-Beam Computed Tomography
CCD	Charge-Coupled Device
CLT	Cairo Local Time
CMOS	Complementary Metal Oxide Semiconductor
CR	Computed Radiography
CT	Computed Tomography
DEQCT	Dual-Energy QCT
DEXA or **DXA**	Dual-Energy X-ray Absorptiometry
DQE	Detective Quantum Efficiency
DR	Direct Digital Radiographic Image Detector, Digital Radiography, Sensors
DXR	Digital X-ray Radiogrammetry
FDK	Feldkamp–Davis–Kress
FOV	Field of View
FPD	Flat Panel Detector
HS-QCT or **HS-pQCT**	High-Resolution Quantitative Computed Tomography
HU	Hounsfield Unit
IIT/CCD	Image Intensifier Tube Coupled to CCD Array
IIT	Image Intensifier Tube
Ir.L.Th	Inter-Label Thickness
kVp	Kilovolt Peak

Abbreviation	*Term*
mA	Milliamperes
MDCT	Multi Detector Computed Tomography
MeSH	Medical Scientific Headings
MTI	Medical Text Indexer
MXA	Morphometric X-ray Absorptiometry
N.Ob	Number of Osteoblast
N.Oc	Number of Osteocyte
NLM	National Library of Medicine
O.Ar	Osteoid Area
O.Wi	Osteoid Width
OPG	Osteoprotegerin
pDEXA or **pDXA**	Peripheral Version of DEXA
Pm	Post Meridiem
pQCT	Peripheral Quantitative CT
PSP	Photostimulable Phosphor Plates
QCT	Quantitative Computed Tomography
RA	Radiographic Absorptiometry
RANK	Receptor Activator of Nuclear Factor Kappa-B
ROI	Region of Interest
SD	Standard Deviation
SDD	Source-to-Detector Distance
SEQCT	Single-Energy QCT
SEXA or **SXA**	Single-Energy X-ray Absorptiometry
SL.Pm	Single Labeled Surface
SNR	Signal to Noise Ratio
T.Ar	Tissue Area
TbN	Trabecular Bone Number
TbSp	Trabecular Spacing
TbTh	Trabecular Thickness
TFT	Thin-Film Transistor
TV	Total Volume
vBMD	Volumetric BMD

INTRODUCTION & REVIEW OF LITERATURE

1. Bone structure and physiology

1.1. Introduction

Bone is a mineralized connective tissue consisting by dry weight of about 28% type I collagen and 5% non-collagenous matrix proteins, such as bone sialoprotein, osteocalcin, osteonectin, osteopontin, and proteoglycans; growth factors and serum proteins also are found in bone. This organic matrix is permeated by substituted hydroxyapatite ($Ca_{10}[PO_4]_6[OH]_2$), which makes up the remaining 67% of bone. The mineral is in the form of small plates, most of which lodge in the holes and pores of collagen fibrils.[1]

1.2. Gross bone histology

Bones have been classified as long or flat based on their gross appearance. Long bones include the bones of the limbs (tibia, femur, radius, ulna, and humerus). Flat bones include all skull bones plus the sternum, scapula, and pelvis.[1, 2]

Characteristic of all bones are a dense outer sheet of compact bone and a central, medullary cavity. This cavity is filled with red or yellow bone marrow that is interrupted, particularly at the extremities of long bones, by a network of bone trabeculae (trabecular, cancellous, or spongy bone are the terms used to