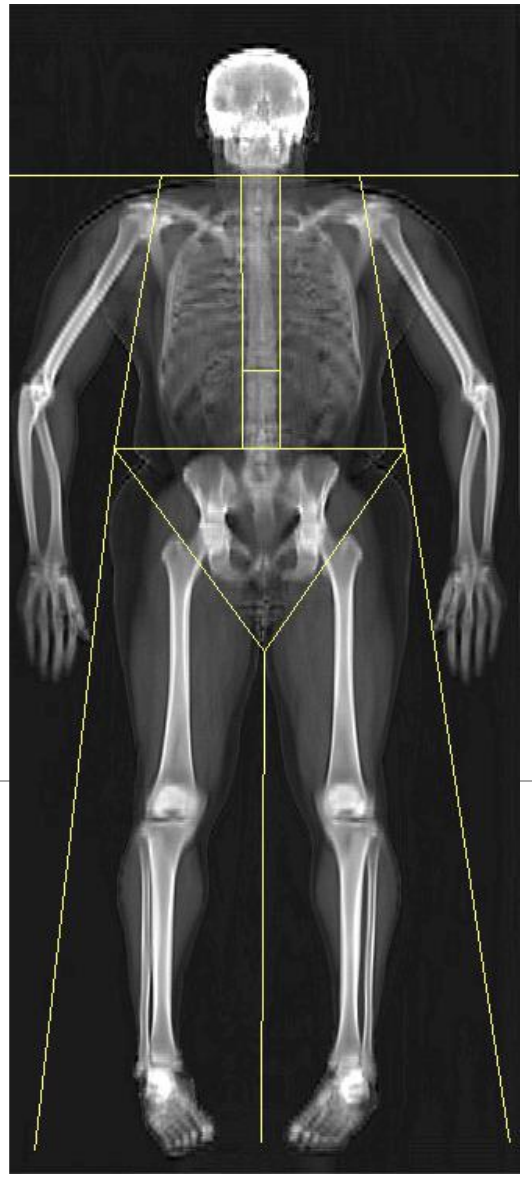
Bone Densitometry Initial Training

lecture 1

Introduction

GREG YARDLEY MSRS, RT (R), CBDT



https://www.youtube.com/watch?v=ipn7qjowQrk

My Healthcare Career

- **Beaver Ambulance Service EMT-I**
- **Sevier Valley Medical Center Student/RT (R)**
- **Intermountain Medical Center RT (R)**
- **Revere Health CBDT, RT (R)**
- **KBR Government Solutions MSRS, CBDT, RT(R)**

- ***Other Part time/PRN jobs***
- Riverwood Urgent Care RT(R)
- Memorial Hermann Pearland Hospital RT (R)
- College of Healthcare Professions LMRT instructor
- ISCD Bone Density Instructor
- Utah Army National Guard Combat life saver/cook/Solider

My Certifications and Teaching Experience

Registered Radiology Technologist

American Registry of Radiology Technologist (ARRT) RT(R).

Certified Bone Density Technologist (CBDT)

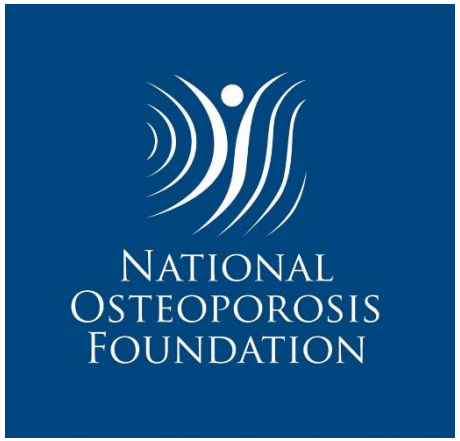
International Society of Clinical Densitometry (ISCD).

Bone Health and Osteoporosis Foundation (BHOF) Ambassador

Instructor for the ISCD.

Presenter for the National Bone and Joint Initiative (NBJI).

Radiology Technologist instructor at College of Healthcare Professions.



THE AMERICAN REGISTRY
OF RADIOLOGIC
TECHNOLOGISTS®

Published works I have been apart of

Evidence Report:
Risk of Early Onset Osteoporosis Due to Space Flight
Human Research Program
Human Health and Countermeasures Element

Approved for Public Release: May 9, 2017
National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas

Risk of Early Onset Osteoporosis

CURRENT CONTRIBUTING AUTHORS:
Jean D. Sibonga NASA Johnson Space Center, Houston, TX
Harlan J. Evans KBRWyle, Houston, TX
Scott A. Smith KBRWyle, Houston, TX
Elisabeth R. Spector KBRWyle, Houston, TX
Greg Yardley KBRWyle, Houston, TX
Joshua Alwood NASA Ames Research Center, Moffett Field, CA

Pre-flight exercise and bone metabolism predict unloading-induced bone loss due to spaceflight

Leigh Gabel ,1,2 Anna-Maria Liphardt ,3 Paul A Hulme,2 Martina Heer,4 Sara R Zwart ,5 Jean D Sibonga,6 Scott M Smith ,6 Steven Boyd 1,2

Acknowledgements The authors would like to thank the crewmembers for their time participating in this study; Anne Cooke, Stephanie Kwong, Duncan Raymond and **Greg Yardley** for scan acquisition and data collection; Katrina Koger for study coordination and Tannis Kemp for image visualisation. We thank the NASA Nutritional Biochemistry Lab for support of the biosample collections and biomarker analyses.

Recommended Methods for Monitoring Skeletal Health in Astronauts to Distinguish Specific Effects of Prolonged Spaceflight

Authors
Lukas J Vasadi, Elizabeth R Spector, Scott A Smith, **Gregory L Yardley**, Harlan J Evans, Jean D Sibonga
Publication date
2016/4/24

Description
NASA uses areal bone mineral density (aBMD) by dual-energy X-ray absorptiometry (DXA) to monitor skeletal health in astronauts after typical 180-day spaceflights. The osteoporosis field and NASA, however, recognize the insufficiency of DXA aBMD as a sole surrogate for fracture risk.

This is an even greater concern for NASA as it attempts to expand fracture risk assessment in astronauts, given the complicated nature of spaceflight-induced bone changes and the fact that multiple 1-year missions are planned.

Based on these concerns, a proposed surveillance program is presented which a) uses Quantitative Computed Tomography (QCT) scans of the hip to monitor the recovery of spaceflight-induced deficits in trabecular BMD by 2 years after return, b) develops Finite Element Models [FEM] of QCT data to evaluate spaceflight effect on calculated hip bone strength and c) generates Trabecular Bone Score [TBS] from serial DXA scans of the lumbar spine to evaluate the effect of age, spaceflight and countermeasures on this novel index of bone microarchitecture.

WELCOME

Take a seat and enjoy the ride.

We have a full couple of days ahead of us.

Why do we have this Instruction?

Because

DXA Quality Matters!!!

“DXA Quality Matters”

DXA quality matters is a paper authored in 2006 by three Physicians who are experts in treating low bone density and Osteoporosis.

DXA Quality Matters

E. Michael Lewiecki,[*,1] *Neil Binkley,*[2] *and Steven M. Petak*[3]

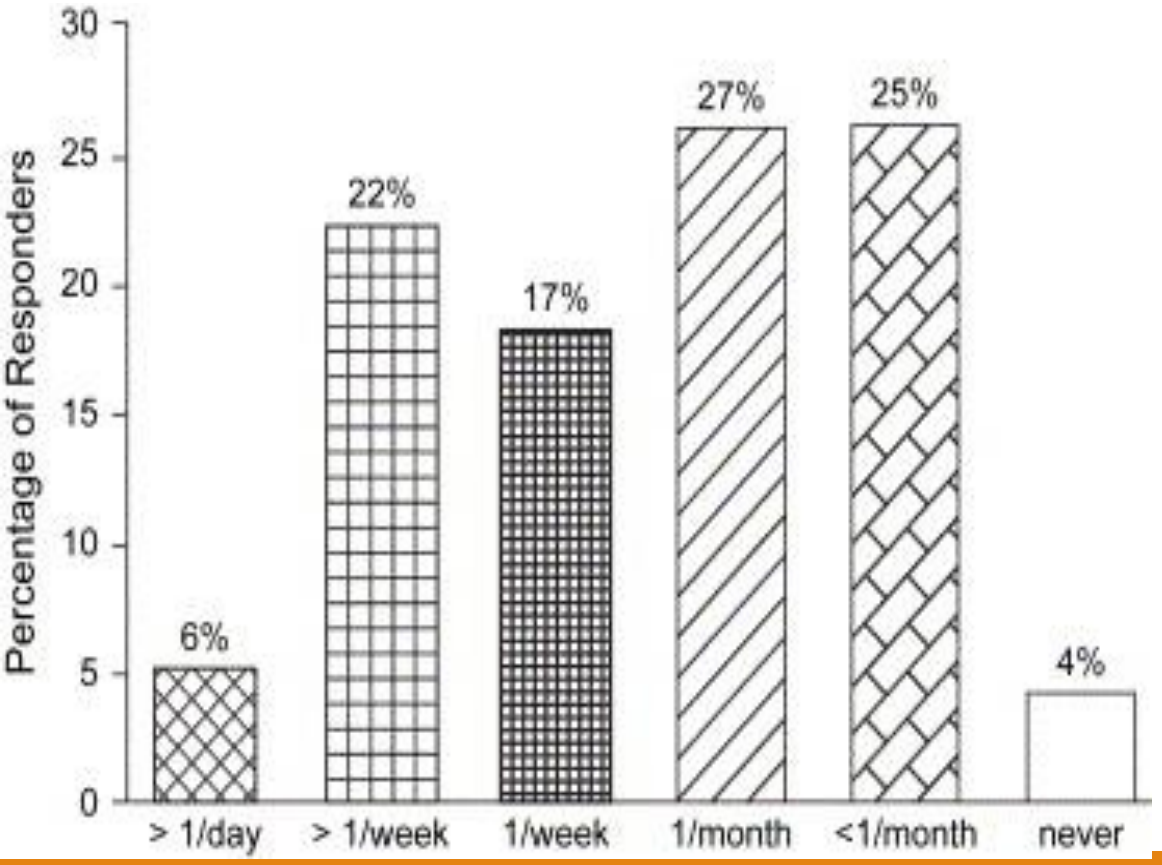
[1]*New Mexico Clinical Research & Osteoporosis Center, Albuquerque, NM;* [2]*University of Wisconsin, Madison, WI; and*

[3]*Texas Institute for Reproductive Medicine, Houston, TX*

Abstract

The proliferation of devices to measure bone mineral density (BMD), with large numbers of technologists oper- ating these instruments and numerous physicians interpreting/reporting the results, raises concern regarding the quality of the studies. High quality BMD measurement and reporting is essential, since referring healthcare pro-

DXA Quality Matters



<u>Frequency of incorrect DXA reports.</u>

Responses of 690 clinician members of the ISCD indicate that:

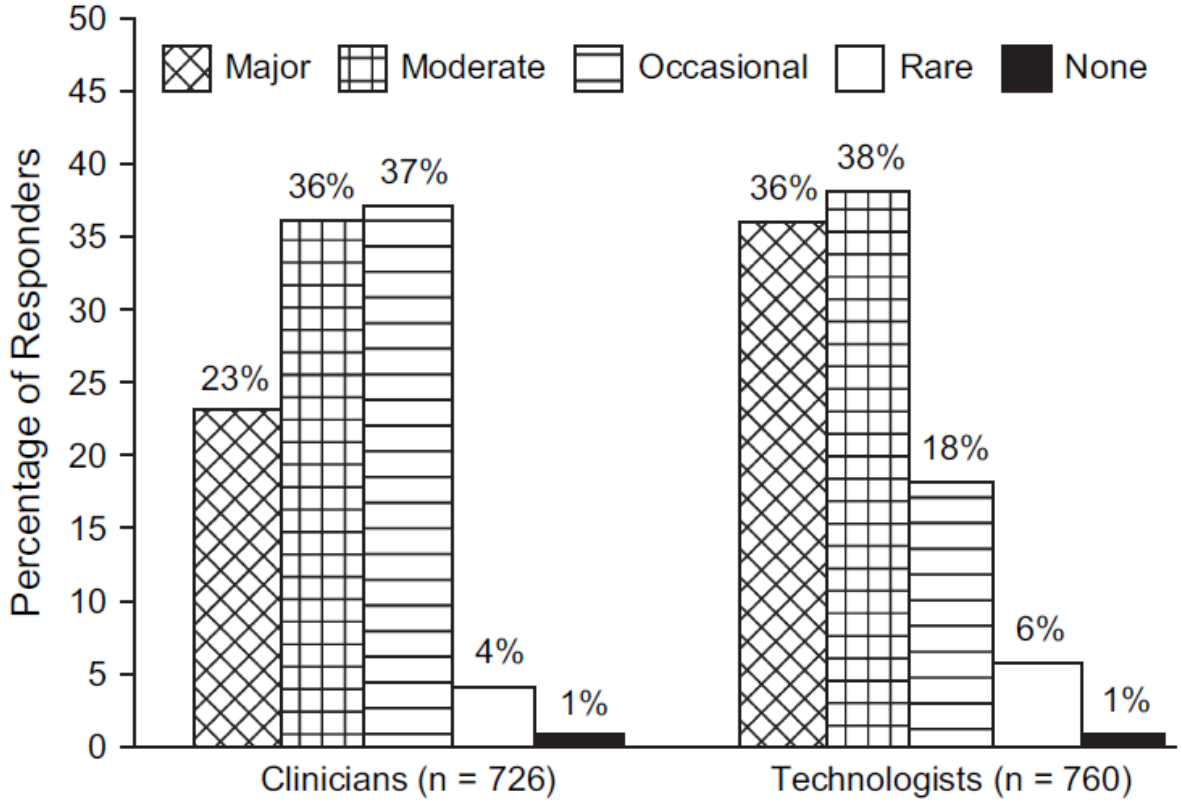
Incorrect DXA reports are **not rare**.

In response to the question ‘‘How often do you see a patient with a previous DXA report interpretation that is incorrect (wrong diagnostic classification, invalid comparison, incorrect use of skeletal site or region of interest, etc.)?’’

308/690 (45%) reported seeing such patients once per week or more frequently.

Percentages do not add up to 100% due to effects of rounding.

DXA Quality Matters



<u>Impact of poor quality DXA reports on patient care:</u>

Of ISCD members responding to the question, ‘‘How great a problem do you believe poor quality DXA reports are in terms of harm to patient care?’’

428/726 (59%) of clinicians and **562/760 (74%) of technologists** felt this to be a **major or moderate problem.**

Percentages do not add up to 100% due to effects of rounding.

Prevalence and type of errors in dual-energy x-ray absorptiometry

Carmelo Messina · Michele Bandirali · Luca Maria Sconfienza · Nathascja Katia D'Alonzo · Giovanni Di Leo · Giacomo Davide Edoardo Papini · Fabio Massimo Ulivieri · Francesco Sardanelli

- *"More than 90 % of DXA examinations/reports presented one or more errors.*
- *Errors in DXA examinations may have potential implications for patient management."*

Messina, et al. Eur Radiol (2015) 25:1504–1511

What does this all mean?

Nearly half of all DXA scans are being:

- Scanned Incorrectly by the technologist.
- Exams are being analyzed incorrectly by the technologist or the Provider.
- Exams are being diagnosed incorrectly by the interpreting physician.
- Referring physician do not understand what the results of the DXA mean.

Result From Incorrect DXA DATA Equates Too:

- Serial DXA scans becoming much more incomparable.
- Patients being prescribed an intervention that is not needed. Accompanied by possible side effects.
- The patient is not taken off treatment and suffers from serious side effects. (Such as AFF and Osteo Necrosis of the Jaw)
- The patient is not put on any intervention that is very much needed and suffers from a serious fracture.

Why is this happening

- DXA scans are not reimbursed lucratively so they don't make an imaging department that much money. In turn the money is not spent for training.
- Providers believe Osteoporosis and low bone density are not preventable. "It just happens when you get old" making these scans **NOT** a high priority.
- Many clinics don't understand or even know there is training available for DXA.
- Clinic/hospitals let anybody do the DXA scans not realizing that DXA is a radiology modality and is actually a very complex complicated device.

Who's at Fault?

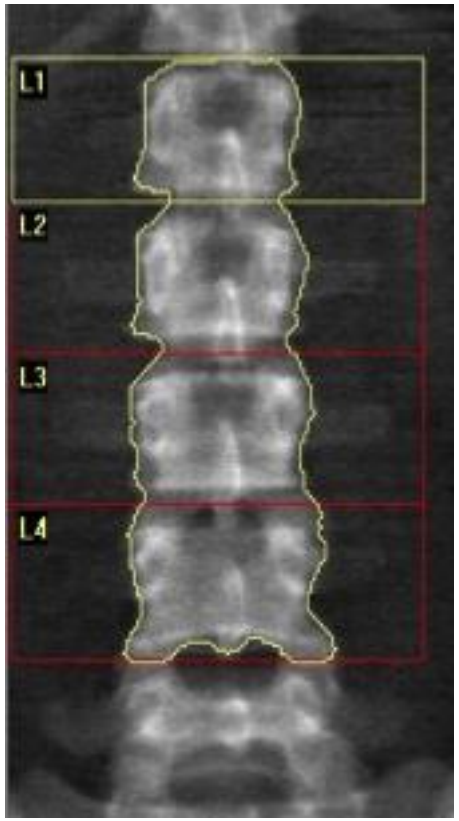
The manufacturer: for telling the costumer anybody can scan and not emphasizing the importance of getting registered.

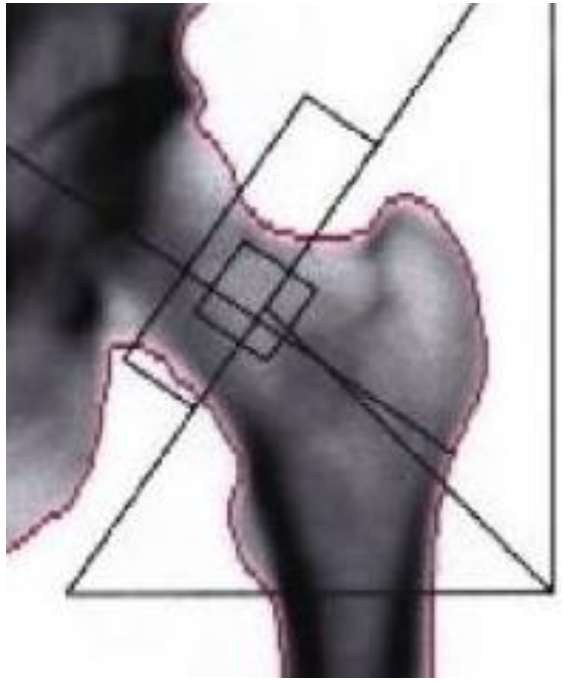
Management: for not doing their research on DXA and letting nonregistered healthcare technologist perform a diagnostic medical exam.

The physician: for not educating themselves because they don’t put Osteoporosis as a high priority.

The Technologist: for not taking the time for educating themselves as well.

Despite Technical Advances, Quality DXA Requires Technical Excellence





Principles of Quality DXA Acquisition, Analysis and Interpretation

- Proper technologist and interpreter training and skill set maintenance
  - Correct utilization of scanner and software
  - Knowledge of current best practices (e.g., ISCD Official Positions) for scan interpretation and reporting
  - Communication/collaboration between technologists and interpreter
- Proper scanner maintenance and quality control
- Use of established protocols for scan acquisition and analysis developed by technologists and interpreters

Lewiecki, E.M., et. al., J Clin Densitom, 19; 127-140, 2016
See ISCD Official Positions at www.iscd.org

Course Objectives

Lecture 2: Bone Science and Osteoporosis.

Lecture 3: DXA equipment, engineering and Radiation Safety.

Lecture 4: Quality Control and Assurance

Lecture 5: Patient Care and Scan Prep.

Lecture 6: Common areas scanned for a DXA scan, Proper Patient Positioning and Analysis

Lecture 7: How to interpret and understand the information on a DXA report. (Area, BMC, BMD, Z-score, T-score, and the graphs).

Course Objectives

Lecture 8: Case studies, Artifacts, and other fun things.

Lecture 9: Prevention and Treatment of osteoporosis and common side effects of treatments.

Lecture 10: Other Uses of the DXA Scanner.

Lecture 11:Test Your Bone Density Knowledge,

Lecture 12: Other Ways of Detecting and Learning More About Bone Fragility.