

https://doi.org/10.1016/j.bone.2017.06.010

10.1519/JSC.0000000000001737, PMID: 27930454

a factor of four. Summary Card

and Divers.

October 2016

Older (55-65v) Adults

received over one day at sea level. Summary Card

John A. Shepherd, Bennett K. Ng, Markus J. Sommer, Steven B. Heymsfield, Bone. 2017 DOI:

Roelofs EJ, Smith-Ryan AE, Trexler ET, Hirsch KR. J Athl Train. 2016 Dec 1. PMID: 27905858

Menopause Transition and Body Composition in Healthy South Indian Women

investigate its relationship with age and menopause as independent factors.

Fat-Free Mass Index in NCAA Division I and II Collegiate American Football Players

Hirsch; Meredith G. Mock Journal of Strength and Conditioning Research. 31(10):2719–2727, OCT 2017. DOI:

*Key Points: Outlines the differences in FFMI differences between different playing positions and

*Key Points: This study identified that One full body DXA scan has the equivalent amount of radiation as

Highlights the importance & accuracy of DXA assessments in professional athletic setting. Summary Card Short term in vivo precision of whole body composition measurements on the Horizon A densitometer. Michael Nowitz, and Paula Monahan Journal Med Imaging Radiation Oncology. 2017 Jul 29. doi: 10.1111/1754-9485.12646

have implications for performance. Quantifying body composition and muscle characteristics may be beneficial for professionals who work with athletes in order to improve performance and prevent injury.

*Key Point: This study was to assess the total body composition of healthy Indian women and to

Deepa Meeta D, Sameena Agarwal S, Akanshi Tanvir A - Journal of Clinical Densitometry, Vol. 19, Issue 4, p536 Published in issue:

Differences in DXA-Derived Lean Tissue Mass and Muscle Quality Between Healthy Young (25-35y) and

Francis P, Stein S, Butterworth M, Hind K - Journal of Clinical Densitometry, Vol. 19, Issue 4, p531 Pub in issue: October 2016

*Key Point: The aim of this study was to assess age-related differences in upper leg lean tissue mass (LTM), maximal voluntary upper leg strength and muscle quality in healthy young and older adults.

Body composition by DXA

Dual-Energy X-ray Absorptometry Studies

Updated: April 2018

(AFF) Metabolic disease/Visceral Fat performance/Athletics Abdominal aortic calcification Hip Structure Analysis **Trabecular Bone Score** Bone Mineral Density Fracture Cost Effectiveness Reimbursement Risk **Body Comp** % Body Fat Pediatric Precision Fracture Femoral X Nov-17 X Eric T. Trexler; Abbie E. Smith-Ryan; Malia N.M. Blue; Richard M. Schumacher; Jerry L. Mayhew; J. Bryan Mann; Pat A. Ivey; Katie R. Oct-17 Jul-17 X X X *Key Points: This study identified Horizon A precision exceeds the minimum acceptable precision value by Seasonal Effects on Body Composition, Muscle Characteristics, and Performance of Collegiate Swimmers Dec-16 X *Key Point: Body composition and muscle characteristics improved through 1 training season, which may Oct-16 X Oct-16 Х

Osteoporosis

HOLOGIC® Dual-Energy X-ray Absorptous Studies Updated:	ometry April 2018	Date	Body Comp	Bone Mineral Density	% Body Fat	Trabecular Bone Score	Fracture Risk	Atypical Femoral Fracture (AFF)	Sarcopenia	Human performance/Athletics	Obesity	Metabolic disease/Visceral Fat	Abdominal aortic calcification	Reimbursement	Cost Effectiveness	Pediatric	Hip Structure Analysis	Precision
A DXA-Based Analysis of Aberrant Body Composition of Patients with Crohn's Disease L. Dowling, M. Skelly, H. Yousuf, D. O'Sullivan, C. Dunne, P. Jakeman - Journal of Clinical Densitometry, Vol. 19, Issue Published in issue: October 2016 *Key Point: The aim of this study was to conduct a discriminate analysis of the body composi patients with Crohn's Disease (CD) that overcomes the recognised limitations in the use of BN	ition of	Oct-16	х															
Body Composition by Dual-X-Ray Absorptiometry in Women of Reproductive Age Journal of Clinical Densitometry, Vol. 19, Issue 4, p526–527 - Published in issue: October 2016 *Key Point: The assessment of the components of body composition (BC) using dual-x-ray ab (DXA) represents an important step in evaluating clinical and nutritional disorders.	osorptiometry C	Oct-16	х															
DXA: Technical aspects and application Bazzocchi A, Ponti F, Albisinni U, Battista G, Guglielmi G - European Journal of Radiology, Volume 85, Issue 8, Augus 1481-92 *Key Point: The purposes of this review are: (1) to appreciate the role of DXA in the study of composition; (2) to understand potential limitations and pitfalls of DXA in the analysis of body composition; (3) to learn about technical elements and methods, and to become familiar with in DXA.	body A	Aug-16	x	x		x											x	
Muscle analysis using pQCT, DXA and MRI Erlandson MC, Lorbergs AL, Mathur S, Cheung AM - European Journal of Radiology, Vol 85, Issue 8, August 2016, Pg *Key Point: A review of peripheral quantitative computed tomography (pQCT), dual X-ray energy absorptiometry (DXA) and magnetic resonance imaging (MRI) techniques used to assess skeletics.	ergy	Aug-16	х									х						

Aug-16 **X**

X

size and quality in-vivo.

Body composition in clinical practice

and delay in development of obesity-related diseases.

Andreoli A, Garaci F, Cafarelli FP, Guglielmi G - European Journal of Radiology, Vol 85, Issue 8, August 2016, Pg 1461-1468

*Key Point: A review of the increasing interest in the study of body composition to monitor conditions

HOLOGIC® The Science of Sure	Dual-Energy X-ray Absorptometry Studies Updated: April 2018	Date	Body Comp	Bone Mineral Density	% Body Fat	Trabecular Bone Score	Fracture Risk	Atypical Femoral Fracture (AFF)	Sarcopenia	Human performance/Athletics	Obesity	Metabolic disease/Visceral Fat	Abdominal aortic calcification	Reimbursement	Cost Effectiveness	Pediatric	Hip Structure Analysis	Precision	Osteoporosis
Body Composition in Healthy Adults Kerr A, G Slater GL, Byrne N, Nana A - Journal of C *Key Point: Compare the reliability of a	clinical Densitometry, Volume 19, Issue 3, July 2016, Pages 282-289 new positioning protocol (Nana et al) with the current reference ion Survey [NHANES]) protocol and investigate their within-	Jul-16	x																
and Bone Mineral Measurements Xu W, Chafi H, Guo B, Heymsfield SB, Murray KB, Pages 298-304 *Key Point: The high correlation between	rgy X-ray Absorptiometry Systems in Assessing Body Composition Zheng J, Jia G - Journal of Clinical Densitometry, Volume 19, Issue 3, July 2016, en the 2 DXA systems with systematic differences enabled r extending the multisystem measurements to advanced	Jul-16	x	х															
Body Composition Analysis Applied to I Clinical Outcomes in Regular, Elite, and	Different Sports Practices: Focus in Perspectives for Research and Professional High-Performance Athletes erduzco A, Montes-Felisart V - Journal of Clinical Densitometry, online 12 July	Jul-16	х							х									
Hind K, K Bansil K, Barlow M, Rutherford Z, Lees N *Key Point: Evaluate lumbar spine bone	pine bone density in elite cricket fast bowlers 1 - Bone and Body Composition Research Group June 2016 2 mass in elite male fast bowlers compared to cricketers of other y absorptiometry (DXA) with novel custom analysis of bilateral	Jun-16		х						х									
Hirsch KR, Smith-Ryan AE, Trexler ET, Roelofs EJ - 10.1519/JSC.0000000000001203.	Pristics of Division I Track and Field Athletes. J Strength Cond Res. 2016 May;30(5):1231-8. doi:	May-16	х							х									

*Key Point: The purpose of this study was to evaluate event-specific body composition and muscle characteristics of track and field athletes and to assess body composition changes after 1 year.

HOLOGIC® Dual-Energy X-ray Absorptometry The Science of Sure Studies Updated: April 2018	Dat	Body Comp	Bone Mineral Density	% Body Fat	Trabecular Bone Score	Fracture Risk	Atypical Femoral Fracture (AFF)	Sarcopenia	Human performance/Athletics	Obesity	Metabolic disease/Visceral Fat	Abdominal aortic calcification	Reimbursement	Cost Effectiveness	Pediatric	Hip Structure Analysis	Precision	Osteoporosis
Three-Compartment Body Composition Changes in Professional Rugby Union Players Over One Competitive Season: A Team and Individualized Approach Lees MJ, Oldroyd B, Jones B, Brightmore A, O'Hara JP, Barlow MJ, Till K, Hind K J Clin Densitom. 2016 May 5. pii: S1094-6950(16)30048-8. doi: 10.1016/j.jocd.2016.04.010 *Key Point: This study highlights the advantages of an individualized approach to dual-energy X-ray absorptiometry body composition monitoring and this can be achieved through application of derived LS	May-16	х					x											
Assessment of Fat distribution and Bone quality with Trabecular Bone Score (TBS) in Healthy Chinese Men Shan Lv, Aisen Zhang, Wenjuan Di, Yunlu Sheng, Peng Cheng, Hanmei Qi, Juan Liu, Jing Yu, Guoxian Ding, Jinmei Cai, and Bin Lai, Rep. 2016; 6: 24935. doi: 10.1038/srep24935	Apr-16	х			х						x							
Seasonal Changes in Whole Body and Regional Body Composition Profiles of Elite Collegiate Ice-Hocke Players. Prokop NW, Reid RE, Andersen RE - J Strength Cond Res. 2016 Mar;30(3):684-92. doi: 10.1519/JSC.00000000000001133. PMID: 26907839 *Key Point: The purpose of the study was to investigate changes in whole-body and regional-body composition of fat and lean tissue. The body composition profiles of 19 elite Canadian collegiate hockey players were assessed using dual energy X-ray absorptiometry.	Mar-16	x		х			x		x									
Detecting meaningful body composition changes in athletes using dual-energy x-ray absorptiometry. Colyer SL, Roberts SP, Robinson JB, Thompson D, Stokes KA, Bilzon JL, Salo AI - Physiol Meas. 2016 Apr;37(4):596-609. doi: 10.1088/0967-3334/37/4/596. Epub 2016 Mar 30. *Key Point: DXA was able to detect real body composition changes without the use of stringent scanning controls. Associations between changes in body composition and performance demonstrated the potential influence of these changes on strength and power indices.	Mar-16	x							х									

Nov-15 **X**

X

X

Comparison of Adipose Distribution Indices with Gold Standard Body Composition Assessments in the

lan J. Neeland, Darren K. McGuire, Björn Eliasson, Martin Ridderstråle, Cordula Zeller, Hans J. Woerle, Uli C. Broedl, and Odd Erik

EMPAREG H2H SU Trial: A Body Composition SubStudy

Johansen Diabetes Ther. 2015 Dec; 6(4): 635–642. doi: 10.1007/s1330001501467

H	O	
IIII		The Science of Sure

X-ray absorptiometry.

season

10.1080/02640414.2015.1085076.

10.1519/JSC.00000000000000886.

training and diet?

2015 Jul 6.

Directions

Dual-Energy X-ray Absorptometry Studies

Body composition analysis of inter-county Gaelic athletic associations players measured by dural energy

*Key Point: Stature and body mass was measured, estimates of three components of body composition, i.e., lean mass, fat mass and bone mineral content was obtained by dual energy X-ray absorptiometry

Changes in body composition in Divison I Football Players over a competitive season and recovery in off-

postseason, although these younger linemen had no significant change in weight. Results from this study could be used to support the implementation of a "training table" program for the athletic department

Do Canadian collegiate hockey players accurately perceive body composition changes after unmonitored

Prokop NW, Duncan LR, Andersen RE, Appl Physiol Nutr Metab. 2015 Oct;40(10):1056-60. doi: 10.1139/apnm-2015-0114. Epub

composition changes in muscle or fat. It is unknown if athletes can accurately perceive their fluctuations in body composition, yet their understanding may help them make more accurate interpretations regarding

Multi-Component Molecular-Level Body Composition Reference Methods: Evolving Concepts and Future

Steven B. Heymsfield, Cara B. Ebbeling, Jolene Zheng, Angelo Pietrobelli, Boyd J. Strauss, Analiza M. Silva, and David S. Ludwig Obes

Davies RW, Toomey C, McCormack W, Hughes K, Cremona A, Jakeman P - J Sports Sci. 2016;34(11):1015-20.doi:

Binkley T, Daughters SW, Weidauer LA, Vukovich MD - J Strength Cond Res. 2015 Sep;29(9):2503-12. doi:

lead by a dietician so that nutritional education programs could be initiated.

the success of potential nutrition or exercise regimens.

Rev. 2015 April; 16(4): 282-294. doi:10.1111/obr.12261

*Key Point: In this study, body composition in the younger linemen had unfavorable changes at

*Key Point: Collegiate athletes often use nutritional programs and supplements to elicit body

(DXA), and normative data for Gaelic athletic association athletes.

Updated: April 2018

Date	Body Comp	Bone Mineral Density	% Body Fat	Trabecular Bone Score	Fracture Risk	Atypical Femoral Fracture (AFF)	Sarcopenia	Human performance/Athletics	Obesity	Metabolic disease/Visceral Fat	Abdominal aortic calcification	Reimbursement	Cost Effectiveness	Pediatric	Hip Structure Analysis	Precision	Osteoporosis
Sep-15	x		x														
Sep-15	x		х					х									
Jul-15	х		х					х									
Apr-15	X		х						x								

HOLOGIC® The Science of Sure	Dual-Energy X-ray Absorptometry Studies Updated: April 2018
Methodology review: using dual-energy	X-ray absorptiometry (DXA) for the assessment of body
composition in athletes and active people	le.
•	ort Nutr Exerc Metab. 2015 Apr;25(2):198-215. doi: 10.1123/ijsnem.2013-0228.
Epub 2014 Jul 14	
*Key Point: This review presents a summ	nary of the sources of error and variability in the measurement of
body composition by DXA, and develops a	a theoretical model of best practice to standardize the conduct
and analysis of a DXA scan.	

ray absorptiometry: a cross-sectional study

10.1080/02640414.2014.926380. Epub 2014 Jun 10.

professional Australian Football players

2013-004194

soccer players. Summary Card

Dual-Energy X-ray Absorptometry
Studies

Fanny Buckinx, Jean-Yves Reginster, Nadia Dardenne, Jean-Louis Croisiser, Jean-François Kaux, Charlotte Beaudart, Justine Slomian

*Key points: This study used DXA scans to show the in season changes in body composition in professional

Donald R. Dengel, Tyler A. Bosch, T. Pepper Burruss, Kurt A. Fielding, Bryan E. Engel, Nate L. Weir, and Todd D. Weston. Journal of

*Key Points: Compares precison of pencil and fan beam DXA devices for assessing body composition in

Zainab Hussain, Tazeen Jafar, Maseeh uz Zaman, Riffat Parveen, Farzan Saeed BMJ Open 2014;4: e004194. doi:10.1136/bmjopen-

Correlations of skin fold thickness and validation of prediction equations using DEXA as the gold

and Olivier Bruyère Buckinx et al. BMC Musculoskeletal Disorders (2015) 16:60 DOI 10.1186/s12891-015-0510-9 Seasonal DXA-measured body composition changes in professional male soccer players

The accuracy and precision of DXA for assessing body composition in team sport athletes. Bilsborough JC, Greenway K, Opar D, Livingstone S, Cordy J, Coutts AJ. J Sports Sci. 2014;32(19):1821-8. doi:

Chiara Milanese, Valentina Cavedon, Giuliano Corradini, Francesco De Vita & Carlo Zancanaro Journal of Sports Science, 33:12, 1219-1228, 16 March 2015 DOI: 10.1080/02640414.2015.1022573

Strength Conditioning Research. 2014 Jan; 28(1):1-6. doi: 10.1519/JSC.000000000000299

standard for estimation of body fat composition in Pakistani children

Body composition and bone mineral density of national football league players.

Mar-14

Date	Body Comp	Bone Mineral Density	% Body Fat	Trabecular Bone Score	Fracture Risk	Atypical Femoral Fracture (AFF)	Sarcopenia	Human performance/Athletics	Obesity	Metabolic disease/Visceral Fat	Abdominal aortic calcification	Reimbursement	Cost Effectiveness	Pediatric	Hip Structure Analysis	Precision	
Apr-15	х					A				2							
Mar-15	х															х	
Mar-15	х							х									
Jan-14	х	х						х									
Jun-14	x							x								x	
	.,																

X

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		The Science of Sure

Energy Deficiency in Sport (RED-S)

Dual-Energy X-ray Absorptometry Studies

Updated: April 2018

Date	Body Comp	Bone Mineral Density	% Body Fat	Trabecular Bone Score	Fracture Risk	Atypical Femoral Fracture (AFF)	Sarcopenia	Human performance/Athletics	Obesity	Metabolic disease/Visceral Fat	Abdominal aortic calcification	Reimbursement	Cost Effectiveness	Pediatric	Hip Structure Analysis	Precision	Osteoporosis
Mar-14	x		x					x		x							
Jan-14	x																
Dec-13	х							х								х	
Oct-13	x																
Oct-13	x																

contraindications to body composition testing.
The Official Positions of the International Society for Clinical Densitometry: Body Composition Analysis
Reporting

The International Olympic Committee consensus statement: beyond the Female Athelete Traid-Relative

*Key Points: RED-S points to a syndrome that affects many aspects male and female athelets physiological function, health and atheletic performance. Body fat percentage and FFM was measured using DXA.

Dual-Energy X-Ray Absorptiometry Measured Regional Body Composition Least Significant Change:

Margo Mountjoy, Jorunn Sundgot-Borgen, Louise Burke, Susan Carter, Naama Constantini, Constance Lebrun, Nanna Meyer, Roberta Sherman, Kathrin Steffen, Richard Budgett, Arne Ljungqvist Journal of Strength and Conditioning Research.

Buehring B, Krueger D, Libber J, Heiderscheit B, Sanfilippo J, Johnson B, Haller I, Binkley N - Journal of Clinical Densitometry,

The Official Positions of the International Society for Clinical Densitometry: Indications of Use and

Kendler D, Borges J, Fielding R, Itabashi A, Krueger D, Mulligan K, Camargos B, Sabowitz B, Wu CH, Yu E, Shepherd J - Journal of

*Key Point: Reviews the most common, specific scenarios (HIV therapy, sarcopenia, bariatric surgery,

obesity) and proposed indications for body composition assessment. We have also discussed

TASHA P. BALLARD, LAURA FAFARA, and MATTHEW D. VUKOVICH American College of Sports Medicine DOI:

*Key Point: Knowledge of measurement precision is essential for monitoring body composition changes

31(10):2719-2727, OCT 2017. DOI: 10.1519/JSC.000000000001737, PMID: 27930454

Comparison of Bod Pod® and DXA in Female Collegiate Athletes

Clinical Densitometry, Volume 16, Issue 4, October-December 2013, Pages 496-507

Effect of Region of Interest and Gender in Athletes

Volume 17, Issue 1, January 2014, Pages 121-128

Reporting of DXA for Body Composition

10.1249/01.MSS.0000121943.02489.2B

over time.

Petak S, Barbu CG, Yu EW, Fielding R, Mulligan K, Sabowitz B, Wu CH, Shepherd JA - Journal of Clinical Densitometry, Volume 16, Issue 4, October–December 2013, Pages 508-519

*Key Point: These guidelines provide evidence-based standards for the reporting and clinical application of DXA-based measures of body composition.

HOLOGIC® The Science of Sure	Dual-Energy X-ray Absorptometry Studies Updated: April 2018	Date	Body Comp	Bone Mineral Density	% Body Fat	Trabecular Bone Score	Fracture Risk	Atypical Femoral Fracture (AFF)	Sarcopenia	Human performance/Athletics	Obesity	Metabolic disease/Visceral Fat	Abdominal aortic calcification	Reimbursement	Cost Effectiveness	Pediatric	Hip Structure Analysis	Precision	Osteoporosis
with body mass index. Infante JR, Reyes C, Ramos M, Rayo JI, Lorente R, Se Medicina Nuclear e Imagen Molecular (English Editio *Key Point: Although BMI is an appropria nutritional status, in athletes should be tal	rrano J, Domínguez ML, García L, Durán C, Sánchez R - Revista Española de on), Volume 32, Issue 5, September–October 2013, Pages 281-285 te parameter in general population for the assessment of sen into account fat and muscle body percentage and their ensitometry appears to be a simple and reliable technique for	Sep-13	X	X	X														
Sillanpää E, Häkkinen A, Häkkinen K Eur J Appl Ph Jun 8. *Key Point: Accuracy of bioimpedance (Bl	nd skinfolds during exercise training in women. Asiol. 2013 Sep;113(9):2331-41. doi: 10.1007/s00421-013-2669-9. Epub 2013 A) and skinfold thickness in estimating body composition among sing dual-energy X-ray absorptiometry (DXA) as a criterion a training intervention.	Sep-13	х																
	From Dual-Energy X-Ray Absorptiometry Output rnal of Clinical Densitometry: Assessment & Management of Musculoskeletal rg/10.1016/j.jocd.2012.11.001	Jul-13	x															х	
Libber J, Binkley N, Krueger D - Journal of Clinical De *Key Point: This report describes technic frequency with which autoanalysis inaccur	rechnical Aspects of Positioning and Analysis Insitometry, Volume 15, Issue 3, July—September 2012, Pages 282-289 In challenges experienced in performing TB DXA, explores the acies occur, assesses their effect on regional body composition proach for TB DXA positioning and analysis.	Jul-12	х																
Recipent of Young Investigator Award Donnenwerth J, Heiderschiet B, Libber J, Fidler E, Kri 2011, Page 154 *Key Point: The purpose of this report is	nal Lean Mass Distribution and Correlation with Performance: Deger D, Binkley N - Journal of Clinical Densitometry, Volume 14, Issue 2, April to characterize DXA-measured lean mass regional distribution in Evaluate the correlation of lean mass with athletic performance	Apr-11	x		x					x									

HOLOGIC® The Science of Sure	Dual-Energy X-ray Absorptometry Studies Updated: April 2018	Date	Body Comp	Bone Mineral Density	% Body Fat	Trabecular Bone Score	Fracture Risk	Atypical Femoral Fracture (AFF)	Sarcopenia	Human performance/Athletics	Obesity	Metabolic disease/Visceral Fat	Abdominal aortic calcification	Reimbursement	Cost Effectiveness	Pediatric	Hip Structure Analysis	Precision	Osteoporosis
Sarcopenia: European consensus on definition and diagnosis: Report of the European Working Group on Sarcopenia in Older People Alfonso J. Cruz-Jentoft, Jean Pierre Baeyens, Jürgen M. Bauer, Yves Boirie, Tommy Cederholm, Francesco Landi, Finbarr C. Martin, Jean-Pierre Michel, Yves Rolland, Stéphane M. Schneider, Eva Topinková, Maurits Vandewoude, Mauro Zamboni Age Ageing. 2010 Jul;39(4):412-23. doi: 10.1093/ageing/afq034. Epub 2010 Apr 13.		Apr-10	х						х										
PSA and body composition by dual X-ray absorptiometry (DXA) in NHANES. Jay H. Fowke and Charles E. Matthews. Prostate. 2010 Feb 1;70(2):120-5. doi: 10.1002/pros.21039		Feb-10	х								Х								
Body Composition in Athletes: Assessment and Estimated Fatness Malina RA - Clinics in Sports Medicine, Volume 26, Issue 1, January 2007, Pages 37-68 *Key Point: Provides an overview of models and methods used for studying body composition, changes in body composition during adolescence and the transition into adulthood, and applications to adolescent and young adult athletes.		Jan-07	х	х	х														
Modeling elite male athletes' peripheral bone mass, assessed using regional dual x-ray absorptiometry Nevill AM, R.L. Holder, A.D. Stewart - Bone, Volume 32, Issue 1, January 2003, Pages 62-68 *Key Point: The results from this study suggest that the bone mass acquisition of elite athletes' arms and legs increases in proportion to the projected bone area, having simultaneously controlled/removed the effect of the confounding variables of body mass and body fat.		Jan-03	x	x	x														

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