The Basis of Current DoD Body Fat Standards

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Warfighter Health & Performance

DoD Directive 1308.1, June 30, 2004
DoD Physical Fitness and Body Fat Program

It is DoD policy that:

4.1. Service members shall maintain physical readiness through appropriate nutrition, health, and fitness habits. Aerobic capacity, muscular strength, muscular endurance, and desirable body fat composition, form the basis for the DoD Physical Fitness and Body Fat Program.

1980 Review of Fitness in the Services produced the Directive specifying that all services follow the USMC lead with enforceable circumference-based body fat standards

[illegible] Service members whose duties [illegible] and cardio-respiratory endurance may be hampered in performing their duties when body fat exceeds 26 percent in males and 36 percent in females. The Military Services shall implement body composition programs that enhance general health, physical fitness and military appearance. Departments must ensure that actual weight loss is viewed as less important than the reduction in body fat. The specific "Height-Weight Screening Table" is in reference (b).

Body fat limits key to different outcomes

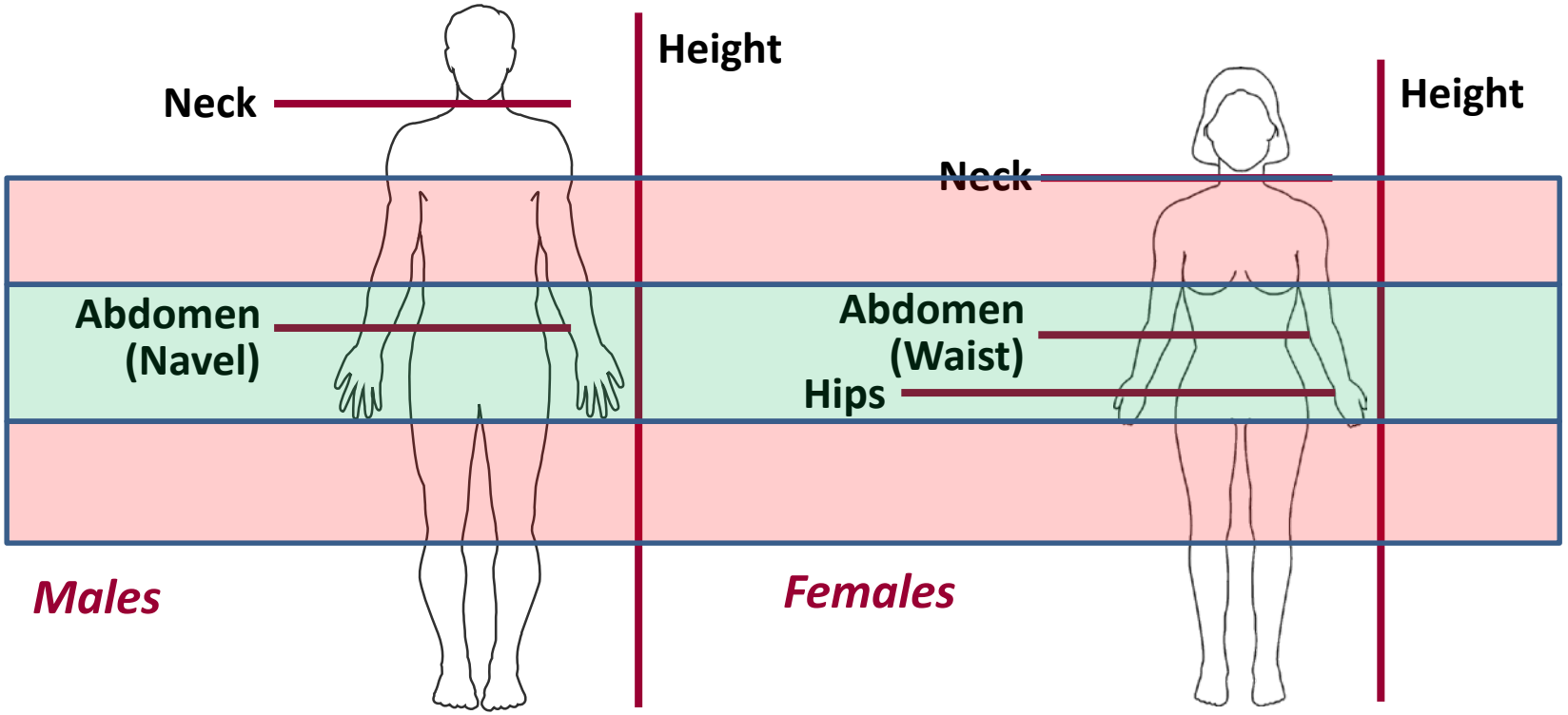
Military Appearance	Combat Readiness	Health
		
Previous Marine Corps Standards <18% BF (men) <26% BF (women)	**Healthy Active Young Recruits** 15-20% BF (men) 25-30% BF (women)	**NHLBI Guideline Equivalents** <~26% BF (men) <~38% BF (women)
Hodgdon, Fitzgerald & Vogel, 1990 Friedl, 2004	Patton, Daniels & Vogel, 1980 Harman & Frykman, 1992 Bathalon et al., 2006	Bathalon et al. 2006 Friedl, 2009

REFS

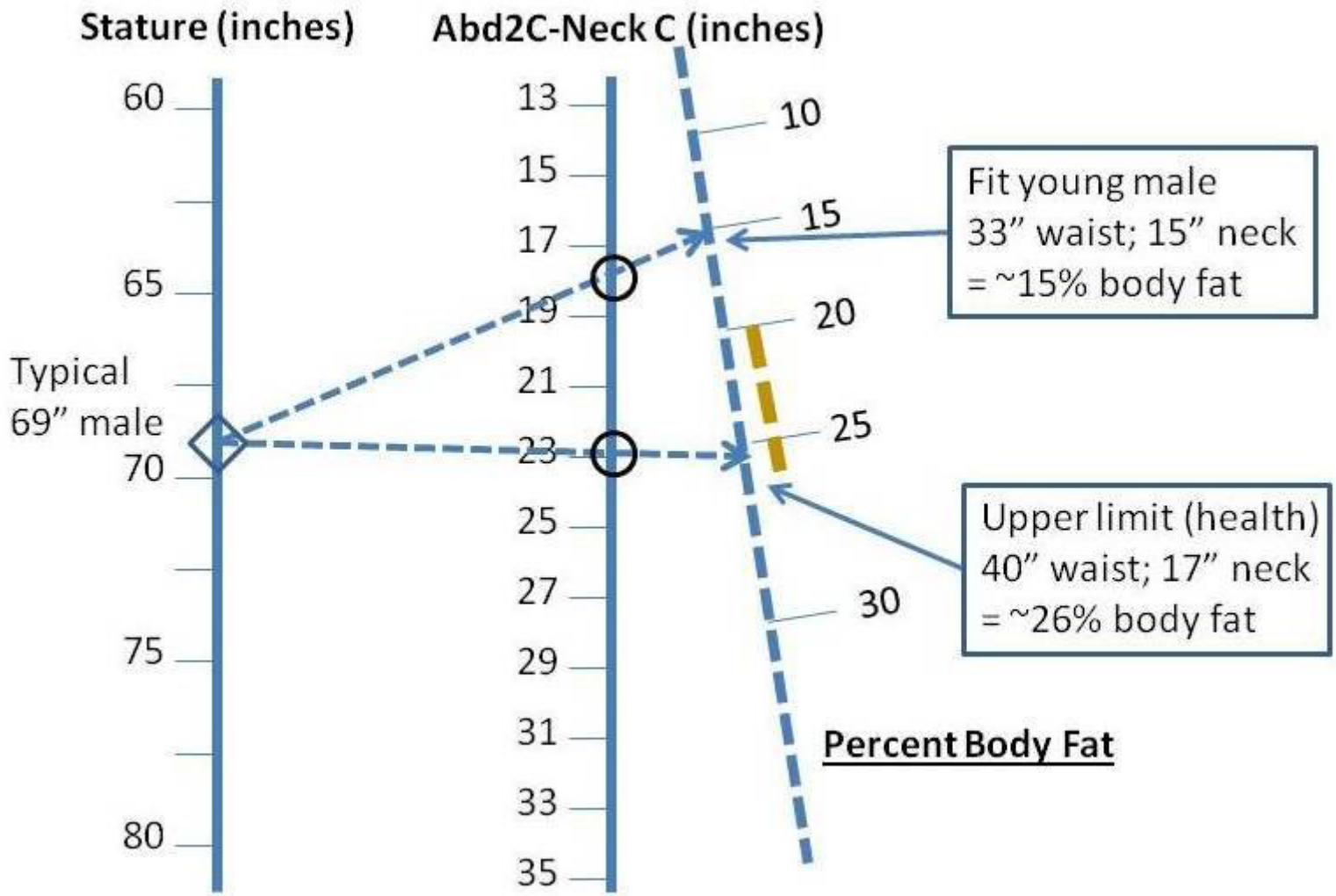
DoDI 1308.3 - Single set of predictive equations

Hodgdon and Beckett, 1984

Practical Estimation of Chronic Energy Balance: Circumference-Based Body Fat Measurements



Body fat equations are focused on the key site reflecting chronic underexercise & overnutrition habits: abdominal and gluteal girths

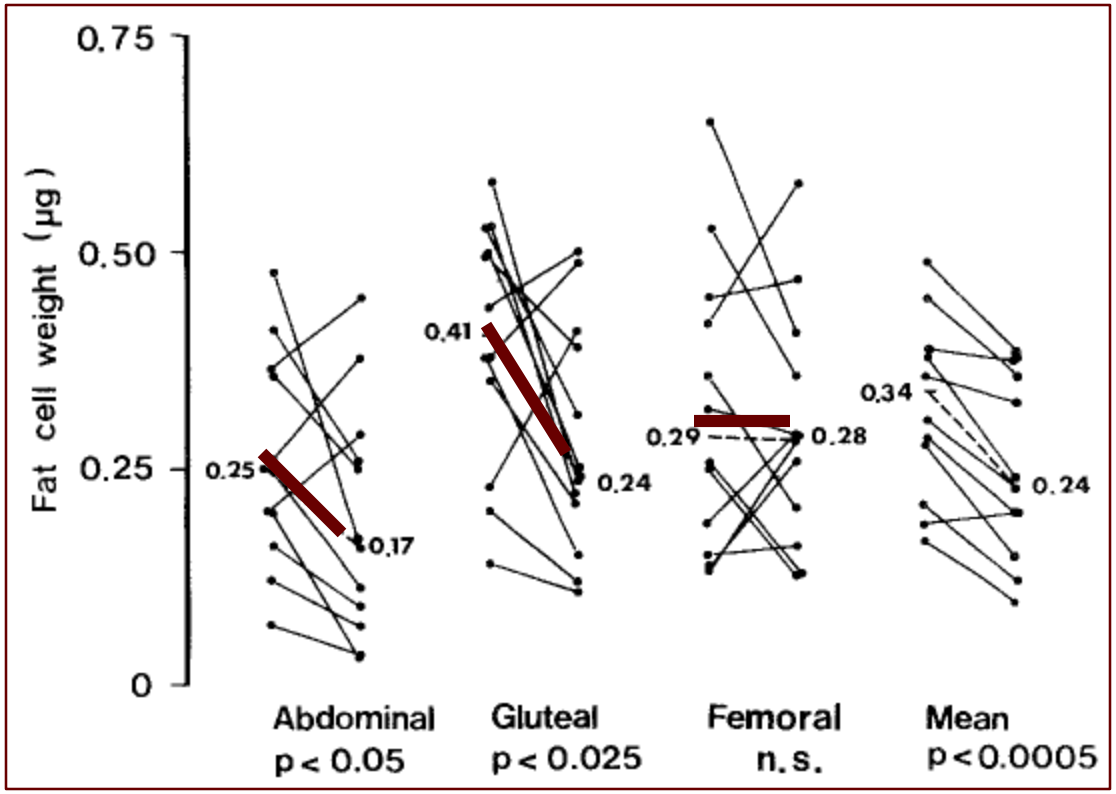

Stature (inches)
Abd2C-Neck C (inches)
60
65
70
75
80
13
15
17
19
21
23
25
27
29
31
33
35
10
15
20
25
30
Typical
69" male
Fit young male
33" waist; 15" neck
= ~15% body fat
Upper limit (health)
40" waist; 17" neck
= ~26% body fat
Percent Body Fat

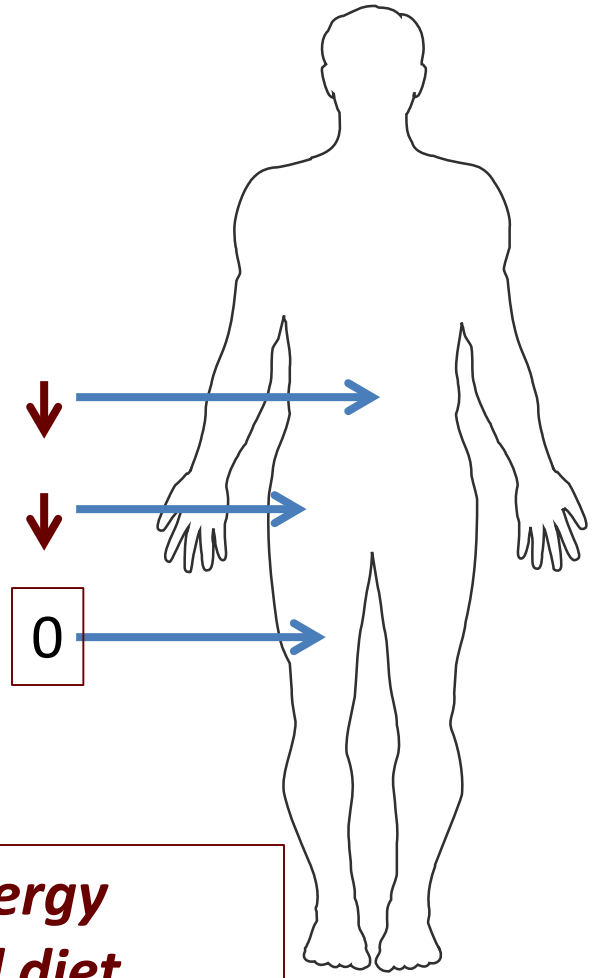
Friedl, 2017

Regional differences in fat cell activity

Rognum, Rodahl & Opstad, 1982

Fat cell biopsies before and after a week of intensive Norwegian Ranger training with complete food deprivation





Abdominal and gluteal fat are <u>labile</u> fat energy stores that can be modified by exercise and diet

Sex differences in intra abdominal fat deposition

Kvist et al. 1988

Unlike men, the intra abdominal space in women is protected against the first 30 kg of fat

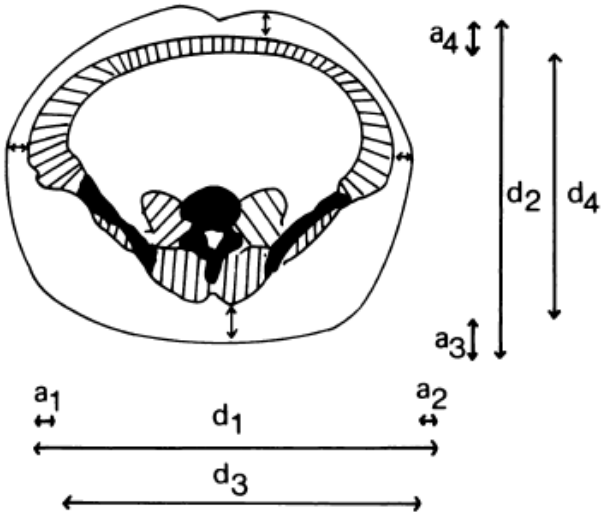
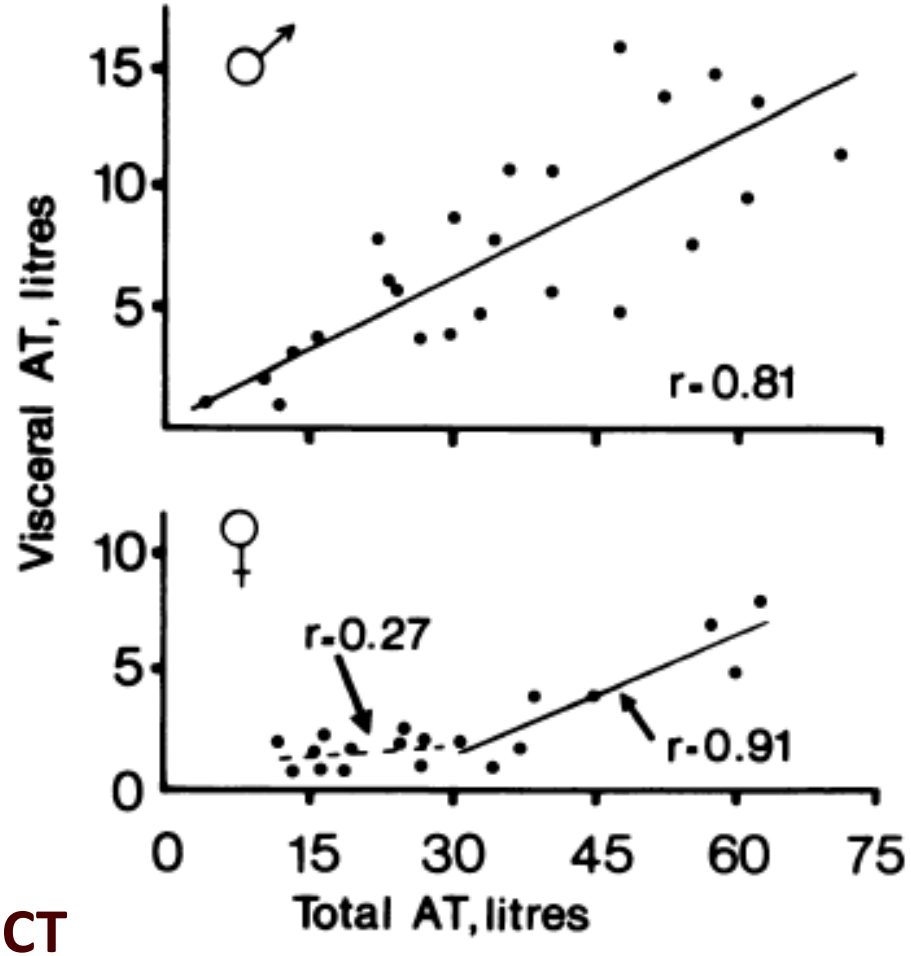
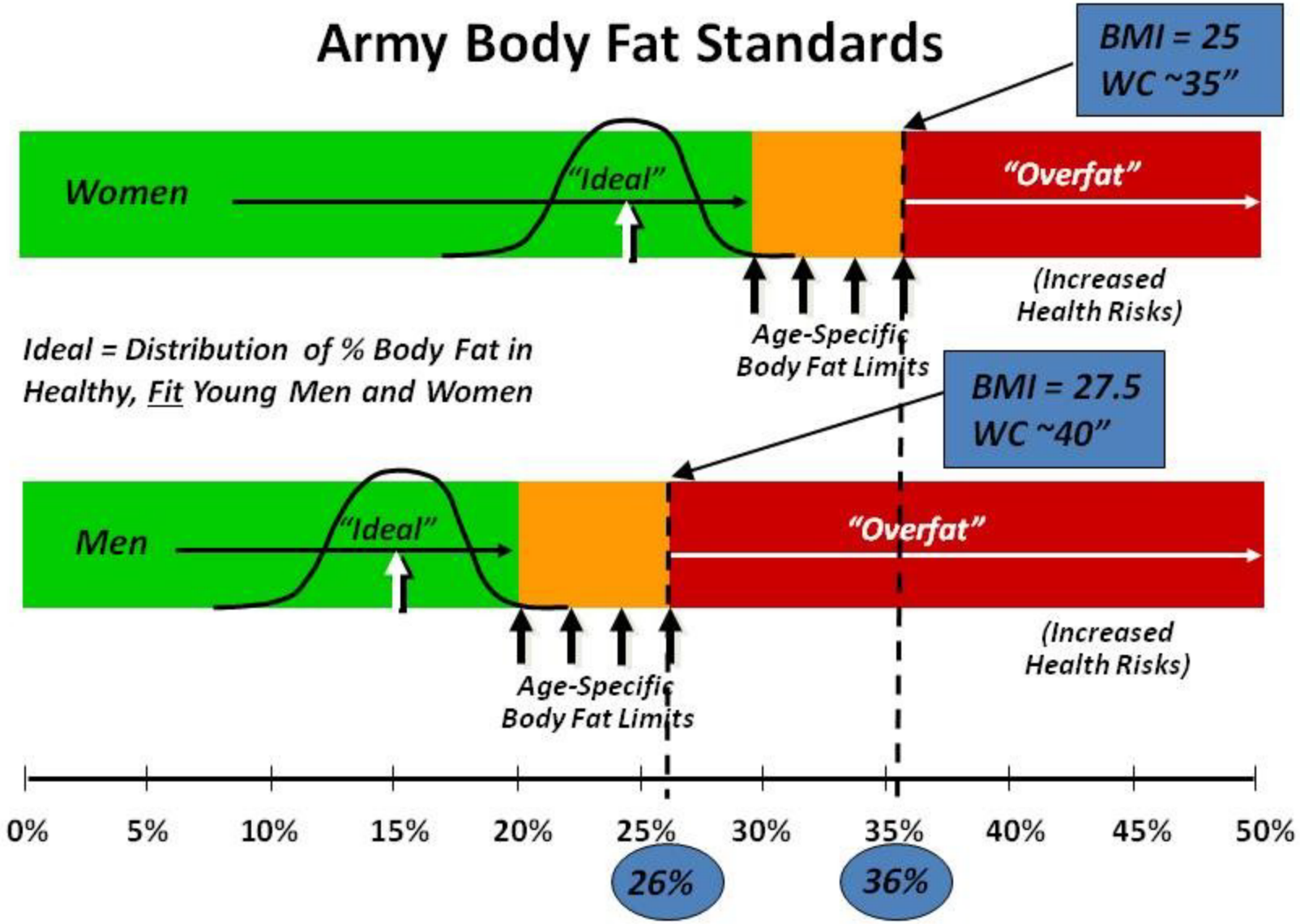


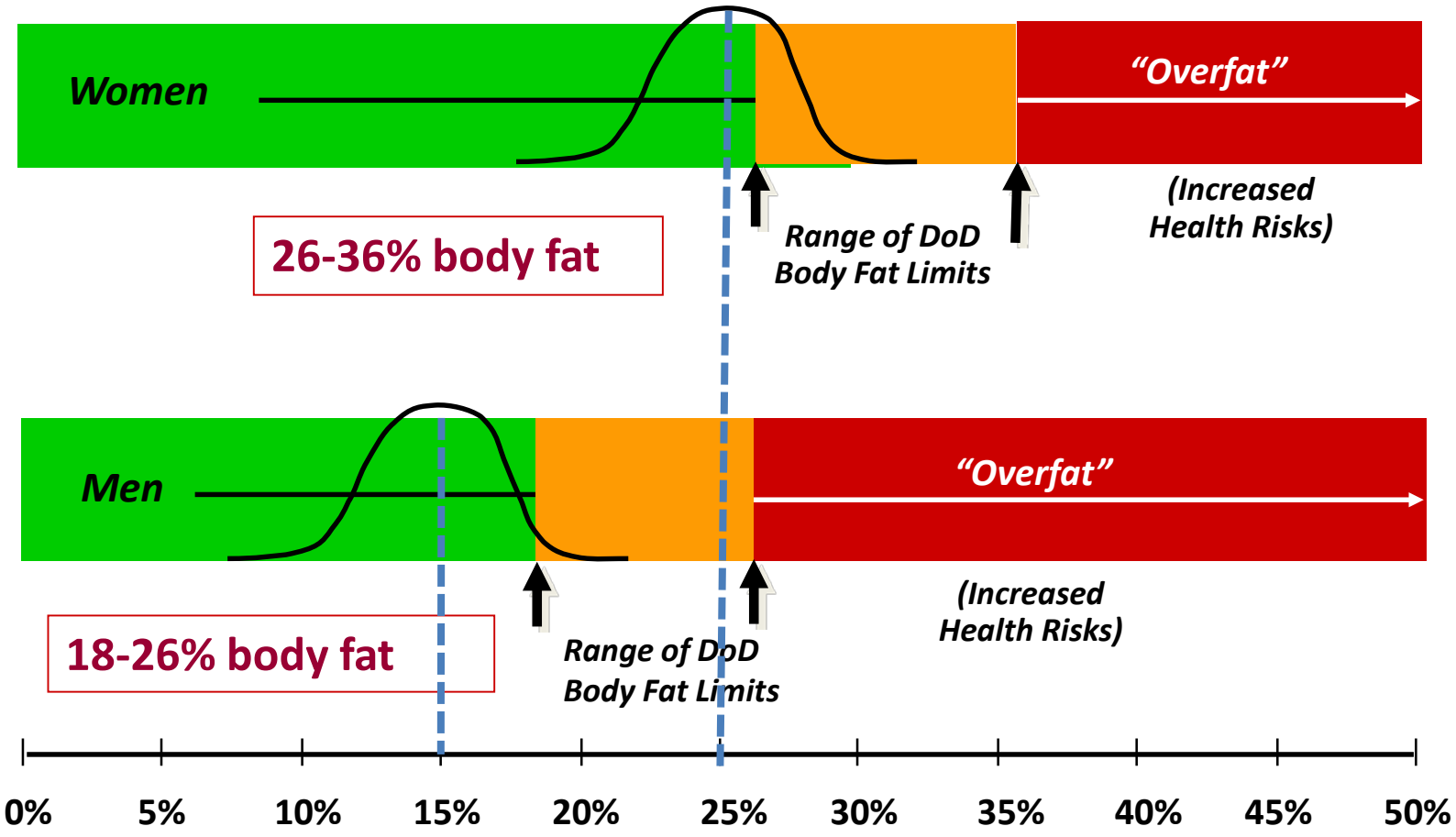
FIG 1. Anthropometric measurements obtained from CT registrations: midsagittal transverse diameter (d_1); sagittal diameter (d_2); lateral subcutaneous AT thicknesses (a_1, a_2); dorsal and ventral subcutaneous AT thicknesses (a_3, a_4); visceral midsagittal transverse diameter ($d_3 = d_1 - [a_1 + a_2]$); visceral sagittal diameter ($d_4 = d_2 - [a_3 + a_4]$).



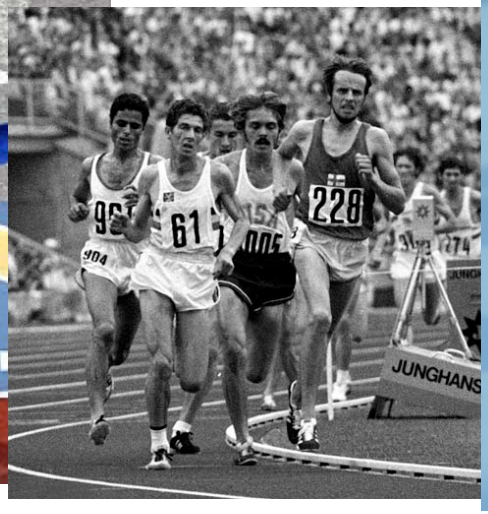
Gold standard measurement would be abdominal (and hip) CT


Army Body Fat Standards
BMI = 25
WC ~35"
Women
"Ideal"
"Overfat"
(Increased Health Risks)
Age-Specific Body Fat Limits
Ideal = Distribution of % Body Fat in Healthy, Fit Young Men and Women
BMI = 27.5
WC ~40"
Men
"Ideal"
"Overfat"
(Increased Health Risks)
Age-Specific Body Fat Limits
0%
5%
10%
15%
20%
25%
30%
35%
40%
45%
50%
26%
36%

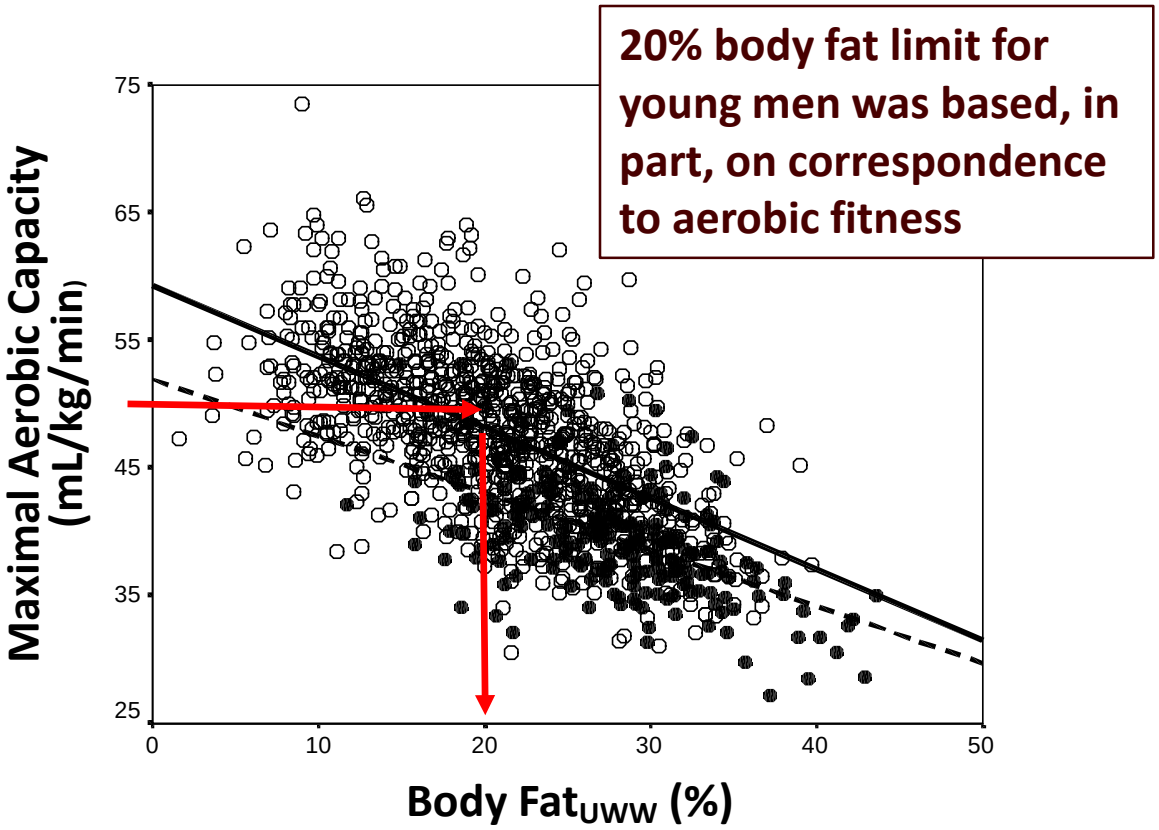
DoD Body Fat Standards



What kind of performance is important?



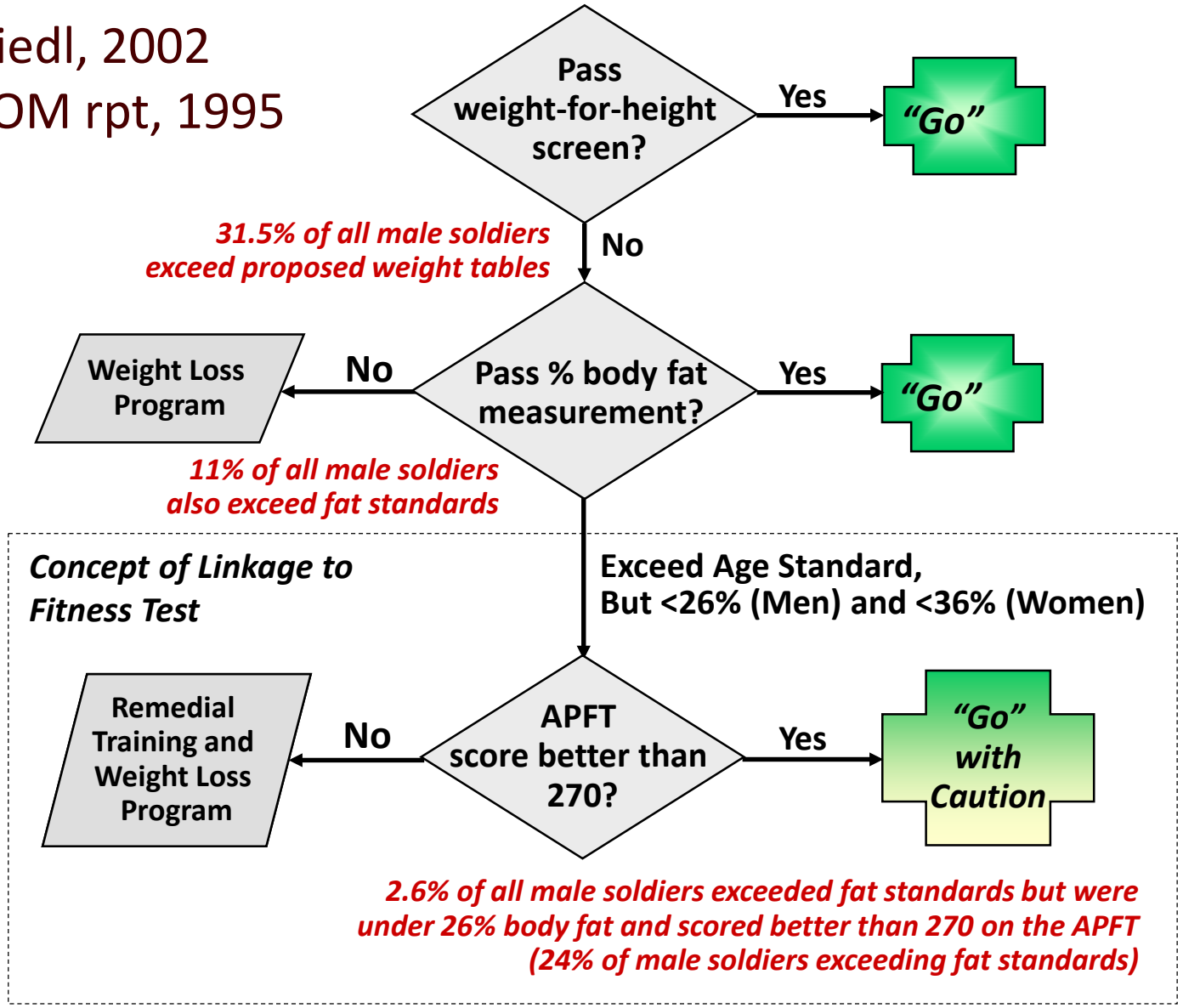
Physical performance is affected by added relative fat weight - but adiposity is not a good predictor of physical performance



Vogel and Friedl, 1992

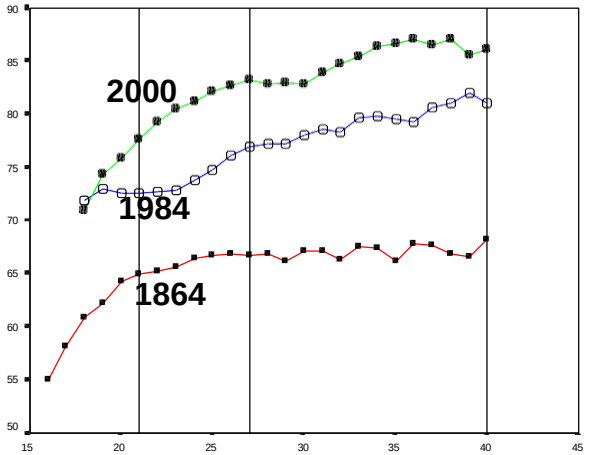
Concept:
Link Fitness and Body Fat Standards

Leu & Friedl, 2002
CMNR, IOM rpt, 1995



Effects of advances in nutrition and healthcare

	1864	1919	1946	1984	2000
Age (y)	25.7	24.9	24.3	26.3	26.3
Ht (in)	67.2	67.7	68.4	68.6	69.6
BW (lb)	141	145	155	167	178
BF(%)	**16.9**	**15.7**	**14.4**	**17.3**	**17.0**
FFM (lb)	**117**	**122**	**133**	**138**	**148**

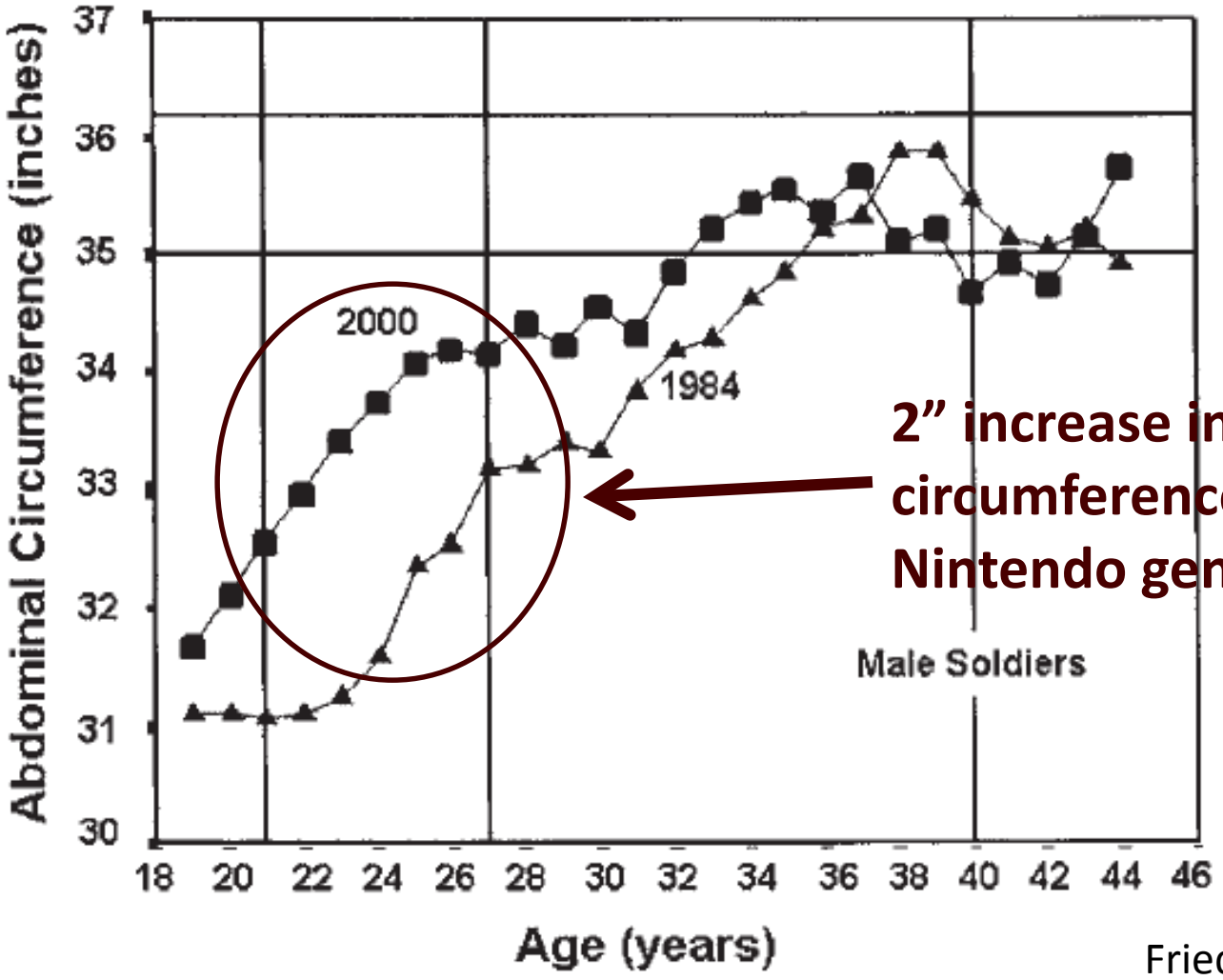


+30 lbs lean mass

Muscle mass has increased

Abdominal circumference increases with age

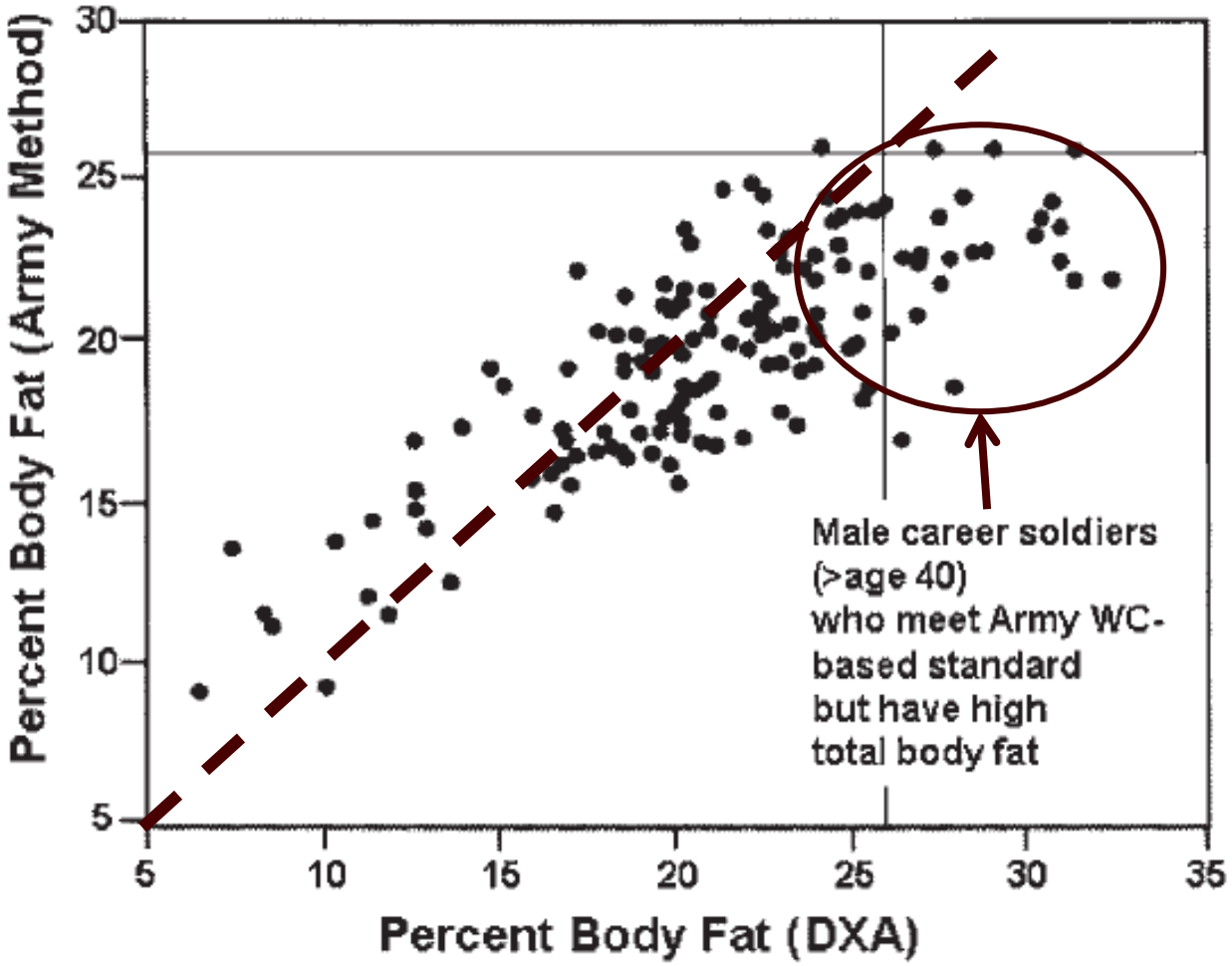
(National data for males 1999-2000 is higher and does not level off)



Friedl, 2004

The method is the standard, with a focus on abdominal fat, not total body fat

Data from a sample of senior male NCOs at USASMA



Friedl, 2004

Weight Control Program Metrics and Interventions

MILITARY MEDICINE, 174, 1:1, 2009

Military Services Fitness Database: Development of a Computerized Physical Fitness and Weight Management Database for the U.S. Army

Donald A. Williamson, PhD; COL Gaston P. Bathalon, SP USA†; LTC Lori D. Sigrist, SP USA†; H. Raymond Allen, PhD*; COL Karl E. Friedl, MS, USA†; Andrew J. Young, PhD†; Corby K. Martin, PhD*; Tiffany M. Stewart, PhD*; MAJ Lolita Burrell, MS, USA†; Hongmei Han, M. Ap. Stat.*; RADM Van S. Hubbard, PHS‡; Donna Ryan, MD**

ABSTRACT The Department of Defense (DoD) has mandated development of a system to collect and manage data on the weight, percent body fat (%BF), and fitness of all military personnel. This project aimed to (1) develop

Fort Bragg base pilot study, 2003

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OBESITY TECHNOLOGY

Efficacy of a Pilot Internet-Based Weight Management Program (H.E.A.L.T.H.) and Longitudinal Physical Fitness Data in Army Reserve Soldiers

Robert L. Newton Jr., Ph.D., Hongmei Han, M.App.Stat., Tiffany M. Stewart, Ph.D., Donna H. Ryan, Ph.D., and Donald A. Williamson, Ph.D.

94th RRC Army Reserve study, 2007

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OBESITY TECHNOLOGY

Development of an Internet/Population-Based Weight Management Program for the U.S. Army

Tiffany Stewart, Ph.D.,[1] Sandra May, M.S., LDN, RD,[1] H. Raymond Allen, Ph.D.,[1] Col. Gaston P. Bathalon, SP, U.S. Army,[2] Guy Lavergne, B.S.,[1] Lori Sigrist, Ph.D., RD,[2] Donna Ryan, M.D.,[1] and Donald A. Williamson, Ph.D.[1]

Louisiana National Guard RCT internet intervention

HEALTH (Healthy Eating, Activity, Lifestyle Training Headquarters) internet/mobile weight management program for the U.S. Army: Outcomes and future directions

Tiffany Stewart [1,*], Robbie Beyl [1], Michael Switzer [1], Karl Friedl [2], Andrew Young [2], Donna Ryan [1], Donald Williamson [1]

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Introduction: A significant number of Soldiers exceed the maximum allowable weight standards, or have body weights approaching the maximum allowable weight standards as defined by AR 600-9, The Army Body Composition Program. In addition, over the last two decades, Soldiers and members of military families have struggled with maintaining healthy weight, and sustaining healthy habits related to nutrition, fitness, and sleep. The present study tested the impact and broad dissemination of an anonymous internet and smartphone based program (H.E.A.L.T.H.; Healthy Eating, Activity, Lifestyle Training Headquarters) designed to address health habits and weight gain in Soldiers.

Methods: Five thousand eight hundred National Guard Soldiers from fourteen units were randomly assigned to an immediate intervention or delayed intervention group for the first 30 months, followed by two years of intervention available for all Soldiers. A

DoD body composition standards ensure readiness to perform the mission at any time