

Modernizing the U.S. Army's Body Composition Policy

Maintaining Lethal and Optimized Soldiers for Today and Tomorrow

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Historically, military leaders have recognized that body size and composition are important factors in the effectiveness of soldiers. Dating back to the Civil War and through the 1960s, concerns were primarily on soldiers being underweight and undernourished to effectively perform their military duties.¹ During this time, the military developed height and weight tables to adequately select individuals of “ideal” or healthy weight for military service. It was not until 1960 that the U.S. Army formally established new standards with Army Regulation (AR) 40-501, *Standards of Medical Fitness*, which classified thresholds for both underweight and overweight soldiers, organized by five-year age groups.² Individuals who fell outside these standards were subject to medical evaluation and potential administrative action.³

By 1976, senior military leaders recognized that body weight alone was not an adequate measure of fitness. Simultaneously, it was recognized that body composition, with a focus on excess body fat, could be detrimental to physical performance.⁴ To address this issue, the Army combined its Physical Fitness and Weight Control Program regulations into one document, AR 600-9, *The Army Body Composition Program*.⁵ As part of this new regulation, all active-duty soldiers were required to meet minimum and maximum height-weight standards. Soon after, in 1980, President Jimmy Carter directed the Department of Defense (DOD) to examine health and fitness standards across the entire military. From this order, a formal review was conducted by military health experts and culminated with the issuing of DOD Instruction (DODI) 1308.1, *Physical*



Soldiers transport a simulated casualty through knee-high snow for four hundred yards during an Exercise Arctic Edge 2024 cold-weather casualty evacuation training exercise on 6 March 2024 in Alaska. Participants used a transport system to move casualties and then performed simulated treatment on them as part of a joint physiological monitoring experiment carried out by the U.S. Army Research Institute of Environmental Medicine (USARIEM) and the Naval Health Research Center. The researchers collected real-time physiological data from the participants over four hours. (Photo by Madison Langwell, USARIEM Public Affairs)

Fitness and Weight Control Program, which recognized the assessment of body composition as a key dimension of military readiness.⁶ DODI 1308.1 formally introduced the use of sex-specific, circumference-based body fat estimation equations based on research outcomes from the U.S. Army Research Institute of Environmental Medicine (USARIEM). Approximately twenty years later, in 2002, the DOD updated DODI 1308.01 to DODI 1308.03, *DoD Physical Fitness and Body Fat Programs Procedures*, requesting services to again standardize the body fat assessment methods and estimation equations.⁷ These new equations adopted the circumference-based body fat equations developed by the U.S. Navy in 1984.⁸

Since the 1981 adoption of circumference-based body fat equations, the body size, body-fat composition, and demographic diversity of the U.S. population have

changed significantly, including those who serve in the military. As documented by the National Health and Nutrition Examination Survey between 1999–2000 and 2015–2016, the United States is now a much more racially and ethnically diverse population, with average body weights and heights significantly increasing across all categories of age, sex, and race.⁹ Specific to the military, capturing normative body-size values is important not only for the combat readiness of the Army's force and health of soldiers but also in developing proper clothing and equipment to fit modern soldiers. In 2012, the Natick Army Research, Development, and Engineering Center conducted the most comprehensive Army-specific anthropometric study since 1988. Measuring more than eleven thousand soldiers (7,435 men; 3,922 women) from active duty, Army Reserve, and Army National Guard components, the study



captured ninety-four dimensions and thirty-nine derived measures of the human body. Results from that study confirmed the hypothesis that soldiers' body size had increased significantly, mirroring changes seen in the general U.S. population.¹⁰ This suggested support for a fresh examination of whether the existing AR 600-9 remained valid.

At the same time, the nature of warfighting evolved with combat operations and training becoming more complex. Through modernization and employment of advanced technologies that required soldiers to carry heavier loads and equipment, the use of these advanced weapons, equipment, and body armor increased the physical demands on soldiers. Simultaneously, there was an increased emphasis on the need for units to maintain the fight for longer periods of time without resupply, which required individual soldiers to carry more food and water, again adding to the weight required to be carried. These requirements of the soldier placed a greater emphasis on body strength. In turn, this required higher levels of lean body mass (muscle mass) in soldiers, both men and women, to meet the increased demands of their jobs. Concurrently, the lifting of the combat exclusion rule for women in 2013 allowed servicewomen to compete for combat military

U.S. Army Research Institute of Environmental Medicine researcher Staff Sgt. Luis Ortiz prepares a study participant enrolled in the 2022 Army Body Composition Study at Fort Lee, Virginia, for a total body scan on the dual-energy X-ray absorptiometry to assess body composition. (Photo by P. Matthew Bartlett)

roles.¹¹ These changes forced a reevaluation of existing physical standards to be based on performance capability to ensure they did not limit opportunities for qualified soldiers, male or female.¹²

As warfare modernized, along with the military's demographic composition through sex integration and evolving physical occupational standards, so too did the research community, advancing methods and technologies to accurately assess body composition. Beyond estimating body fat through circumference-based equations, technological advancements enabled highly accurate measurement of body composition, using a total-body X-ray scanner known as the DXA (dual-energy X-ray absorptiometry).¹³ The DXA is a painless, noninvasive full-body scan that measures total body composition, including bone mineral content and density, lean body mass, and fat mass to the gram, in under ten minutes, while an individual lies motionless on the scanner's bed. Due to its accuracy and ease of

measurement, the DXA technology quickly replaced the hydrostatic weighing technique of the 1980s as the “gold standard.” A key advantage of the DXA over hydrostatic weighing was its simplicity. Hydrostatic weighing required participants to remain motionless while completely submerged in a tank of water, expelling all the air from their lungs while being weighed. This was difficult for many individuals. As such, DXA was an ideal method to assess the accuracy of circumference-based body fat equations used by the Army Body Composition Program (ABCP).

A Call to Action

In March 2021, USARIEM was tasked by the U.S. Army Training and Doctrine Command’s Center for Initial Military Training to evaluate the ABCP, to assess its accuracy in measuring soldier’s body composition, and to recommend updates to improve precision of measurement while addressing critical gaps in readiness and performance.

With a mission deeply rooted in optimizing soldier health and performance, USARIEM was uniquely positioned to lead the ABCP’s modernization.¹⁴ USARIEM has a long history of assessing the relationship among body composition, physical readiness, and soldier health and operational effectiveness. Although earlier studies of body composition standards were initiated with the U.S. Marine Corps in 1974, the development of circumference-based equations for men were first undertaken by James A. Hodgdon and Marcie B. Beckett at the Naval Health Research Center (NHRC).¹⁵ Specific equations for women were also developed by NHRC in 1984 for use in the U.S. Navy.¹⁶ However, it was USARIEM’s collaboration with NHRC that helped shape the Army’s specific approach and the sex-specific circumference-based equations (Hodgdon equations).¹⁷ These equations became the method for body fat estimation used in the AR 600-9, *Body Composition Program*.¹⁸ The equations remained part of AR 600-9 for more than twenty years until research and policy described in this article took place.

Historically, USARIEM has earned a reputation for leveraging diverse subject-matter expertise, taking a comprehensive research approach to soldier health and readiness across physical training, nutrition, sleep, and operating in environmental extremes. Through the years, USARIEM has remained a leader in the

validation and integration of modern tools and technologies for use in both laboratory and field research, delivering data-driven outcomes in body composition, nutrition, exercise physiology, and data analytics to address soldier training, operational performance, and policy development.¹⁹

Approach

The approach to evaluating and updating the ABCP was grounded in scientific rigor and operational practicality. After initial review of modern scientific literature in body composition and military performance, the 2021 research team addressed four critical questions posed by Army senior leaders:

1. Does AR 600-9 screen out the “right” soldiers?²⁰
2. Is the AR 600-9 taping method still accurate across the current Army population?
3. Should the Army update the AR 600-9 weight for height table?
4. Is there a better way to measure soldier’s body composition?

From these key questions, project objectives were derived, and the study was scientifically designed to collect data from a cross section of the Army’s soldier population to statistically represent soldiers across sex, age, race, ethnicity, military rank, and military operational specialty or job. Development of a research study protocol laid the blueprint for the scientific procedures used to test certain relevant hypotheses. The USARIEM researchers hypothesized:

1. Soldiers would have greater lean mass and less body fat compared to the U.S. population.
2. The DXA measurements would be correlated with standard tape body circumferences.
3. Physical fitness test scores would be associated with body composition.

Investigators developed a strategic sampling plan to best represent the U.S. Army population. With the goal of recruiting enough soldiers within each subgroup to ensure accurate representation, researchers designed sampling to match the Army’s distribution of sex, age, race/ethnicity, military rank, and the physical demand categories of all military operational specialties. Based on sample size calculations, it was estimated that approximately two thousand soldiers would be needed to adequately assess the study’s questions and hypotheses with sufficient statistical power.

The research plan was developed into a study protocol listing specific procedures, risks, and mitigation strategies to protect the soldier participants. The protocol underwent rigorous peer review, first at USARIEM, scientifically by subject-matter and quality compliance experts, then by the U.S. Army Medical Research and Development Command’s Human Institutional Review Board at Fort Detrick, Maryland, to assess the risk level and to oversee data collection and data management phases of the research. This process ensured that the research procedures had safeguards in place to protect the soldier volunteers. Approval was granted in May 2021, clearing the way for field data collection.

Between October 2021 and December 2022, data were collected from 1,902 soldiers (1,259 men; 643 women) from Fort Bragg, North Carolina; Fort Lee, Virginia; and the U.S. Military Academy, West Point, New York. Each soldier underwent a comprehensive evaluation, including demographic surveys—querying age, sex, race/ethnicity, health history, exercise habits, and injury history—as well as performance on Army physical fitness tests. Additionally, each soldier was measured for height, weight, and body circumference using both the manual tape method and infrared-guided three-dimensional body surface scanning, which can output hundreds of circumference measurements and generating millions of individual data points. Measures of total body composition were obtained from DXA and bioelectrical impedance analysis (BIA). In addition, soldiers’ administrative, performance, and medical records were obtained from the Soldier Performance Health and Readiness database (a USARIEM-maintained capability). This database links across multiple Army-wide databases to build a comprehensive pool of key medical and performance data obtained from soldiers’ personal records.

Armed with this robust dataset, USARIEM investigators were ready to develop a new course of action (COA) to modernize the ABCP. Based on the guiding principles of maintaining operational readiness and ensuring applicability across all Army components in any environment, two primary COAs were considered:

COA 1. Maintain the current standards with no changes suggested. This COA would be advocated if study data showed the current regulation still met the needs of the Army population.

COA 2. Update AR 600-9 with new guidance based on the data-driven outcomes from the USARIEM study. The following factors were considered in updating AR 600-9:

1. As body composition (body fat and lean mass) is associated with physical performance outcomes, provide a policy update to link body composition and physical performance standards or thresholds to promote healthy body composition and meet operational readiness.
2. Develop new sex-specific circumference estimation equations to assess body fat that would improve validity and precision for use in the modern Army population.
3. Update the body composition standards (e.g., allowable body fat ranges) by age and sex to ensure that physical performance was not compromised and injuries were minimized.
4. Shift from circumference-based estimation equations to modern body fat assessment methods such as use of the BIA or DXA.
5. Combine multiple elements of COA 2 to emphasize physical readiness and preventative health for short- and long-term care of the soldier.

Selection of the Course of Action

Selecting the optimal COA required consideration of several critical factors to ensure that updates were practical, financially prudent, evidence-based, and aligned with operational needs. A central objective was to ensure the new method could be applied consistently in any environment and across all Army components while remaining efficient and cost effective. Ultimately, Army senior leaders and policymakers selected a hybrid COA approach that maintained the circumference-based body fat assessment but with significant updates, provided a second level of body fat assessment with modern equipment (e.g., BIA or DXA) if the soldier wanted to challenge the circumference-based body fat method, and provided a new physical performance threshold that would exempt soldiers from body fat assessment.

The traditional multi-site circumference method was replaced by a single-site abdominal measurement directly across the navel, for both men and women, using newly developed simplified sex-specific equations.²¹ Data were collected from approximately 1,900



soldiers who demonstrated the accuracy and practicality of the single-site method. To validate these findings, USARIEM scientists tested an additional three hundred soldiers at Fort Stewart, Georgia, in December 2022.²² Ultimately, this secondary assessment in a unique soldier population supported the initial findings that body fat can reliably and consistently be assessed using the single-site abdominal measurement with the updated Taylor-McClung body fat equations.²³ Further comparison with large, internal datasets (e.g., the ARIEM Reduction in Musculoskeletal Injury Study conducted during basic combat training using similar body composition techniques) reinforced the validity of this new assessment method.²⁴ After rigorous testing and simulation of computer models using one-, two-, and three-site body circumference measurements, the simplified single-site method and sex-specific estimation equations emerged as the most efficient and effective solution.²⁵

Policy Change

The research culminated in the development and validation of new simplified single-site, sex-specific equations for estimating body fat percentage leading to a policy change reflected in two Army directives (AD): AD 2023-08, *Army Body Fat Assessment Exemption for Army Combat Fitness Test Score*; and AD 2023-11, *Army Body Fat Assessment for the Army*

A researcher conducts a single-site abdominal measurement across the abdominal site of a soldier to assess body composition in December 2024 at the U.S. Army Research Institute of Environmental Medicine in Natick, Massachusetts. (Photo by P. Matthew Bartlett)

*Body Composition Program.*²⁶ On 15 March 2023, Christine Wormuth, secretary of the army, officially instituted AD 2023-08. This directive emphasizes the importance of physical fitness to maintain soldier readiness. Under this policy, soldiers who score 540 total points or higher on the six events, with a minimum of 80 points for each event in the Army Combat Fitness Test (ACFT), are exempt from the circumference-based body composition assessment until their next scheduled ACFT, within eight months for active duty (twelve months for Army Reserve and National Guard).²⁷ All soldiers, regardless of exemption status, still undergo height and weight screening.

In addition to AD 2023-08, this research also informed a second major policy update in AD 2023-11, issued 9 June 2023. The previous multi-site circumference method was officially replaced with the newly validated single-site abdominal measurement and corresponding sex-specific body fat estimation equations. AD 2023-11 incorporates these changes into the existing AR 600-9, ensuring that the revised assessment method is uniformly adopted across the entire U.S. Army, including all three components. Together, AD

2023-08 and AD 2023-11 represent a comprehensive science-based modernization of the ABCP aligned with operational readiness, and reflective of the modern soldier population.

On 17 April 2025, a new directive, AD 2025-06, *Army Fitness Test*, was issued.²⁸ The directive states that, as of 1 June 2025, the Army Fitness Test (AFT) will replace the ACFT. Following the AFT directive, AD 2025-17, *Army Body Fat Standard for Army Fitness Test Score*, was issued 4 September 2025 and addresses the performance exemption with the AFT.²⁹ That directive states that all soldiers who score 465 points or higher on the AFT with a minimum of 80 points in each of the five events are exempted from having their circumference body fat assessed.³⁰ This policy requires the next AFT assessment not to exceed eight months for the exemption to remain valid. Soldiers will have their height and weight assessed regardless of whether they meet the exemption or not.

The USARIEM scientists played a direct role in guiding and engaging Army senior leaders through timely status updates throughout the entire study and policy development process. The engagement of Army senior leaders and scientific subject-matter experts is a clear example of collaborative success. Army senior leaders, including the secretary of the army, chief of staff of the army, and sergeant major of the army, remained deeply involved at each stage of the study's progress and the policy development process. The Army Resilience Directorate (ARD) also played a key role once the study had culminated and outcomes were briefed to summarize and package the findings in a clear and decisive way to the soldier population. ARD's Health Promotion and Policy Office were responsible for officially writing and implementing the policy. This included communicating these changes to the ones that mattered most, the soldiers. To facilitate smooth implementation, USARIEM aided in developing official measurement technique guidance and regulation, new tools, and informational products (e.g., an online body fat calculator) and other educational materials to help guide soldiers to success. As noted in AD 2025-17, the body composition policy continues to evolve with modern Army fitness updates.³¹ With the resulting COA, this research followed the framework of solving a problem using the doctrine, organization, training, materiel, leadership and education, personnel, facilities, and

policies (DOTMLPF-P) process, focusing primarily on nonmaterial solutions. As summarized in the directive, new doctrine emerged that includes providing exemptions based on performance with specific timing (eight and twelve months for these to be valid) or a soldier being able to request a body scan (e.g., DXA) if they do not feel their circumference accurately assesses their body fat. This recognizes the importance of strength and fitness alongside body composition standards, as reflected in the greater reliance on the performance metrics (AFT) when considering soldier readiness (doctrine and organization). Subsequently, training practices will adapt to better prepare soldiers for the physical demands of military jobs while also aiming to reduce training related injuries and promote better overall health (training). Working in lockstep with Army senior leaders along the way provided unyielding transparency, facilitating leaders to better execute their mission and create genuine buy-in (leadership and personnel). Educational efforts ensured that leaders understood and could communicate the rationale behind the policy changes, emphasizing the bond between physical fitness, improved measurement techniques, and operational effectiveness (leadership and education). Finally, revising actual policy institutionalized these changes across the Army, ensuring doctrine, training, and leadership efforts were fully recognized, coordinated, and lasting.

Link with Performance Outcomes

The new COA introduced a new physical performance standard by incorporating the exemption for soldiers who score at least 540 points on the ACFT (with a minimum of 80 points on each event). AD 2025-17 provides similar guidance for the AFT for soldiers who score at least 465 points with a minimum of 80 points in each event on the newly adopted AFT.³² In essence, the Army moved to provide soldiers the opportunity to prove their operational readiness and capability without being subjected to body composition policy standards exclusively and directly addressed Army senior leaders' concerns about linking body composition standards with actual physical performance results. This new addition to the body composition policy benefits soldiers who may have previously been flagged as unfit based on the multi-site measurement alone, especially those with higher muscle mass but remain highly capable and combat

ready. AD 2023-08 prioritized that soldiers met the operational demands of warfighting, thereby maintaining a more lethal force while maintaining appropriate presentation in their uniforms.³³

Link to Musculoskeletal Injury Incidence

Another element was acknowledging the relationship between body composition and musculoskeletal injury (MSKI) risk.³⁴ USARIEM's data demonstrated that a higher body fat percentage is associated with increased rates of MSKI, which limits duty time and reduces soldier readiness and lethality.³⁵ Research showed that soldiers meeting the Army body composition standards experienced a reduction in MSKI in the year following the assessment.³⁶ With the implementation of a more precise body fat assessment of modern soldiers aligned with physical performance assessments, the Army is better positioned to identify soldiers at risk for MSKI and promote early intervention with targeted health and fitness programs. This proactive approach aims to reduce injury rates, promote long-term health, and ultimately, enhance soldier readiness and lethality through more deliberate and focused training and preparation.

Addressing Changing Requirements of U.S. Army Soldiers (Strength versus Endurance)

Today's Army and the modern battlefield require soldiers to maintain a balance of strength, power, and endurance capabilities. By exempting high-performing soldiers from body composition assessment, the Army recognizes that physical performance is crucial to meeting the standard and enabling job success, as exemplified in the 2023 policy and the 2025 update. This policy acknowledges that soldiers with greater muscle mass may potentially have greater body mass (weight) and larger circumference measurements. Soldiers' present-day training reflects what the Army needs, where strength is recognized as critical to job performance. Inevitably, changes in the size and shape of soldiers' bodies have occurred. Soldier tasks are neither those of a lean marathon runner nor one of a large powerlifter. However, the goal is for soldiers to have bodies that suit them to be healthy and capable of performing soldier-specific tasks. The chosen COA allows them to meet these objectives and train specifically for the tasks

and demands of the job rather than strictly satisfying the measure of the tape.

Ease of Deployment and Field Usability

As previously noted, one of the most critical considerations was ensuring that the selected COA would be easily deployable—whether in a recruiting station, training facility, or in the field—across all three Army components. The new circumference-based measurement and sex-specific equations meet this need by using a single measurement site with a simplified equation. In alignment with the previous method, it requires minimal equipment, a simple tape measure that can fit in the assessor's pocket and can be utilized anywhere. These factors ensure that commanders can assess body composition outcomes quickly and consistently, anywhere, anytime. To further modernize this effort, the Army also launched a new mobile application and web-based body fat calculator, allowing anyone to quickly input their abdominal measurement, select their sex, and receive immediate results of their body fat estimate.³⁷ This not only improves usability but also encourages soldiers to take personal responsibility in understanding and maintaining their personal fitness and readiness.

Fiscal Responsibility Across Army Components

Fiscal responsibility was also a key factor. While high-precision technologies like DXA offer greater accuracy, it is cost-prohibitive, requires trained technicians, constant calibration, and long-term maintenance, and it cannot be as readily deployed throughout Army installations and units or in the field. Additionally, limited geographic access could disproportionately impact National Guard and Army Reserve units as compared to the active-duty component. National Guard and Army Reserve units that are not within proximity to another unit or location that provides a DXA would mean lost time and money spent on soldiers traveling to and from testing locations, cutting into valuable training time and adding to the cost of assessments. The enacted revised circumference method and associated policy changes meet the accuracy necessary to assess health and performance while at the same time maintaining fiscal responsibility.

Conclusions

The ABCP’s evolution demonstrates how the Army can adapt longstanding measures to new realities without compromising readiness or lethality. By leveraging comprehensive scientific research and candid soldier feedback, Army senior leaders enacted changes that continue to make the program impartial and more accurate, yet still uncompromising in its goal of fielding an Army force that is physically capable of withstanding the rigors of combat and the demands of training to prepare for combat. However, true success in this, or any other program, relies on the ability to adapt. In the years to come, continued assessment and adjustment of the ABCP to mirror changes in the Army demographics will be paramount to a successful program as well as the key to achieving the primary goal of maintaining soldier combat readiness and individual health. The Army will monitor how these changes affect force readiness, injury rates, and individual career outcomes. If further updates are needed (e.g., adjusting the AFT exemption threshold or incorporating new technology on a broader scale), Army senior leaders have shown their willingness to adapt in an effort of continual improvement. In a world that is ever changing, sustained regular reassessment intervals will help to maintain accuracy

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and integrity of the current COA. As seen before, and as evidenced by the necessity to reevaluate the previous ABCP, the demographics, size, and shape of soldiers are likely to change over time. Equally important—science, technology, and the precision of measurement of the human body will also change. The recommended reevaluation is at the ten-year anniversary of this initiated COA.

The Army’s approach to modernizing its body composition policy offers perspective and insight as to how actionable, data-driven research and collaboration can lead to effective and timely policy change (i.e., it took only eleven months between initializing data collection and policy change). Perhaps among the most vital of lessons learned is the importance of being open to reevaluating old traditions and standards, recognizing the potential for improvement before such things become problematic or detrimental. For this program of evaluation, we revealed that the previous method, although once sufficient, over time had grown to have shortcomings. As the Army soldier population morphed physically over the years from when the legacy measurements and equations were introduced, these methods became more prone to error or false categorization. While the previous method may have underestimated body fat in certain segments of the Army population, it also served to overestimate body fat in other segments. With the growing demand that soldiers meet the physical requirements of their jobs,

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particularly the increased need for muscular strength to carry out operational tasks, strategically aligning body composition with performance standards became paramount. This ultimately led to a lesson learned with the implementation of the ACFT performance threshold, later changed to the AFT threshold. The continued collaborative work of scientists, Army senior leaders, and policymakers will maintain the most up-to-date performance thresholds for those soldiers that may exceed body composition standards anthropometrically but still maintain, if not exceed, performance capabilities, readiness, and lethality. With the new policy, the Army recognizes that body composition and physical fitness are distinct but greatly influence each other and should be considered in parallel to truly measure a soldier's readiness.

Not to be understated was the importance of true collaboration. Scientists from USARIEM; policy

writers from the Headquarters, Department of the Army; health promotion officers from ARD; and a multitude of Army senior leaders all played key roles in the design, execution, and implementation of these changes. The team cohesion of this effort demonstrated that reform is most effective when it combines scientific rigor, policy expertise, and operational perspective. No single tenet has tangible value on its own. Additionally, the willingness of Army senior leaders to employ data-driven science and act in a timely fashion, without extraneous influence, underscores the importance of leadership buy-in to this evaluative process when considering true and meaningful change. ■

The opinions or assertions contained herein are the views of the authors and are not to be construed as official or as reflecting the views of the U.S. Army, the Department of War, or the U.S. government.

Notes

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