APPENDIX to Whole Body Dual X-Ray Absorptiometry (DEXA) to Determine Body Composition Policy

Prior Authorization Requirements

This service (or procedure) is considered **investigational** in all instances. If you would like to submit additional information please forward to the Prior Authorization Department.

Within five days before the actual date of service, the Provider MUST confirm with Blue Shield that the member's health plan coverage is still in effect. Blue Shield reserves the right to revoke an authorization prior to services being rendered based on cancellation of the member's eligibility. Final determination of benefits will be made after review of the claim for limitations or exclusions.

Questions regarding the applicability of this policy should also be directed to the Prior Authorization Department. Please call 1-800-541-6652 or visit the Provider Portal www.blueshieldca.com/provider.

Evidence Basis for the Policy

Rationale

Body composition measurement techniques are based in part on assumptions regarding the distribution of different body compartments and their density, and all rely on formulas to convert the measured parameter into an estimate of body composition. Therefore, all techniques will introduce variation based on how the underlying assumptions and formulas apply to different populations of subjects (i.e., different age groups, ethnicities, or underlying conditions). While some of these techniques have demonstrated validity in body composition evaluation, they have not demonstrated any meaningful health outcome benefits, compared to each other or to less complex techniques (i.e., body mass index or BMI). The following is a brief overview of the most commonly used techniques.

Anthropometry is the measurement of skin-fold thickness using hand-held calipers at various sites, bone dimensions, and limb circumference. This technique is based on the assumption that subcutaneous adipose layer reflects total body fat.

Bioelectrical impedance analysis (BIA) employs small surface electrodes attached to the patient at various locations (i.e., arm and foot) and a small electrical current that is circulated. The impedance or resistance to the current is measured as it travels through water that is found in

muscle and fat; impedance is greatest in fat tissue. The impedance value is then combined with anthropomorphic data to give body compartment measures.

Underwater weighing (UWW) or hydrostatic weighing uses a specially constructed tank in which the subject is seated on a suspended chair and then submerged in water while exhaling. A formula is applied to solve for body density using the measured weight of the body outside the water, the weight of the immersed body, and the density of the water. Underwater weighing is based on the assumption that the body can be divided into two compartments with constant densities (i.e., adipose tissue), and lean body mass (i.e., muscle and bone).

Dual X-Ray Absorptiometry

In the whole body dual x-ray absorptiometry (DEXA or DXA) scanning technique, two different low-level energy beams scan the entire body for estimation of three body compartments consisting of fat mass, lean body mass, and bone mass. This technique is based on the principle that x-ray radiation is absorbed differently by body minerals; the more minerals in the material, the higher the absorption. Therefore, bone (high mineral content) absorbs the radiation at a higher rate than fat (low mineral content). Additionally, DEXA scans have the ability to determine body composition in defined regions (i.e., in the arms, legs, and trunk). Dual x-ray absorptiometry measurements are based in part on the assumption that the hydration of fat-free mass remains constant at 73%. Hydration, however, can vary from 67% to 85%, and can be variable in certain disease states. Other assumptions used to derive body composition estimates are considered proprietary by DEXA manufacturers (i.e., Lunar, Hologic, and Norland).

Dual X-Ray Absorptiometry Clinical Applications

Several different clinical roles for whole body DEXA scans to assess body composition have been suggested. Each clinical application requires different data for analysis.

DEXA as Reference Standard for Body Composition Assessment

In general, reference standards for diagnostic tests, often used primarily in research settings, serve to evaluate and verify the use of simpler and more convenient alternative tests that measure the same diagnostic parameter. Dual x-ray absorptiometry appears to be the reference standard for whole body composition analysis in research studies (Smith et al., 2001; Vandrely et al., 2003; Van Den Ham et al., 2003; Smith et al., 2003; Kamimura et al., 2003;) due to its ease of use and the fact it provides a three-compartment model of body density, (i.e., lean body mass, bone mass, and fat mass), compared to the two-compartment model of the techniques described above.

There is extensive literature comparing DEXA to other techniques for assessing body composition, most commonly underwater weighing, bioelectrical impedance, or skin-fold thickness in different populations of patients (i.e., different age groups, ethnicities, and underlying disorders) (Laskey, 1996; Prior et al., 1997; Kohrt, 1998; Salamone et al., 2000). In general, these studies have shown that DEXA is highly correlated to various methods of body composition assessment. However, these correlation studies do not provide information on which diagnostic technique more closely represents the true value. For example, a lack of correlation between DEXA and underwater weighing may reflect the lack of accuracy of underwater weighing, as opposed to any deficiency in the DEXA technique. Furthermore, two diagnostic

techniques may be highly correlated but produce different values of body composition (i.e., compared to underwater weighing, DEXA may identify different groups of patients as abnormal and normal).

The more recent literature consists primarily of studies comparing the accuracy of other measures of body composition with DEXA as a reference standard. One study (60 patients) reported that in comparison with body composition measurements by DEXA, standard anthropometrical measurements (body mass index (BMI), arm muscle circumference, or triceps skin fold) were not reliable measures of malnutrition in women with rheumatoid arthritis (Elkan et al., 2008). A number of other reports describe the validity of leg-to-leg bioimpedence as a measure of body composition in various populations (Jebb et al., 2007; Forrester et al., 2008). Two studies compared a variety of measures in healthy children and adults, and a third study was done in obese subjects (Jensky-Squires et al., 2008; Kullberg et al., 2009; Liem et al., 2009). In one study, which measured the accuracy of skin-fold measurements for assessing the nutritional status of children with cystic fibrosis, DEXA was the “gold standard” comparator (Wells et al., 2008). In another study, investigators hypothesized DEXA would provide more accurate measurement than other methods in conditions, such as chronic obstructive pulmonary disease (COPD), with altered fluid balance (Miller et al., 2009). None of the studies reported data demonstrating the impact of body composition measurement on health outcomes.

Regardless of whether a DEXA scan is considered the reference standard, the key consideration regarding its routine clinical use is if the results of the scan can be used in the management of the patient to improve health outcomes. Although refinement of equations comparing accuracy of other body composition measurements may lead to closer agreement with DEXA estimates of fat mass and fat free mass, the routine clinical use body mass index (BMI) is considered to provide satisfactory accuracy (United States Preventative Services Task Force, 2003).

DEXA as a Diagnostic Test to Detect Abnormal Body Composition

As a single diagnostic measure, it is important to establish diagnostic cutoff points for normal and abnormal values. This is problematic, since normal values will require the development of normative databases for the different components of body composition (i.e., bone, fat, and lean mass) for different populations of patients at different ages. In terms of measuring bone mineral density, normative databases have largely focused on postmenopausal white women, and these values cannot necessarily be extrapolated to either men or to different races. Dual x-ray absorptiometry scan determinations of bone mineral density are primarily used for fracture risk assessment in postmenopausal women and to select candidates for various pharmacological therapies to reduce fracture risk. In addition to the uncertainties of establishing normal values for other components of body composition, it also is unclear how a single measure of body composition would be used in the management of the patient.

DEXA as a Technique to Monitor Changes in Body Composition

Changes in body composition over time may provide useful information. The ability to detect changes is related in part to the precision of the technique, defined as the degree to which repeated measurements of the same variable give the same value. Dual x-ray absorptiometry measurements of bone mass are thought to have a precision error of 1% to 3%, and given the slow rate of change in bone mineral density in postmenopausal women treated for osteoporosis,

it is likely that DEXA scans would only be able to detect a significant change in bone mineral density in the typical patients after two years of therapy. Of course, changes in body composition are anticipated to be larger and more rapid than changes in bone mineral density in postmenopausal women; therefore, precision errors in DEXA scans become less critical in interpreting results. Many studies have used DEXA to monitor changes in body composition, and the precision is similar to that estimated for DEXA measurements of bone mineral density. While measuring changes in body composition is widely used in athletes for training purposes, it is still unclear how monitoring changes in body composition could be used in the medical management of the patient.

Other Applications

A few reports suggest that DEXA may have clinical utility for diagnosis of lipodystrophy in patients with human immunodeficiency virus (HIV), for predicting metabolic insulin sensitivity in older men and women, and for predicting glomerular filtration rate in dialysis patients (Carr et al., 2003; Moran et al., 2004; Bonnet et al., 2005; Lee et al., 2005; Taylor et al., 2006). Research in these specific clinical applications of DEXA is at an early stage, and studies have not shown if use of this test in clinical care improves outcomes.

In summary, whole body DEXA has emerged as the new reference standard for body composition studies, replacing underwater weighing. While DEXA scans have become a valued research tool, the literature does not identify any study that directly focused on how this technique may be used to ultimately improve patient management and health outcomes. Additionally, the literature did not identify any controlled studies in which DEXA body composition measurements were actively used in patient medical management compared to the use of other simpler techniques of body composition assessment. Well-designed controlled studies are needed to evaluate the diagnostic accuracy and clinical utility of DEXA to determine body composition. Evidence remains insufficient to permit conclusions concerning the effect of body composition measurement by DEXA on health outcomes. Therefore, whole body DEXA is considered investigational.

Benefit Application

Benefit determinations should be based in all cases on the applicable contract language. To the extent there are any conflicts between these guidelines and the contract language, the contract language will control. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

Some state or federal mandates (e.g., Federal Employee Program (FEP)) prohibit Plans from denying Food and Drug Administration (FDA) - approved technologies as investigational. In these instances, plans may have to consider the coverage eligibility of FDA-approved technologies on the basis of medical necessity alone.

This Policy relates only to the services or supplies described herein. Benefits may vary according to benefit design; therefore, contract language should be reviewed before applying the terms of the Policy. Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement.

Type	Number	Description
CPT	76499	Unlisted diagnostic radiographic procedure
HCPC	None	
ICD9 Procedure	None	
ICD9 Diagnosis	All Diagnoses	
Place of Service	All Places of Service	

Tables

N/A

Definitions

Body composition - The percentage of fat, muscle, and bone in the body.

Body mass index (BMI) - A person's weight in kilograms divided by their height in meters squared.

Index / Cross Reference of Related BSC Medical Policies

The following Medical Policies share diagnoses and/or are equivalent BSC Medical Policies:

- Bone Mineral Density and Vertebral Fracture Assessment

Key / Related Searchable Words

N/A

References

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Policy History

This section provides a chronological history of the activities, updates and changes that have occurred with this Medical Policy.

Effective Date	Action	Reason
4/5/2007	BCBSA Medical Policy adoption	Medical Policy Committee
1/7/2011	Policy revision without position change	Medical Policy Committee

The materials provided to you are guidelines used by this plan to authorize, modify, or deny care for persons with similar illness or conditions. Specific care and treatment may vary depending on individual need and the benefits covered under your contract. These Policies are subject to change as new information becomes available.

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