A therapeutic support apparatus comprises multiple layers of foam having different densities and memories. The support apparatus comfortably supports the weight of a user while minimizing pressure points between the user and the support apparatus. Each foam layer has a unique density and memory based upon the type of tissue the layer is intended to support. A relatively low-memory outer foam layer made from latex non-viscoelastic foam substantially supports skin and subcutaneous tissue. A relatively high-density and medium-memory intermediate layer made from polyurethane foam supports muscle tissue. A relatively high-density and high-memory core layer made from polyurethane foam supports the spine. In combination, these layers minimize hyperextension and promote blood circulation and comfort while the support apparatus is used by a user positioned in a supine, recumbent, or sideways-lying position.
SPINAL TENSION AND PRESSURE RELIEVING BODY SUPPORT APPARATUS

CLAIM TO PRIORITY

[0001] This application claims the benefit of U.S. Provisional Application No. 60/830,363 entitled SPINAL TENSION AND PRESSURE RELIEVING BODY SUPPORT APPARATUS and filed Jul. 12, 2006, and U.S. Provisional Application No. 60/889,496, entitled PRESSURE RELIEVING BODY SUPPORT APPARATUS and filed Feb. 5, 2007, which are hereby incorporated by reference in their entirety.

FIELD OF THE INVENTION

[0002] The present invention relates generally to mattresses and cushions. More specifically, the present invention relates to an apparatus for supporting a human body in a supine, recumbent, seated or sideways-lying position in a manner that relieves tension and pressure on the spine and promotes blood circulation.

BACKGROUND OF THE INVENTION

[0003] Nearly 80 million or fifty percent of working Americans are disabled by back pain at some time in their lives. It is estimated that one-third of men and one-half of women will prematurely retire from their careers because of back pain. Approximately 400 billion dollars are spent on care of the spine within the health care system annually. It is estimated that by 2015 Medicare and Medicaid will spend nearly one trillion dollars on medically compromised individuals needing long-term care and who are susceptible to developing nosocomial pressure ulcers while in health care facilities.

[0004] Many types of mattresses, cushions, and other therapeutic pads have been developed to treat back pain, spinal disorders, and/or pressure ulcers by attempting to support and relieve pressure from the spine. Conventional mattress and box springs systems, however, often fail to provide the relief of pressure and tension necessary for a healthy spine or optimal circulation. Conventional mattress designs, such as, for example, mattresses that are constructed from hard plastic covers, thick high-density filler material, or springs, such as, for example, steel springs, can create pressure points on the shoulders, hips and thighs of a user. Specifically, the weight of the user compresses such a conventional mattress such that the mattress develops pressure points on the skin and at prominent bony sites of the user. The resulting pressure points can impede circulation and, in turn, exacerbate compromised circulation in a user already suffering from a circulatory disorder such as, for example, diabetes and congestive heart failure. This, in turn, increases the likelihood that the user will develop a dermatologic disorder such as pressure ulcers or tissue necrosis. Similar problems are also often associated with the cushions used to provide a padded seat in a wheelchair.

[0005] Many conventional mattresses can also distort the spine into either sacral hyperextension while a user is laying on his or her back or lateral distortion while a user is laying on his or her side. Sacral hyperextension can cause facet imbrications and associated foraminal narrowing—the leading cause of resting-induced chronic back pain and often associated with most spinal pain syndromes in the working class and the elderly—which can disrupt nerve communication and impair venous drainage and arterial flow. Poor spinal support while lying on the side can result in lateral distortion and tension in spinal joints and spinal muscles. This is often responsible for facet syndrome, a classic diagnosis familiar to all pain management physicians who, while attempting to treat the mechanical cause of poor posture-induced sleep disorders, must resort to sedatives, anti-spasmodics, antidepressants, and anti-anxiety agents.

[0006] Yet another drawback of coil, flex steel, and foam, such as low-memory viscoelastic “space age” foam, mattresses is their general lack of an ability to relieve both pressure and tension. In the case of coil and flex steel mattresses, the pressure-relieving characteristics of the mattresses are non-uniform and may even diminish in the areas between the zones where the coils and flex steel provide pressure relief.

[0007] Foams can be characterized by their corresponding Indentation Force Deflection (IFD) rating, otherwise known as the Indentation Load Deflection (ILD), which is the international scale for memory and is based on a scale ranging from 0-100. Indentation force deflection is defined as the measure of the load-bearing capacity of flexible foam. It is generally measured as the force in pounds required to compress a fifty square inch circular indentor foot into a 4 inch thick sample no smaller than 24 inches square to a stated percentage of the sampled initial height. Common IFD values are generated at 25 and 65 percent of initial height. See http://www.pfa.org/jls/lg/d3574.html. Incorporated herein by reference in its entirety. The details of this measurement are defined in reference test method ASTM D3574 which is also incorporated herein by reference in its entirety. The IFD values identified in the present application are based on a twenty five percent deflection. Foams also have a rate of recovery. Recovery is defined as the return to original dimension and properties of a foam sample after a deforming force is removed.

[0008] In the case of foam mattresses and seat cushions, two major problems exist, particularly with respect to low “memory” or conforming foam applications: loss of support due to 1) body heat and 2) body weight.

[0009] Loss of support characteristic of low memory or conforming foams occurs as the spine, which is the body’s core and warm point(s), comes in contact with the low “memory” or viscoelastic foam. Low memory, conforming, or viscoelastic foams are designed to soften or lose I.F.D. rating and subsequent support as normal body heat is absorbed by the foam. This low memory, conforming, or viscoelastic foam, by design, becomes more viscous or liquid-like, as it absorbs and retains heat, effectively losing its memory or ability to rebound and offer support. This loss of support occurs at precisely the spinal levels that need the most support: the thoracic curve and the sacrum.

[0010] A variety of techniques and devices have been used to reduce incidence of pressure ulcers in medically compromised individuals and provide greater comfort to individuals confined to or spending substantial amounts of time in a bed or a wheelchair. For instance, air mattress overlays, static and dynamic air mattresses, water mattress overlays, gel-like overlays, specialty beds, foam overlays, and various other types of materials and combinations of materials have been used to create new types of mattresses or to modify existing mattresses. In addition, costly motorized or dynamic devices in mattresses must also be used for similar purposes. The cost, complexity, size, and/or weight of many of these
products narrows the market for which such devices can be effectively or successfully offered.

Therefore, there is a need for an apparatus that provides comfortable support, promotes circulation of the blood, and relieves back pain and spinal tension without the drawbacks discussed above.

SUMMARY OF THE INVENTION

The present invention addresses the aforementioned needs of patients and other individuals for a low-cost pressure relieving, high-quality body support apparatus, such as, for example, a mattress, cushion, pad, and the like, that relieves back pain and spinal tension, promotes circulation of blood, and provides comfortable support by providing a multi-density, tissue density specific, therapeutic body support apparatus made from multiple layers of high-memory, non-conforming, or non-viscoelastic type foam that have a high rate of recovery. The present invention is an efficient and cost-effective non-mechanized device that meets the aforementioned needs by providing a low-cost, light-weight, durable, and easy-to-use body support apparatus.

In addition to reducing pressure points, the body support apparatus of the present invention provides superior tension and pressure relief to the spine and other regions of the back. Specifically, the body support apparatus provides the spinal support that is necessary for spinal decompression and optimal circulation, deeper levels of sleep, and spinal rest. Pressure and tension relief is substantially uniform along the surface of the body support apparatus.

The body support apparatus has a contiguous design that minimizes the existence of zones of diminished pressure or tension relief to provide substantially uniform support to the spine. The body support apparatus generally comprises a core layer of relatively high-density, high-memory polyurethane foam, an intermediate layer of relatively high-density medium-memory polyurethane foam, and an outer layer of relatively high-density latex foam with a higher rate of recovery and memory than low-memory, conforming foams. In different embodiments, the present invention can have three or more layers of the high-density, high-memory foam, the medium-memory foam, and/or the high-density latex foam.

Foams with low I.F.D. ratings, popularly known as low "memory" foams, not to be confused with latex foam or higher I.F.D. rated non-conforming polyurethane foams, have low rebound and/or memory characteristics as well as a low rate of recovery. The inability of low memory, conforming, or viscoelastic foams to support body weight is defined by and the result of their very low I.F.D. rating. Memory or conforming foams have, at best, a very low memory averaging between 5 and 20 on the scale, and a low rate of recovery. This low memory rating means that all mattress or seat cushion applications bearing the low memory or conforming rating, by design, degrade in their body support characteristics with the application of sustained pressure or body heat. As a result of the poor support offer by foams of the low memory, conforming, or viscoelastic type, pressure and heat points are created leaving patients who are at risk of pressure ulcers more prone to necrotic skin disorders.

By having multiple layers of foam having different thickness, memories, and/or densities, the support layers of the present invention combined can facilitate the ability of the nervous system to become better able to enter a rest phase during sleep, and promote improved circulation of blood into the skin, muscles, and spinal column to more effectively reduce both spinal tension and pressure in the aforementioned tissues.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a body support apparatus according to an embodiment of the present invention.

FIG. 2 is a side view of a body support apparatus according to an embodiment of the present invention supporting a human body.

FIG. 3 is a side view of a body support apparatus according to an embodiment of the present invention supporting a human body.

FIG. 4 is side view of a mattress according to the prior art supporting a human body.

FIG. 5 is a partial cross-sectional view of human spine depicting normal disc spacing and joint proximity alignment.

FIG. 6 is a partial cross-sectional view of a human spine depicting disc compression, foramen narrowing, and facet joint overlap imbrications.

FIG. 7 is a cross-sectional view of a lumbar disc, sacrum, and vertebrae in a state of normal tension and pressure.

FIG. 8 is a cross-sectional view of a lumbar disc, sacrum, and vertebrae in a state of abnormal tension and pressure.

FIG. 9 is a cross-sectional view of a body support apparatus according to an embodiment of the present invention.

FIG. 10 is a perspective view of a body support apparatus according to an embodiment of the present invention.

FIG. 11 is a perspective view of a body support apparatus according to an embodiment of the present invention.

FIG. 12 is a perspective view of a body support apparatus in a hospital environment according to an embodiment of the present invention.

FIG. 13 is a perspective view of a body support apparatus used with a wheelchair seat according to an embodiment of the present invention.

FIG. 14 is a perspective view of a body support apparatus used with a wheelchair seat according to another embodiment of the present invention.

FIG. 15 is a sectional view of a body support apparatus according to an embodiment of the present invention.

FIG. 16 is a cross-sectional view of a body support apparatus according to an embodiment of the present invention.

FIG. 17 is perspective view of an insert of a body support apparatus according to an embodiment of the present invention.

FIG. 18 is a side view of a body support apparatus according to an embodiment of the present invention.

FIG. 19 is an exploded view of a body support apparatus according to an embodiment of the present invention.

FIG. 20 is a cross-sectional view of a body support apparatus according to an embodiment of the present invention.
FIG. 21 is a perspective view of a body support apparatus according to an embodiment of the present invention.

DETAILED DESCRIPTION

A body support apparatus 100 according to an embodiment of the present invention is illustrated at FIG. 1. Body support apparatus 100 generally has multiple foam layers 120. Foam layers 120 may include core layer 122, intermediate layers 124, and outer layers 126. Body support apparatus 100 presents top surface 128. Top surface 128 of body support apparatus 100 generally evenly redistributes the weight of a user through foam layers 120 to minimize pressure points between the user and body support apparatus 100.

In direct contrast to the low-memory, conforming, or viscoelastic foams previously described, suitable foams according to the present disclosure exhibit generally higher memory, higher rate of recovery, and higher resistance to compression than the low-memory, conforming foams. Suitable foams according to the present disclosure can include: (1) a high-density latex, such as a natural latex, that is non-conforming, non-heat sensitive, and non-viscoelastic and has a higher rate of recovery and memory than the low-memory, non-conforming foams; (2) high density, high-memory polyurethane foam which is non-conforming, non-heat sensitive, non-viscoelastic; and (3) high density, medium-memory polyurethane foam which is non-conforming, non-heat sensitive, and non-viscoelastic.

Although body support apparatus 100 illustrated in FIG. 1 has five foam layers 120, body support apparatus 100 can have three or more foam layers 120 without departing from the spirit of scope of the present invention. Referring to foam layers 120 making up body support apparatus 100, core layer 122 generally has a relatively high density, high-memory, intermediate layers 124 generally have a relatively high density, medium-memory, and outer layers 126 generally have a relatively high density, and a higher memory and rate of recovery than low-memory, non-conforming foams described above.

Each intermediate layer 124 is generally coextensively positioned between core layer 122 and outer layer 126. In an example embodiment, the density of each foam layer 120 approximates the density of a corresponding body tissue such that layer 126 approximates very nearly the density of skin and fat, layer 124 approximates the density of muscle, and layer 122 approximates the density of spinal ligaments and discs.

Foam layers 120 of body support apparatus 100 generally have different indentation force deflections (IFDs), discussed above. The IFD value stated within this application are examples and a range of IFD values on either side of these stated values may be utilized in the present invention.

In an example embodiment of the present invention, core layer 122 generally has an IFD in a range between about 75 and about 90. The IFDs of intermediate layers 124 generally be in a range between about 29 and about 39. In an example embodiment, top intermediate layer 124A has an IFD of about 19 and bottom intermediate layer 124B has an IFD of about 24. By constructing body support apparatus 100 to have intermediate layers 124 with different IFDs, body support apparatus 100 can be turned over to selectively provide more or less muscle support. In an example embodiment, outer layers 126 have an IFD in a range between about 19 and about 24. The upper and lower superficial layers can be formed of a latex foam material with a significantly higher rate of recovery than low-memory conforming foams. One suitable latex foam is a breathable, natural latex foam material.

In different applications, body support apparatus 100 can simultaneously provide relief and support to user assuming a supine position, a recumbent position, or a sideways-lying position. Body support apparatus 100 can also promote circulation of the blood and prevent and treat pressure ulcers. Specifically, body support apparatus 100 is made from high-memory foam such that outer layer 126 is soft, yet non-collapsible, intermediate layer 124 can provide support to the musculature, and core layer 126 is resiliently hard. Foam layers 120 can have the same thickness or different thicknesses. Referring to foam layers 120 making up body support apparatus 100, core layer 122 is generally the thickest foam layer 120, while outer layers 126 are generally the thinnest foam layers 120.

Body support apparatus 100 distributes the weight of a user over top surface 128 while still providing support to spinal region 130 of the user. Specifically, body support apparatus 100 maintains proper curvature of spine 132 and orientation of sacrum 134 of a user, such as, for example, a user in the supine position, as depicted in FIGS. 2-3. Body support apparatus 100 contiguously and uniformly supports spinal region 130 of a user with multiple cushioning components, or foam layers 120. By distributing the weight of the user, body support apparatus 100 minimizes the existence of pressure points that can lead to compromised circulation, sacral hyperextension, and general discomfort. In contrast, conventional mattresses 200 can promote exaggerated carving of spine 132 of a user in the supine position, as depicted in FIG. 4.

Referring to FIGS. 2-3, the spinal region of a user positioned on body support apparatus 100 in a supine position is shown. In an example embodiment, body support apparatus 100 has five foam layers 120, including single core layer 122, two intermediate layers 124, and two outer layers 126, as depicted in FIG. 2. By having multiple intermediate and outer layers 124, 126, body support apparatus 100 can be reversible. In another embodiment, support pad has three foam layers, including single core layer 122, single intermediate layer 124, and single outer layer 126, as depicted in FIG. 3. Other embodiments of the present invention can have more or fewer foam layers 120 without departing from the spirit of scope of the present invention. In general, the existence of multiple foam layers 120 in body support apparatus 100 reduce the incidence of pressure points between top surface 128 of body support apparatus 100 and a user.

Foam layers 120 may be attached to each other in any number of ways. Generally, foam layers 120 are joined to one another by a continuous adhesive bonding between layers 120. In an example embodiment, foam layers 120 are attached to other foam layers 120 with a chemical adhesive. In one embodiment, foam layers 120 are attached using a water-based, permanent flexible, non-toxic adhesive covering at least a portion of the interface of each foam layer 120. In another embodiment, foam layers 120 are frictionally held together by the surfaces of each foam layer 120.

Referring to FIG. 2, outer layer 126 presents top surface 128 of body support apparatus 100 on which a user
can position him or herself in a supine, recumbent, or sideways-lying position. Outer layers 126 present a tactile-comfort layer to the user and are generally self-ventilating, soft, non-collapsible, insensitive to heat, and able to provide continuous support. Specifically, outer layers 126 of body support apparatus 100 provide tactile comfort and dermal support to a user by having a density that is substantially similar to the density of human skin and subcutaneous tissue. In an example embodiment, outer layers 126 are made from latex foam. Outer layers 126 can have a thickness in the range of about one inch to about two inches. In an example embodiment, outer layers 126 have a thickness of approximately one inch. The density of outer layers 126 can be varied so as to provide more or less support to the skin and subcutaneous tissue.

[0049] Referring to FIG. 2, intermediate layers 124 are situated between core layer 122 and outer layers 126. Generally, intermediate layers 124 provide a muscle-support and muscle-comfort layer to a user by having a medium-memory rebound while maintaining continuous firmer high-density support. Specifically, intermediate layers 124 can provide such musculature comfort and support by having a medium-memory rebound while maintaining continuous firmer medium-memory support. In an example embodiment, intermediate layers 124 are made of polyurethane. Intermediate layers 124 can have a thickness of between about two inches and about four inches. In an example embodiment, intermediate layers 124 have a thickness of approximately 2.5 inches and have a density of approximately 2.5-3.0 pounds per cubic foot. Intermediate layers 124 can thereby support the denser and heavier muscle tissue located below the skin.

[0050] Referring to FIGS. 2-3, core layer 122 is situated between intermediate layers 124 or beneath one intermediate layer 124. Core layer 122 enables support pad 110 to properly support spine 132 of a user, as depicted in FIGS. 2-3. To support the spine 132, core layer 122 impedes the pelvis (not shown) and sacrum 134 from saggng into hyperextension, as depicted in FIG. 5. In contrast, as depicted in FIG. 6, conventional mattress 200 tends to facilitate saggng of the pelvis (not shown) and sacrum 164 into hyperextension.

[0051] Referring to FIG. 7, sacrum 134 and vertebrae 136 form overlap region 138 and gap 139. Similar overlap regions 138 and gaps 139 are formed between vertebrae 136. Within overlap regions 138 are nerve foramina. As the curvature of spine 132 becomes more pronounced, overlap regions 138 become more pronounced and clearance for nerve and blood supply is reduced by the increase in overlap and decrease in gap desired for circulation, as depicted in FIG. 8. By impeding hyperextension, core layer 122 thereby minimizes narrowing of nerve foramina due to excessive spinal joint overlap, such as can occur when a user positions him or herself in a supine position. When the user positions himself or herself in a sideways position, core layer 122 similarly reduces tension and pressure on the spinal nerves by minimizing spinal sag that can cause the nerve foramina in overlap regions 138 to become offset.

[0052] Core layer 122 generally impedes hyperextension and reduces tension and pressure on the spinal nerves by having a density that can support the spine of a user weighing up to approximately four-hundred pounds. In an example embodiment, core layer 122 is made from high-density polyurethane. Core layer 122 may have a thickness in the range of about two inches to about five inches and has a density of approximately 2.5-3.0 pounds per cubic foot. In an example embodiment, core layer 122 has a thickness of approximately two inches and has a density of approximately 2.5-3.0 pounds per cubic foot. Core layer 122 thereby supports the denser and heavier spinal joint tissues where the nerves exit the spine by maintaining continuous support necessary for spinal relaxation and decompression.

[0053] Referring to FIG. 9, body support apparatus 100 can include removable cover 140. Removable cover 140 can be made from any number of materials that do not materially affect the IFR of foam layers 120 or the overall compressive and supportive characteristics of body support apparatus 100, such as, for example, velour, natural wool blends, and other suitable materials. In an example embodiment, removable cover 140 is washable and substantially encloses foam layers 120. Specifically, removable cover 140 can be made from a material or contain an additive or treatment, or both, having anti-microbial characteristics or providing a self-ventilating liquid-barrier inner lining. In one example embodiment, removable cover 140 comprises a fire-retardant natural wool blend.

[0054] Referring to FIG. 10, body support apparatus 100 can include a safety cover 150 in another embodiment. Specifically, safety cover 150 can be made from a material or contain an additive or treatment, or both, having fire-retardant or fire-resistant qualities. In an example embodiment, safety cover 150 meets or exceeds relevant life safety code requirements for health care institutions, such as, for example, applicable state and federal governmental laws, rules, and administrative regulations.

[0055] Removable cover 140 and safety cover 150 can be secured around foam layers 120 in any number of ways. In an example embodiment, removable cover 140 or safety cover 150 is secured around foam layers 120 by a zipper mechanism. In other embodiments, removable cover 140 or safety cover 150 is secured around foam layers by buttons, snaps, hook-and-loop fasteners, or other suitable fastening members.

[0056] In another embodiment of the present invention, body support apparatus 100 rests upon foundation 160, as depicted in FIG. 11. Foundation 160 generally includes top surface 162 and bottom surface (not shown). Foundation 160 may be made from any substantially rigid structure. When body support apparatus 100 is rested upon foundation 160, bottom surface (not shown) of body support apparatus 100 is substantially coextensive with top surface 162 of foundation 160. In an example embodiment, foundation 160 is formed from box spring 164 and foundation cover 166, as depicted in FIG. 11. In another embodiment, foundation 160 is formed from box spring 164 or foundation cover 166. Body support apparatus 100 and foundation 160 may conformingly fit on frame 169, as depicted in FIG. 11.

[0057] Referring to FIG. 11, foundation cover 166 can be placed on top of box spring 164, while body support apparatus 100 can be placed on top of foundation cover 166. Foundation cover 166 may be made of any substantially rigid material that conforms to the bottom surface of body support apparatus 100 and may be selected to have any number of thicknesses. In an example embodiment, foundation cover 166 is made from plywood having a thickness of approximately five-eighths of one inch. Although box spring 164 and foundation cover 166 may have any number
of sizes and shapes, box spring 164 and foundation cover 166 generally have the same size and shape as body support apparatus 100.

[0058] In another embodiment, body support apparatus 100 may be constructed so as to fit onto gurney 170 or other apparatus design to accommodate an individual in a supine position, as depicted in FIG. 12. In another embodiment, body support apparatus 100 may be constructed so as to fit the seat of wheelchair 180, as depicted in FIG. 13-14. In another embodiment, body support apparatus 100 can be constructed to fit specialty institutional chairs for medically compromised individuals.

[0059] Referring to FIG. 15, in another embodiment, foam layers 120 may be contoured so as to integrate head-support region 182 and neck-support region 184 into body support apparatus 100. Head-support region 182 and neck-support region 184 may be integrated into a mattress. Alternatively, head-support region 182 region 182 and neck-support region 184 may be integrated into pillow 190, as depicted in FIG. 15.

[0060] Referring to FIGS. 16-19, in another embodiment of the present invention, body support apparatus 100 includes pressure-relief mattress 200. In an embodiment of the present invention, pressure-relief mattress 200 has a similar gradient created by tiered layers of tissue density-specific pressure relieving layers of foam and a relief zone with the tiered layers. Referring to FIG. 16, pressure-relief mattress 200 has bottom layer 202, top layer 204, at least two intermediate inserts 206, and relief zone 208. Bottom layer 202 is substantially planar to accommodate a box spring, platform, or other support of a bed. Intermediate inserts 206 are substantially wedge-shaped, as depicted in FIG. 17, to facilitate a bumper-like edge or ridge 210. Top layer 204 is substantially non-planar to accommodate for intermediate inserts 206. Relief zone 208 is coplanar with the at least two intermediate inserts 206 and situated between top layer 204 and bottom layer 202.

[0061] Referring to FIGS. 18-19, pressure-relief mattress 200 can further include cut-away section 212 in ridge 210 to accommodate a user’s limbs, such as, for example, an arm. Cut-away section 212 provides an area for resting an arm and/or extending the arm beyond the edge of pressure-relief mattress 200. The structure of the embodiment depicted in FIGS. 16-19 may reduce the risk that a patient will roll out of bed and suffer an injurious fall.

[0062] Further example embodiments of pressure-relief mattress 200 are shown in FIGS. 20-21. Referring to FIG. 20, pressure-relief mattress 200 includes bottom layer 222, intermediate layer 224, and top layer 226. Bottom layer 222 has first major surface 228 and second major surface 230. Bottom layer 222 comprises notch 232 at any point along the longitudinal axis of second major surface 230. Notch 232 extends substantially through bottom layer 222 to act as a hinge for bed inclination adjustment. The annotated dimensions in FIG. 20 are examples and are not to be considered limiting in any manner.

[0063] Pressure-relief mattress 200 is depicted in FIG. 21, as set forth in U.S. Provisional Application 60/830,363. The dimensions in FIG. 21 are examples and are not to be considered to be limiting in any manner. Pressure-relief mattress 200 provides continuous pressure relief at all points since the support is an integral part of the unique body support system. Each point of support is created by multiple cushioning components. Each foam layer 120 approximates the density of the tissue it supports.

[0064] It is to be understood that the above-described arrangements are only illustrative of the application for the principles of the present invention. Numerous modifications and alternative arrangements can be devised without departing from the spirit and scope of the present invention. Thus, while the present invention has been shown in the drawings and fully described above with particularity and detail in connection with what is presently deemed to be the most practical and preferred embodiments of the invention, it will be apparent to those of ordinary skill in the art that numerous modifications, including, but not limited to, variation in size, shape, form, function, and manner of operation, assembly, or use may be made without departing from the principles and concepts set forth herein.

What is claimed:

1. A multi-layer therapeutic body support apparatus, the apparatus comprising:
   a. a core foam layer having a core density and a core indentation force deflection;
   b. a top outer foam layer having a first outer density and a first outer indentation force deflection;
   c. a first intermediate foam layer intermediate and coextensive with the core layer and the top outer layer and having a first intermediate density and a first intermediate indentation force deflection;
   d. wherein the core indentation force deflection is greater than the first intermediate indentation force deflection;
   e. and the first intermediate indentation force deflection is greater than the first outer indentation force deflection.

2. The multi-layer therapeutic body support apparatus of claim 1, wherein the core foam layer comprises polyurethane foam.

3. The multi-layer therapeutic body support apparatus of claim 2, wherein the core density is between about 2.5 pounds per cubic foot and about 3.0 pounds per cubic foot.

4. The multi-layer therapeutic body support apparatus of claim 1, wherein the core indentation force deflection is in the range from about 75 pounds/fifty square inches to about 90 pounds/fifty square inches at twenty five percent deflection.

5. The multi-layer therapeutic body support apparatus of claim 1, wherein the first intermediate foam layer comprises polyurethane foam.

6. The multi-layer therapeutic body support apparatus of claim 5, wherein the intermediate density is between about 2.5 pounds per cubic foot and about 3.0 pounds per cubic foot.

7. The multi-layer therapeutic body support apparatus of claim 1, wherein the intermediate foam indentation force deflection is between about 29 pounds/fifty square inches at twenty five percent deflection and about 39 pounds/fifty square inches at twenty five percent deflection.

8. The multi-layer therapeutic body support apparatus of claim 1, wherein the outer foam layer has an indentation force deflection in the range from about 19 pounds/fifty square inches and about 25 pounds/fifty square inches at twenty five percent deflection.

9. The multi-layer therapeutic body support apparatus of claim 1, wherein the first outer foam layer comprises latex foam.

10. The multi-layer therapeutic body support apparatus of claim 1, further comprising:
a bottom outer foam layer having a second outer density and second outer indentation force deflection;  
a bottom intermediate layer intermediate and coextensive with the core layer and the bottom outer layer having a second intermediate density and second intermediate indentation force deflection; and  
wherein the core second indentation force deflection is greater than the second intermediate second indentation force deflection and the second intermediate second indentation force deflection is greater than the second outer second indentation force deflection.

11. The multi-layer therapeutic body support apparatus of claim 1, further comprising a raised ridge proximate at least a portion of a perimeter of the apparatus.

12. The multi-layer therapeutic body support apparatus of claim 11, wherein the raised ridge is interrupted by a cut away sized to receive an appendage of a body of a person lying on the apparatus.

13. The multi-layer layer therapeutic body support apparatus of claim 1, wherein the apparatus is a mattress.

14. A therapeutic body support apparatus, comprising: a core portion having a core density and a core second indentation force deflection;  
a top outer portion having a first outer density and a first outer second indentation force deflection;  
a first intermediate portion intermediate and coextensive with the core portion and the top outer layer and having a first intermediate density and a first intermediate second indentation force deflection;  
wherein the core second indentation force deflection is greater than the first intermediate second indentation force deflection, and the first intermediate second indentation force deflection is greater than the first outer second indentation force deflection;  
a bottom outer portion having a second outer density and second outer second indentation force deflection;  
a second intermediate portion intermediate and coextensive with the core portion and the bottom outer portion and having a second intermediate density and a second intermediate second indentation force deflection; and  
wherein the core second indentation force deflection is greater than the second intermediate second indentation force deflection and the second intermediate second indentation force deflection is greater than the second outer second indentation force deflection.

15. The therapeutic body support apparatus of claim 14, wherein the core foam portion comprises polyurethane foam.

16. The therapeutic body support apparatus of claim 15, wherein the core density is between about 2.5 pounds per cubic foot and about 3.0 pounds per cubic foot.

17. The therapeutic body support apparatus of claim 14, wherein the core indentation force deflection is in the range from about 75 pounds/fifty square inches to about 90 pounds/fifty square inches at twenty five percent deflection.

18. The therapeutic body support apparatus of claim 14, wherein the first intermediate foam portion comprises polyurethane foam.

19. The therapeutic body support apparatus of claim 18, wherein the intermediate density is in a range from about 2.5 pounds to about 3.0 pounds per cubic foot.

20. The therapeutic body support apparatus of claim 14, wherein the intermediate indentation force deflection is between about 29 pounds/fifty square inches and about 39 pounds/fifty square inches at twenty five percent deflection.

21. The therapeutic body support apparatus of claim 14, wherein the outer foam portion has an indentation force deflection in the range from about 19 pounds/fifty square inches to about 25 pounds/fifty square inches at twenty five percent deflection.

22. The therapeutic body support apparatus of claim 21, wherein the outer foam portion has an indentation force deflection of about 24 pounds/fifty square inches at twenty five percent deflection.

23. The therapeutic body support apparatus of claim 14, further comprising a raised ridge proximate at least a portion of a perimeter of the apparatus.

24. The therapeutic body support apparatus of claim 23, wherein the raised ridge is interrupted by a cut away sized to receive an appendage of a body of a person lying on the apparatus.

25. The therapeutic body support apparatus of claim 14, wherein the apparatus is a mattress.