11

Aging well, a fascia-focused movement perspective

Fascia changes through the lifespan

One-fifth of Americans will be 65 or older by 2030. Since the early 20th century, Americans have added at least 30 years to the average life expectancy. Ken Dychtwald, the founder of Agewave, a polling and market-research organization for people over 50, states, "I know that 'senior' is on its way out, and I'm not sure that there's any other word or phrase that I've thought of or anyone's thought of that's on its way in." Older people today are like pioneers of a new life stage trying to find their way (National Public Radio, 2016). These older people may also be pioneers of fascia-focused movement. Research conducted over the past 30 years indicates that fascia, the body's largest organ of communication, is the material link that connects and unites all parts of the body.

Age 65 may be the official start of "aging well". From the perspective of fascia, however, aging well is a lifelong process. Whatever your decade, it is always beneficial to engage in fascia-friendly nutrition, practices of nasal breathing, fascia-focused movement and rejuvenation. Development of a reserve capacity of strength and resilience serves as a safety margin that helps prevent functional limitations following inactivity and deconditioning associated with surgery, acute illness and aging.

Throughout your entire life, fascia, the tensional, continuous, fibrillar network that extends from the surface of the skin to the nucleus of the cell, responds to movement, immobility, nutrition, disease, trauma and surgery. Every step you take, every move you make, sends precise, asymmetric forces throughout this mobile, adaptable, fractal and irregular global network (Guimberteau & Armstrong, 2015, p.173). Familiar, frequently practiced gestures of ease – rollerblading or riding a unicycle – reinforce fascial glide and functional densifications. In contrast, traces of neglected movement patterns become faint and forgotten. Do you remember how to climb your favorite tree? Frequent practice engrains the pattern of a tennis serve in your motor cortex and your connective tissues. When you alter your technique or change coaches, you must develop new neurological wiring and different system-wide fascial patterns, all of which affect muscle timing, coordination and strength. The neuromyofascial system contains a record of movement in space and time that is uniquely you.

Fascia, the basic architecture of the human body, is a dynamic map of life events; the structure and properties of fascia change with the passing of time. As life progresses, fascial elasticity decreases and potentially contributes to disorders related to aging. Reduction in superficial fibroblasts and collagen cells underlies skin changes, characterized by the evolution of wrinkles. Starting at age 21, collagen and elastin decline by 1.0–1.5% each year. The loss of elastin is a process that is measurable around the third decade. Collagen fibers become less organized and more tangled. Tissues lose their defined shape and elasticity (Chaitow, 2014, p.25). There is a decrease in the volume, number and quality of the fibers. Age-related fascia changes affecting respiration, proprioception and posture control are summarized in Table 11.1.

Somatic dysfunction and postural disorders are common in older individuals. Physical force, provided by gravity and physical movement, is a primary regulator of life's form and function. Tom Myers coined the term "spatial medicine" in 1986 to describe the importance of the spatial health of individual cells and the fascia system. Unbalanced tissue tensions can affect mechanotransduction, the transmission of forces through the tissues. Normally, even in the absence of external loading, the extracellular matrix is under tension that stimulates mechanochemical transduction. With age, stiffness of fibroblasts decreases, influencing the cell's responses to mechanical stimulations. Leon Chaitow suggests fascial dysfunction may result from slowly evolving trauma or sudden injury leading to inflammation and inadequate remodeling. Inactivity that may accompany illness or pain adversely affects fascia. "Densification" interferes with the ability of tissues to slide, altering proprioception and muscle balance. When fascia is "excessively mechanically stressed, inflamed or immobile, collagen deposition becomes disorganized resulting in fibrosis and adhesions". A combination of irritation, inflammation, acidification and densification of loose connective tissue may lead to myofascial pain as a result of free nerve endings becoming hyper-activated resulting in local inflammation, pain and sensitization. These changes can be reversed by manual therapy interventions that reduce stiffness, density and viscosity (Chaitow, 2014, pp.24–25).

Aging is usually associated with the loss of elasticity, bounce and springiness in movement. This is reflected in fascia architecture. Undulations in the microstructure of collagen fibers are called crimp. Inactivity and immobilization alter the structure of the fiber. It appears flattened, losing crimp and springiness. Regular, proper exercise loading of the fibers can induce more youthful collagen architecture that regains a more wavy fiber arrangement, expressing a significantly increased elastic storage capacity (Schleip & Baker, 2015, p.7).

Age-related fascia changes may challenge anyone's determination to age gracefully, but fortunately, there is an alternative to the options of either denying physiological change or being rendered immobile by the inevitability of biology. Fascia-focused Pilates for the older adult is a form of mindful movement resulting from the application of fascia research to the principles, movement vocabulary, and equipment created by Joseph Hubertus Pilates (1880–1967). The unique movement system he invented was revolutionary. Figure 11.1 shows a photo composite J. H. Pilates created to illustrate "Why we are old at 50". Thirty years of research on the architecture and properties of the neuromyofascial system inform additional Pilates movement vocabulary, sequencing, cueing and equipment use. The fascia-focused movement criteria, detailed in Table 1.7, have evolved from the publications listed in Table 1.5.

Benefits of fascia-focused Pilates

Fascia-focused Pilates uses movement to address the physiological changes that occur with aging. The practice may improve lung function. Nasal breathing and specific eye movements contribute to improved posture. Fascia-focused Pilates stimulates proprioception in order to improve balance and prevent falls. Improved grip strength and increased range of motion for overhead reaching may result from increased resilience of the neuromyofascial system. This movement practice may restore fascia attributes such as glide, crimp, and elastic recoil, the kinetic storage capacity of fascia.

Guide to chapter resources

The resource tables in this chapter support implementation of fascia-focused Pilates movement sequences. The Fascia-focused planning guide for aging well includes a client profile (Table 11.4). This example is a profile of an 80-year-old female client with peripheral neuropathy and balance difficulties. Her function is improved by fascia-focused Pilates movement sequences that address proprioception for standing balance and walking – these are shown in Table 11.5. J. H. Pilates movement sequences also benefit the older adult's proprioception for standing balance and walking, and these exercises are described in Table 11.2 along with Pilates principles and associated fascia-focused movement criteria. The Fascia-focused planning guide for aging well – exercise selections in Table 11.6 shows that the client's movement sequences fulfill fascia-focused movement criteria.

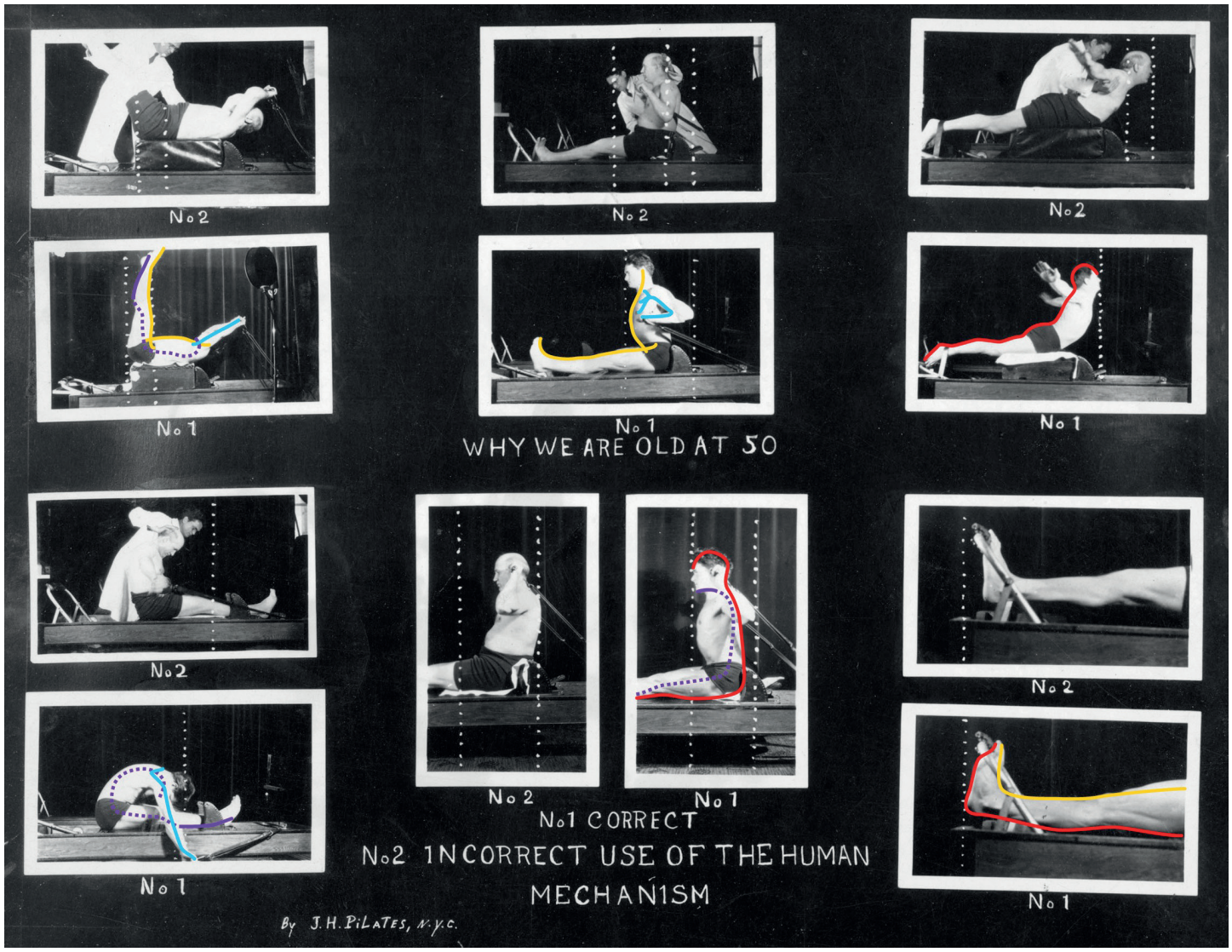


FIGURE 11.1
"Why we are old at 50".
J. H. Pilates demonstrates the correct use of the human mechanism in the photos labeled "No. 1". His client demonstrates the incorrect use of the human mechanism in photos labeled "No. 2". (*Reproduced with kind permission from Balanced Body Inc., www.pilates.com*)

In childhood, both good and bad habits are easily formed. Why not then concentrate on the formation of only good habits and thus avoid the necessity later on in life of attempting to correct bad habits?

In traveling the road to life, all we need to do is trace life itself from birth to youth and middle age and discover that which is responsible for disturbing and upsetting physical and mental equilibrium – the balance of body and mind. Then it will be comparatively easy to recognize and understand the causes and to correct them according to infallible laws of nature.

In short, study your body, know its good and bad points, eliminate the bad and improve the good. What will be the result? A perfect being physically and mentally!

Joseph H. Pilates (Gallagher & Kryzanowska, 2000)

Explanation of Figure 11.1

Excerpts from the J. H. Pilates Universal Reformer repertoire contrast his form with that of a less experienced client. These photos indicate that J. H. Pilates cultivated a resilient neuromyofascial system. Chapter 5 shows these photos in the context of J. H. Pilates exercise sequences.

In the color line overlays, purple indicates the Deep Front myofascial continuity, yellow, the Superficial Front myofascial continuity, blue, the Superficial and Deep Front and Back Arm myofascial continuities, red, the Superficial Back myofascial continuity. From top left to bottom right:

- "Swimming – Backstroke" (top left) illustrates integration of the Deep Front, Superficial Front, and Arm myofascial continuities.
- "Rowing – Back" (top middle) illustrates integration of the Superficial Front and Arm myofascial continuities.
- "Swan-Dive" (top right) illustrates activation of the Superficial Back myofascial continuity.
- "Triceps" (bottom left) illustrates integration of the Deep Front and Back Arm myofascial continuities.
- "Lifting" (bottom middle) illustrates integration of the Deep Front and Superficial Back myofascial continuities.
- "Footwork – Toes" (bottom right) illustrates integration of the Superficial Back and Superficial Front myofascial continuities.

TABLE 11.1
Age-related fascia changes

Fascia changes		
1. Starting at age 21, collagen and elastin decline by 1.0%–1.5% each year 2. Fibroblasts work slower and less efficiently 3. Reduced collagen content with mainly single-direction fibers is less resilient than multidirectional fibers in a tight collagen mesh 4. Loss of elastin impacts proper functioning of organs and eyes		
Respiration	**Fascia-focused movement practices**	**Pilates principles and fascia-focused movement criteria**
1. Respiratory system compliance decreases by 20% between age 20 and age 60	Nasal breathing results in abdominal breathing and helps ensure regular, calm, steady breathing using the diaphragm	Interoception – interstitial nerves in fascia serve an interoceptive, rather than proprioceptive or nociceptive function. Stimulation of those free nerve endings provides information about the condition of the body in search for homeostasis in relation to physiological needs. Interoceptive signaling is associated with feelings such as warmth, nausea, hunger, soreness, effort, heaviness or lightness. Perceptions about internal somatic sensations are associated with emotional preferences and feelings (Schleip & Baker, 2015)
2. Lungs mature in females at approximately age 20 and in males at approximately age 25		
3. Lung function starts to weaken around 35 years	Nasal breathing results in 10–20% more oxygen uptake than mouth breathing	Whole-body continuity – connect trunk to limbs and limbs to trunk while connecting deep structures to superficial ones and superficial structures to deep ones
4. Lung elasticity declines	Trunk lateral flexion, extension and rotation (***Figure 9.6A–F***)	Stimulate tissue renewal
5. Respiratory muscles weaken		Preparatory countermovement
6. Somatic dysfunction of the spine, ribs and diaphragm contribute to dysfunctional respiratory mechanism	Trunk extension (***Figure 9.6C***)	Pilates principle: centering Awareness of myofascial continuities during movement

Continued

TABLE 11.1 Continued

7. Mid-cervical dysfunctions aect the phrenic nerve and consequently the function of the diaphragm	Improve cervical range of motion (***Figure 10.4A***)	Kinesthetic acuity – kinesthesia (dynamic proprioception), the aptitude to sense the position and movement of the limbs and trunk
8. Restriction of diaphragmatic movement will increase venous and lymphatic stasis in lungs and in the rest of the body	Trunk lateral flexion, rotation, extension, flexion (***Figure 9.2A–D***)	Flowing movement sequences (oxygen advantage nasal breathing fascia)
Ribs		Pilates principle: breathing
1. Ribcage compliance decreases with increasing age starting in fourth decade		Develop glide within the three dimensional fascia network
2. Stiness of the chest wall intensifies	Trunk lateral flexion and rotation (***Figure 8.1A–C***)	Develop tissue resilience
3. Gradual postural modification associated with age affects the position of the upper respiratory tract	Upper thoracic extension may improve upper respiratory function (***Figure 12.2A,B***)	Multidirectional movements with slight changes of angle
4. Increased thoracic kyphosis creates increased anteroposterior diameter of the chest. This results in a decreased diaphragmatic dome requiring increased respiratory effort	Trunk rotation and extension (***Figure 8.1D,E***)	Multidirectional movements with slight changes of angle
Eyes		Pilates principle: precision Movement initiation – connect proximal structures to distal ones and distal structures to proximal ones
1. Age-related changes in the shape, size and volume of the bony eye orbits contribute to decreased motility of the eyeball resulting in more difficulty initiating and maintaining an upward gaze	Practice eye mobility in conjunction with thoracic and cervical extension (***Figure 4.4***). This may be practiced in sitting	Facilitate tissue hydration
2. Difficulty looking up may result in increased ocular tension and contribute to difficulty maintaining upright posture		
Proprioception & Posture Control		Pilates principle: whole-body movement Whole-body movements simultaneously involving large areas of the neuromyofascial system
1. The decline in cutaneous sensation in lower extremities has a negative impact on balance and mobility	A variety of proprioceptive stimulation to the lower extremities may improve balance (***Figure 11.2***)	Pilates principle: concentration Proprioceptive refinement – proprioceptive sensations are connected with position, tendon and muscle sensations
2. Concentric peak torque strength (the ability of the upper extremity to turn against resistance) begins to decline in the fourth decade	Sequences may improve overhead reach and grip strength (***Figure 8.6D–G***)	Pilates principle: control Preparatory countermovement
3. Non weight-bearing muscles are less affected by age than weight-bearing muscles	Upright, assisted, partial weight-bearing sequences may improve standing stability and balance (***Figure 14.2E–I***)	Pilates principle: balanced muscle development (optimal activation of the neuromyofascial system) Develop regular lattice with crimp
4. Standing mediolateral stability is reduced in women between the 40s and 60s		Force/load transfer – movements that transfer force/load through the neuromyofascial system
5. Age-related modifications in muscle function and structure are minimal until 60 to 70 years	Movements are sustainable for motor control refinement and collagen remodeling	Develop elastic recoil
6. After 70 years, muscle function and structure alterations increase significantly	Movements encourage awareness of the biotensegrity model	Pilates principle: rhythm Dynamic stretching – slow and fast tempo variations

Explanation of Table 11.1

Table 11.1 summarizes age-related fascia changes occurring between the third and eighth decade. These changes affect breathing, proprioception and posture control. According to Thomas W. Findley, MD, PhD, fascia is part of the cardiovascular, respiratory, gastrointestinal, musculoskeletal, and neurological systems. Although fascia has not been studied thoroughly in terms of its purpose and integration in different organ systems, it may be essential to elucidate mechanisms of organ system dysfunction.

FIGURE 11.2
Fascia-focused "Proprioception Parade".
Stimulation of foot and ankle proprioception facilitates standing balance. Five of the seven Anatomy Trains® myofascial meridians (pictured in Table 11.5) include the feet and ankles: the Superficial Back, Lateral, Spiral, Deep Front, and Superficial Front lines.

Explanation of Figure 11.2

Andrew Taylor Still MD, the founder of osteopathy, proclaimed that, 'no doubt nerves exist in the fascia'. He suggested that all fascial tissues should be treated with the same degree of respect as if dealing with, 'the branch offices of the brain' (Still, 1902, cited in Schleip & Baker, 2015, p.31). Dissections indicate there is a rich presence of sensory nerves in fascial tissues (Stecco, 2015). This body-wide tensional network is the largest and most important sensory organ.

Decline in cutaneous sensation in the lower extremities has a negative effect on balance and mobility. "Proprioception is the ability to sense the position and location, orientation, and movement of the body and its parts. It could be defined as the process of conscious and subconscious sensing of joint position and/or motion" (Skoglund 1973; Fix 2002; cited in Van der Wal, 2009, p.81). It is possible that a variety of proprioceptive stimulation to the lower extremities will improve balance. Aging well is a lifelong process. You may practice selections from the "Proprioceptive Parade" in Figure 11.2 throughout life, starting in adolescence.

In proprioception, the somatomotorcortex and its representational mapping of the body are of central importance. Receptive nerve endings for proprioception tend to be located in fascial shearing zones between superficial and deep fascia. Some fascial structures, such as ankle and wrist retinacula, seem to have very little role in force transmission. These more obliquely running fascial bands seem to be located close to major joints and contain a high density of proprioceptive nerve endings. According to Robert Schleip, some researchers suggest that the prime function of these fascial bands may be sensorial rather than biomechanical in that they provide detailed proprioception to the central nervous system (Schleip & Baker, 2015, p.35). Stecco (2015, p.81) states that damage to the retinacula and their embedded proprioceptors results in inaccurate proprioceptive afferentation. This may lead to poorly coordinated joint movement and eventual inflammation and activation of nociceptors.

Each of the movements shown in Figure 11.2 may be practiced in sitting before standing with support. When it is safe to do so, advance to standing without support. This progression provides gradual challenge to activation of the Deep Front myofascial continuity and integration of all the myofascial continuities. Squats, and squats with trunk rotation, may be practiced while standing on each of these unstable surfaces.

In fascial tissues, the majority of interstitial neurons are polymodal receptors, i.e. they are responsive to more than one kind of stimulation. Nociceptive neurons, associated with perception of pain, have been identified in fascial tissues. These polymodal receptors seem to be satisfied if sufficient proprioceptive information is supplied. In cases of insufficient proprioceptive stimuli, these neurons tend to actively lower their threshold for pain stimulation (Schleip & Baker, 2015, p.31). The movement sequences shown in Figure 11.2 are designed to saturate fascial receptors with proprioceptive information.

"Interstitial nerves in fascia also serve an interoceptive function. Interoceptive signaling is associated with feelings like warmth, nausea, hunger, soreness, effort, heaviness or lightness as well as a sense of belonging or alienation" (Crag, 2002 cited in Schleip & Baker, 2015). Many of these free nerve endings are located in visceral connective tissues. Other interoceptive interstitial neurons are located within endomysial and perimysial intramuscular connective tissues. Stimulation of these nerve endings provides the brain with information about the condition of the body in its constant search for homeostasis in relation to its physiological needs.

Some interstitial neurons are sensory devices for thermoception. Stimulate these fascia receptors before exercise by encouraging the client to move her feet in a box of warm sand, in warm water with marbles, or with the heated SmartSpine™ system created by Marie-José Blom.

From left to right and top to bottom:

- Shift the central axis forward and backward while standing on pliable, textured half-spheres. This encourages ankle dorsiflexion along with integration of the Superficial Front and Back myofascial continuities.
- Rotate the entire body left and right while standing with each foot on a rotator disc. This encourages balance of the left and right Spiral myofascial continuities.
- Rotate 360 degrees while standing with two feet on one rotator disc. This integrates all the myofascial continuities with the exception of the Front and Back Arm Lines.
- The rocker board provides a versatile standing surface in four main orientations. This challenges integration of all the myofascial continuities except the Functional and Arm Lines.
- Maintaining the rocker board and pelvis level during single ankle plantar flexion exposes imbalances in the right and left Superficial Back myofascial continuities.
- Stand on the wobble board with both knees in extension. Keep the pelvis level and steady while smoothly guiding the rim of the board in a circle. Always maintain one point of the rim in contact with the floor. This facilitates control of ankle mobility.
- Stand both feet on the step of a Pilates Arc® or a slant board. Shift weight forward and backward at the hip joints. This requires more glide of the Superficial Back myofascial continuity than standing on the pliable half-spheres.
- Functional Footprints®, invented by Jean-Claude West, kinesiologist, and Katie Keller, MSPT, require accurate alignment in all three planes of motion. This refines coordinated integration of all the myofascial continuities.
- Standing on pliable, textured balls challenges control of many degrees of freedom throughout the body.
- Standing and standing squats on a foam roller challenge the Lateral and Spiral myofascial continuities to contribute to accurate foot, ankle, knee, hip, pelvis, and spine alignment.

TABLE 11.2
Movements selected from J. H. Pilates vocabulary that stimulate proprioception for standing balance and walking

J. H. Pilates movement sequence	Figure	Pilates principle	Fascia-focused movement criteria
1. Footwork Feet and knees Arches Heels Toes	***5.1***	Rhythm	Preparatory countermovement Dynamic stretching – slow and fast tempo variations
2. Down – Stretch	***5.5***	Control	Proprioceptive refinement – proprioceptive sensations are connected with position, tendon and muscle sensations
3. Rowing – Back	***5.4***	Balanced muscle development (optimal activation of the neuromyofascial system)	Multidirectional movements with slight changes of angle
4. Chest – Expansion	***5.13***	Precision	Kinesthetic acuity–kinesthesia (dynamic proprioception), the aptitude to sense the position and movement of the limbs and trunk
5. Control Stretch – Lifting	***5.16***	Breathing	Flowing movement sequences
6. Wunda Chair with arm springs and dowel	***7.2***	Concentration Centering	Awareness of myofascial continuities during movement Movement initiation – connect proximal structures to distal ones and distal structures to proximal ones
7. Wunda Chair with arm springs	***7.3***		
8. Wunda Chair with arm springs	***9.2***		
9. Ped-o-Pull/Pedi-Pole	***9.2***	Whole-body movement	Whole-body movements simultaneously involving large areas of the neuromyofascial system Whole-body continuity – connect trunk to limbs and limbs to trunk while connecting deep structures to superficial ones and superficial structures to deep ones

Explanation of Tables 11.2, 11.4, 11.5, & 11.6

The completed client profile shown in the fascia-focused planning guide (Table 11.4) is an example of the information you will need to prepare a fascia-focused movement program that stimulates proprioception for standing balance and walking. Table 11.5 describes each exercise in terms of the Anatomy Trains® Myofascial Map created by Thomas W. Myers. These exercises are placed in the exercise selections portion of the fascia-focused planning guide for aging well (Table 11.6). The table matches each exercise with its fascia-focused movement criteria and outcomes. The movement sequence of J. H. Pilates exercises with the Reformer and Chair also stimulates proprioception for balance and walking (Table 11.2).

TABLE 11.3
Components of physical fitness – examples from J. H. Pilates exercises and fascia-focused Pilates

Components of physical fitness	Exercise example	J. H. Pilates	Fascia-focused
Cardiorespiratory endurance *Health-related component of physical fitness relating to the ability of the circulatory and respiratory systems to supply fuel during sustained physical activity and to eliminate fatigue products after supplying fuel*	Reformer elastic recoil sequences (***Figures 6.12–6.15***)		•
Power *A skill-related component of physical fitness that relates to the rate at which one can perform work. Power is the amount of work performed per unit of time*	Chair Forward Step Down/Russian (squat atop chair) Sideward Step Down/Side Russian Backward Step Down/Running Start (***Table 7.1, Nos. 21–23***)	•	
Agility *A skill-related component of physical fitness related to the ability to rapidly change the entire position of the entire body in space with speed and accuracy*	Reformer Twist Side Stretch & Control Stretch (***Figure 5.17***)	•	
Balance *The maintenance of equilibrium while stationary or moving*	Reformer Balance-Control 4 Russian-Stretch 1 Russian-Stretch 2 (***Figure 5.18***)	•	
Coordination *A skill-related component of physical fitness that relates to the ability to use the senses, such as sight and hearing, together with the body in performing motor tasks smoothly and accurately*	Reformer Supine assisted cervical rotation with footwork. Coordinate eye movements with cervical rotation: 1. Eyes move in the direction of cervical rotation 2. Eyes focus at one point on the ceiling while the head is being turned by the hand 3. Eyes look opposite the direction of the head as it is turned by the hand (***Figure 10.2, I–N***)		•
Flexibility *A health-related component of physical fitness that relates to the range of motion available at a joint*	Reformer Thigh-Stretch Rocking (***Figure 5.13***)	•	
Endurance *A health-related fitness component that relates to the amount of external force that can be exerted over an extended period of time*	Chair All myofascial continuity variations of J. H. Pilates chair Pull-Up and Side Pull-Up (***Table 7.1, Nos 40, 42***) Facing chair, one foot per pedal, hands on top of chair in seven different positions Side to chair, one foot per pedal, outside foot in front, hands on top of chair in seven different positions Side to chair, one foot per pedal, outside foot in back, hands on top of chair in seven different positions (Entire sequence shown in ***Figure 8.5***)		•
Speed *Relates to the ability to perform a movement within a short period of time*	Reformer elastic recoil sequences (***Figures 6.12–6.15***)		•
Strength *A health-related component that is assessed by the maximal amount of resistance or force that can be sustained in a single effort*	Mat The Push Up (***Table 3.7D***)	•	

TABLE 11.3 Continued

Adaptations to physical fitness training	Fascia adaptations to physical fitness training
Specificity *The body adapts to the type and amount (volume and intensity) of exercise load and the primary energy systems engaged during the activity. Training specifically for muscular strength and power may only produce adaptations to those fitness components without improving cardiorespiratory fitness*	Facilitate tissue hydration Develop glide within the three-dimensional neuromyofascial system Develop regular lattice with crimp Develop elastic recoil
Overload *The body adapts to the type and amount of training stimulus imposed and fitness gains are made by progressively increasing the exercise load*	Stimulate tissue renewal Develop tissue resilience
Retrogression *The loss of performance gains (detraining) occurs when training stops. Only one or two weeks of detraining can significantly reduce fitness gains. Many improvements can be lost within several months*	Fascia dehydration Fascia loss of glide Fascia loss of regular lattice with crimp

TABLE 11.4
Fascia-focused planning guide for aging well – client profile

Client diagnosis or condition of concern: 80-year-old female with peripheral neuropathy, Charcot–Marie–Tooth neuropathy

Short-term goals	Long-term goals
1. Increase ankle dorsiflexion control and ROM	1. Sustain eye gaze at horizon height, do not focus on the ground
2. Improve standing lateral stability	2. Sustain upright posture, decrease kyphosis
3. Improve gait stability during direction changes	3. Climb three flights of stairs at home
4. Decrease hand tremors	4. Sustain fine motor control to cut food with cutlery
5. Increase thoracic rotation	5. Walk dog on city sidewalk

Fascia-focused planning guide for aging well	Client profile – completed by client or practitioner
1. Identify factors that influence fascia function	
Genetic	*Charcot–Marie–Tooth neuropathy*
Disease-associated	*Peripheral neuropathy*
Pharmaceutical	*Medication prescribed to reduce hand tremors*
Surgeries	*Bilateral foot tendon reconstruction age 13*
• scars	*Extensive foot scars* *Disruption of proprioception has resulted in falls throughout her life*
• adhesions	*Extensive foot adhesions*
Systemic inflammation	*No anti-inflammatory medication*
Lifestyle-related	
• nutrition	*No special diet*
• supplements	*No supplements*
• smoking	*Never a smoker*
• alcohol	*3 glasses of wine per week*
• time spent sitting	*Minimum 6 hours per day*
Hypomobile	*No*
Hypermobile	*Well above average range of motion*
Temperature and humidity preference	*Prefers above 72°F with 55–75% humidity. Cold temperature decreases sensation in feet*

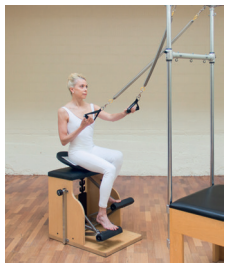
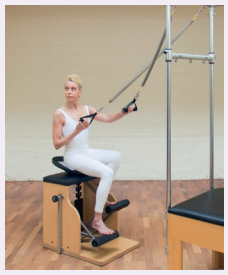
Continued

TABLE 11.4 Continued

2. Self-applied tools to enhance fascia function balls, rollers, sticks, hand tools	
Home practice	*Client notices improved foot-ankle proprioception walking barefoot at home. Client rolls feet over textured balls when seated at home*
In-studio program	
Number of minutes per day	
3. Therapies to enhance fascia function Acupuncture, Osteopathy, Physical Therapy, Rolfing®, Structural Integration, etc.	*Osteopathic appointments*
Appointment schedule	*2 times per week*
Communication to coordinate care	*Pilates instructor referral*
4. Range of motion	
Partial	*Ankle dorsiflexion – osteoarthritis*
Full	*Restriction of right hip internal rotation*
Contraindicated	*Sustained lumbar flexion*
5. Weight-bearing	
Non weight-bearing	*May place spring straps around knees/elbows*
Partial weight-bearing	*Increased confidence with spring assistance*
Full weight-bearing	*Can progress to full weight-bearing on single leg*
6. Kinetic chain	
Open	*Not effective*
Closed	*Preferred with moderate resistance*
7. Type of assistance or resistance optimal for client	
Bodyweight only	
Bands	
Springs	*Spring assistance/resistance preferred. Peripheral neuropathy responds well to moderate spring resistance, enhancing proprioception*
Free weights	
8. Optimal level of intensity to maximize benefit and minimize injury	*Deliberate pace, light/moderate spring assistance*
9. Balance capacity for novelty to intrigue nervous system with need to decrease risk	*Vary balance on unstable surfaces carefully progressing to hands-free*
10. Pilates movement options available to the client	
Mat, Reformer, Chair, Trapeze Table, Barrels	*Has access to all Pilates equipment*
Additional equipment	*Small balls and hand weights*
Unstable surfaces foam roller, Oov, rotator disc, rocker board, balance board	*Has access to all unstable surface equipment*
11. Activate all appropriate myofascial continuities described in Anatomy Trains: myofascial meridians for manual and movement therapists (Myers, 2014)	*Client experiences shoulder instability attributed to frequent falls. This affects her arm myofascial continuities*
12. Practice to develop elastic recoil properties of fascia	*Hands and feet cannot tolerate elastic recoil practice*
Duration: 20–30 minutes per day	
Frequency: 2–3 times per week	
Recovery time for collagen synthesis: 2 days	

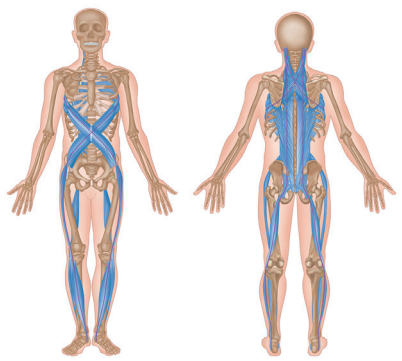
TABLE 11.4 Continued	
13. Fascia-focused movement without elastic recoil emphasis	
Duration: 30–60 minutes per day	*55 minute sessions*
Frequency: 2–6 times per week	*2 times per week*
Revise program at least every 21 days	*Program varies according to symptom severity*
14. Client cueing preferences	
Depth of touch	*Light touch*
Exteroception or interoception cues	*Exteroception*
15. Client preferences for music that facilitates rhythmic movement and concentration	*Client has hearing loss, quiet focus is best*
16. Interaction with other forms of training	*Client attends personal training sessions 2 times per week that include exercise bike and strength training machines.*
Variable-intensity interval training (VIIT)	
Aerobic exercise: 15–45 minutes, 3–4 times per week	
Strength training: 15–30 minutes, 2 times per week; 1–2 days recovery	
Mindful movement yoga, t'ai chi, qi kung, Gyrotonic®, Gyrokinesis®	

TABLE 11.5
Fascia-focused Pilates movement sequence – stimulate proprioception that supports standing balance and walking

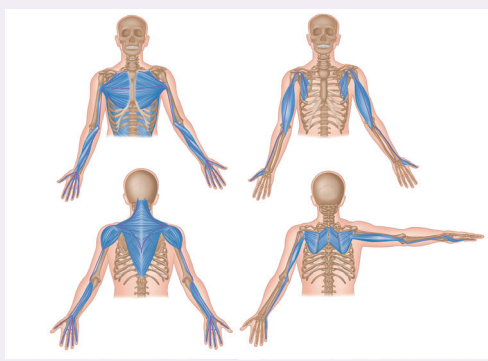
A Name and myofascial continuity	Description	
Sit on wobble board atop Pilates Chair, alternate leg press Integrate activation of the Spiral and Arm myofascial continuities	Seated trunk rotation Sit on rotator disc or wobble board placed on Pilates Chair Counter rotate the pelvis and thorax Head, neck, and eyes turn with the thorax Hold handles attached to long yellow springs Guide knees directly forward of hip joints to facilitate medial and lateral hip glides	 **A1**
Sit on wobble board atop Pilates Chair, alternate leg press Integrate activation of the Spiral and Arm myofascial continuities	Seated trunk rotation Sit on rotator disk or wobble board placed on Pilates Chair Counter rotate the pelvis and thorax Head, neck, and eyes turn opposite thorax Hold handles attached to long yellow springs Guide knees directly forward of hip joints to facilitate medial and lateral hip glides	 **A2**

Continued

TABLE 11.5 Continued

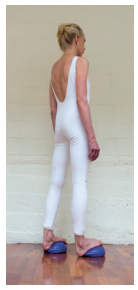


The Spiral Line* creates and mediates spirals and rotations in the body

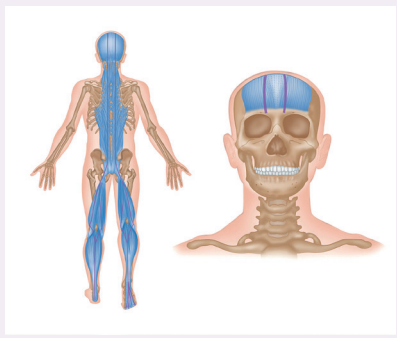


The Arm Lines* act across 10 joints in the arm to bring things toward us, push them away, pull, push or stabilize the body. The Arm Lines connect into the Lateral, Spiral and Functional Lines

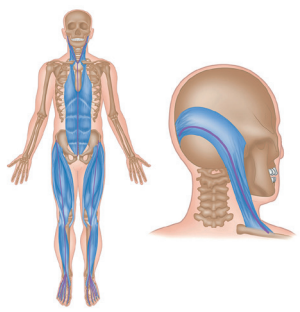
B Name and myofascial continuity	Description
Standing ankle plantar-dorsiflexion Integrate activation of the Superficial Back and Superficial Front myofascial continuities	Stand on two resilient, textured half spheres May hold bar with both hands, with each hand, with neither hand Entire central axis shifts forward and backward in the sagittal plane



B

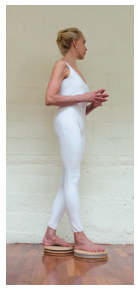
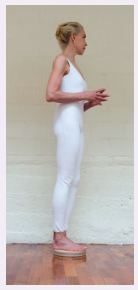


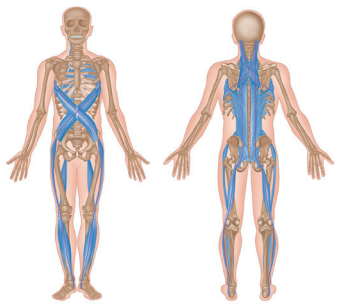
The Superficial Back Line* connects the entire posterior surface of the body from sole of foot to the eyebrows. When the knees are extended in standing the SBL functions as one continuous connection of integrated myofascia. The Superficial Back Line creates extension and hyperextension



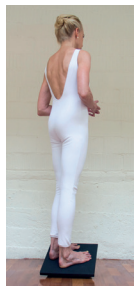
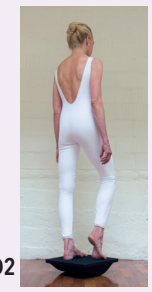
The Superficial Front Line* connects the entire anterior surface of the body from the top of the feet to the side of the skull in two pieces – toes to pelvis and pelvis to head. Standing in hip extension creates one continuous connection of integrated fascia

TABLE 11.5 Continued

C Name and myofascial continuity	Description	
Stand with each foot on a rotator disc Integrate activation of the left and right Spiral myofascial continuities	Move in the transverse plane May hold bar with both hands, each hand, and neither hand Initially, cervical spine matches thoracic rotation As proprioception improves, client may rotate cervical spine opposite thoracic spine	 C1
Stand with both feet on one rotator disc Integrate activation of the left and right Spiral myofascial continuities	Narrow base of support challenges balance May hold bar with both hands, alternating hands, and neither hand Initially, cervical spine matches thoracic rotation As proprioception improves, client may rotate cervical spine opposite thoracic spine	 C2



The Spiral Line* creates and mediates spirals and rotations in the body

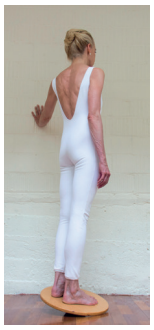
D Name and myofascial continuity	Description	
Stand on rocker board Integrate activation of the Left and Right Lateral myofascial continuities	Weight shift in frontal/coronal plane Turn rocker board to diagonal planes May alternate right and left hip unleveling together with lumbar side bending May hold bar with both hands, each hand and neither hand Both knees ought to be extended Aim ischium toward opposite heel	 D1
Stand on rocker board Integrate activation of the Left and Right Lateral myofascial continuities	Alternate single heel lift, keeping the rocker board level May hold bar with both hands, each hand and neither hand Aim ischium of lifted heel leg toward inner ankle bone of steady leg	 D2

Continued

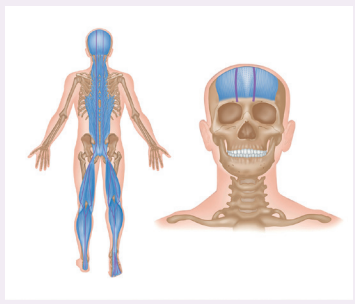
TABLE 11.5 Continued

The Lateral Line* participates in creating lateral flexion of the trunk, abduction of the hip and eversion of the foot. It functions as an adjustable "brake" for lateral and rotational movements of the trunk

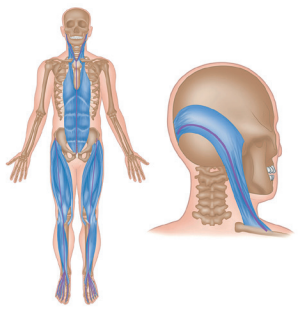
E Name and myofascial continuity	Description
Stand on wobble board Integrate activation of the Superficial Back, Superficial Front, Lateral, and Spiral myofascial continuities	Roll the rim in contact with the floor in a clockwise direction Change to a counterclockwise direction Aim the navel straight ahead, do not rotate the pelvis to face right or left Aim the fourth toes straight ahead Connect articulation of the ankle joints and the hip joints May hold bar with both hands, each hand and neither hand



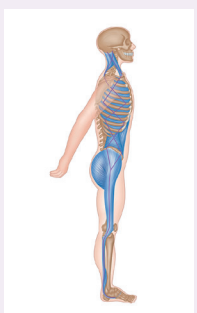
E



The Superficial Back Line* connects the entire posterior surface of the body from sole of foot to the eyebrows. When the knees are extended in standing the SBL functions as one continuous connection of integrated myofascia. The Superficial Back Line creates extension and hyperextension

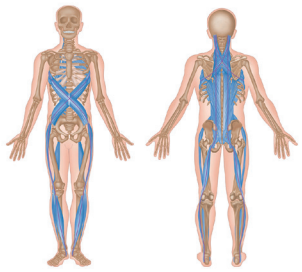


The Superficial Front Line* connects the entire anterior surface of the body from the top of the feet to the side of the skull in two pieces – toes to pelvis and pelvis to head. Standing in hip extension creates one continuous connection of integrated fascia

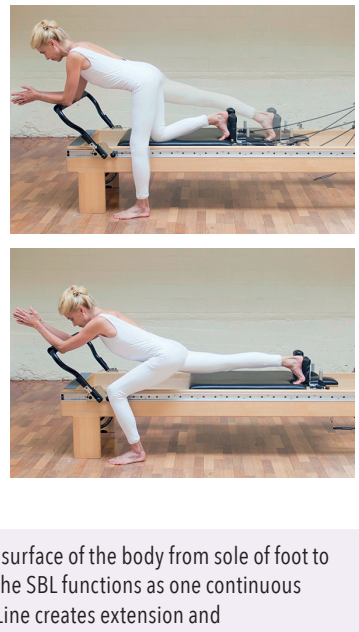


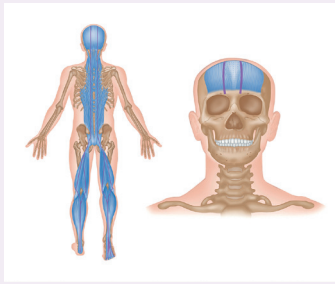
The Lateral Line* participates in creating lateral flexion of the trunk, abduction of the hip and eversion of the foot. It functions as an adjustable "brake" for lateral and rotational movements of the trunk

TABLE 11.5 Continued

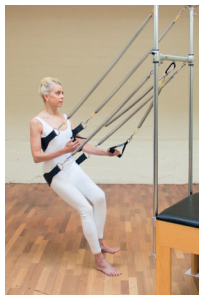


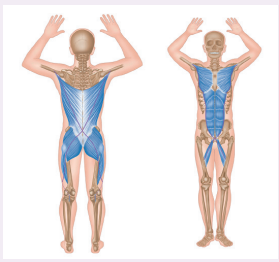
The Spiral Line* creates and mediates spirals and rotations in the body

F Name and myofascial continuity	Description	
Hip and knee flexion and extension in standing Reformer lunges Integrate activation of the Superficial Back, Deep Front, Lateral, and Superficial Front myofascial continuities	Right hip and knee in flexion with plantar surface of right foot against reformer shoulder rest Left leg stands next to frame perpendicular to the floor Bend both elbows, placing forearms in contact with the foot bar. Weight-bearing on the short lever of the arms facilitates shoulder girdle organization including activation of the lower thoracic extensors and scapular depressors During exhalation, right knee and hip extend, moving the carriage against spring resistance (spring resistance is adjusted for client capability) During inhalation, move into left knee and hip flexion, continuing to glide the carriage in the frame away from the foot bar Return to starting position	 F



The Superficial Back Line* connects the entire posterior surface of the body from sole of foot to the eyebrows. When the knees are extended in standing the SBL functions as one continuous connection of integrated myofascia. The Superficial Back Line creates extension and hyperextension

G Name and myofascial continuity	Description	
Supported lateral weight shift and single leg balance with Trapeze Table long springs and stability slings Integrate activation of the Front and Back Functional myofascial continuities	Weight shift in coronal plane Both knees in flexion Aim ischium toward same side heel Accentuate activation of left arm when balancing on right foot Accentuate activation of right arm when balancing on left foot Rotate pelvis and thorax in opposite directions	 G



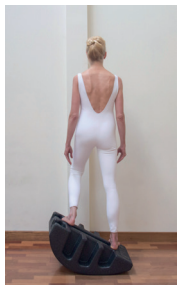
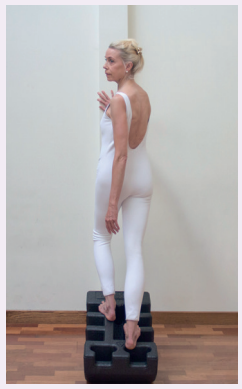
The Front and Back Functional Lines* have strong postural stabilizing functions in positions outside the standing resting posture

Standing exercises with the Pilates Chair, wobble board and rotator disc activate the Front and Back Functional myofascial continuities

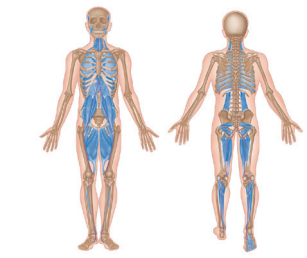
Continued

TABLE 11.5 Continued

H Name and myofascial continuity	Description	
Standing assisted squat on floor on diagonal with respect to springs Integrate activation of all the myofascial continuities	Stand at the foot of the Reformer frame at an angle with respect to the springs 1 yellow spring Lengthen the cords so that the central axis is perpendicular to the floor when the hands hold handles attached to the cords During inhalation, hip, knee and elbow flexion, moving into a squat During inhalation, ankle plantar flexion, rising onto the balls of the feet and soles of the toes During exhalation, hip, knee and elbow extension, returning to standing	 H

I Name and myofascial continuity	Description	
Stand on inverted Pilates Arc® Integrate activation of the left and right Lateral myofascial continuities	Weight shift in coronal plane Both knees extended Accentuate hip unleveling and lumbar side bending May hold bar with both hands, each hand and neither hand Aim ischium toward opposite heel Due to the asymmetry of the Pilates Arc®, the orientation shown here demands more of the right lateral pelvic stabilizers than the left	 I1
Stand on inverted Pilates Arc® Integrate activation of the Spiral and Superficial Front and Back myofascial continuities	Weight shift in sagittal plane, alternating knee flexion and extension Both knees extended, alternating ankle plantar and dorsiflexion Accentuate hip leveling and lumbar rotation toward front leg May hold bar with both hands, each hand and neither hand Aim ischium toward opposite heel Due to the asymmetry of the Pilates Arc®, the orientation shown here demands more of the left lateral pelvic stabilizers than the right	 I2

The Spiral, Superficial Back and Front, and Lateral Lines* are shown with Figure E



All of the above exercises activate **The Deep Front Line***. It comprises the body's myofascial core. It is a three-dimensional space rather than a line located between the Left and Right Lateral Lines in the coronal plane, between the Superficial Front Line and Superficial Back Line in the sagittal plane and surrounded by the Spiral Line and Functional Lines. The DFL connects the movements of breathing to walking

*Anatomy Trains® is the myofascial map created by Thomas W. Myers (2014). These seven categories of myofascial continuity provide a structure for organizing fascia-focused Pilates movement.

Drawings of The Spiral Line, Arm Lines, Superficial Back Line, Superficial Front Line, Lateral Line, Front and Back Functional Lines and Deep Front Line from Fascia in Sport and Movement, *Chapter 6, are reproduced with kind permission from Jon Hutchings and Lotus Publishing Ltd.*

TABLE 11.6
Fascia-focused planning guide for aging well – exercise selections

Client diagnosis or condition of concern: 80-year-old female with peripheral neuropathy, Charcot–Marie–Tooth neuropathy

Exercises selected by instructor *shown in **Table 11.5***	Fascia-focused movement criteria Movement requirements: Movements are sustainable for motor control refinement and collagen remodeling Movements encourage awareness of the biotensegrity model* Access all appropriate myofascial continuities in optimal sequence for client profile	Mat	Reformer	Chair	Trapeze Table	Pilates Arc®	Additional	Movement outcomes: Facilitate tissue hydration	Develop glide of the fascial system	Stimulate tissue renewal	Develop tissue resilience	Develop regular lattice with crimp	Develop elastic recoil
*"A tensegrity structure provides a global response to a local mechanical stress. The result is a degree of independence from the force of gravity. Without a tensegrity model, our fibrillar structure would collapse under gravitational force. With the tensegrity model, our structure absorbs and disperses the compression by spreading the load throughout the entire network, including the structures at the periphery." (Guimberteau & Armstrong, 2015)													
Note: client reports she cannot feel her hands and feet	Interoception – interstitial nerves in fascia serve an interoceptive, rather than proprioceptive or nociceptive function. Stimulation of those free nerve endings provides information about the condition of the body in search for homeostasis in relation to physiological needs. Interoceptive signaling is associated with feelings such as warmth, nausea, hunger, soreness, effort, heaviness or lightness. Perceptions about internal somatic sensations are associated with emotional preferences and feelings (Schleip & Baker, 2015)												
Sit on wobble board on Pilates Chair, alternate leg press ***A1 & A2***	Kinesthetic acuity – kinesthesia (dynamic proprioception), the aptitude to sense the position and movement of the limbs and trunk			•				•	•		•		
Standing ankle plantar and dorsiflexion ***B***	Dynamic stretching – slow and fast tempo variations						•	•	•	•	•		
Stand with each foot on a rotator disc ***C1***	Flowing movement sequences						•	•	•		•		
Stand with both feet on one rotator disc ***C2***	Proprioceptive refinement – proprioceptive sensations are connected with position, tendon and muscle sensations						•	•			•		
Stand on rocker board ***D1 & D2***	Whole-body movements simultaneously involving large areas of the neuromyofascial system						•	•	•		•		
Stand on wobble board ***E***	Multidirectional movements with slight changes of angle						•		•		•		
Hip and knee flexion and extension in standing Reformer lunges ***F***	Kinesthetic acuity – kinesthesia (dynamic proprioception), the aptitude to sense the position and movement of the limbs and trunk		•					•	•	•	•		
Supported lateral weight shift and single leg balance with Trapeze Table long springs and stability slings ***G***	Whole-body continuity – connect trunk to limbs and limbs to trunk while connecting deep structures to superficial ones and superficial structures to deep ones				•		•	•	•	•	•		

Continued

TABLE 11.6 Continued

Client diagnosis or condition of concern: 80-year-old female with peripheral neuropathy, Charcot–Marie–Tooth neuropathy								Movement outcomes					
Exercises selected by instructor *shown in **Table 11.5***	Fascia-focused movement criteria Movement requirements: Movements are sustainable for motor control refinement and collagen remodeling Movements encourage awareness of the biotensegrity model* Access all appropriate myofascial continuities in optimal sequence for client profile	Mat	Reformer	Chair	Trapeze Table	Pilates Arc®	Additional	Facilitate tissue hydration	Develop glide of the fascial system	Stimulate tissue renewal	Develop tissue resilience	Develop regular lattice with crimp	Develop elastic recoil
Standing assisted Reformer squat oriented at an angle with respect to the springs and the carriage motion ***H***	Force/load transfer – movements that transfer force/load through the neuromyofascial system		•					•	•	•	•		
Stand on inverted Pilates Arc®, coronal plane weight shift ***I1***	Preparatory countermovement					•		•	•	•	•		
Stand on inverted Pilates Arc®, sagittal plane weight shift ***I2***	Movement initiation – connect proximal structures to distal ones and distal structures to proximal ones					•		•	•	•	•		

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Pilates Anytime Classes

www.pilatesanytime.com

Note: Clips from these classes are available to those who purchase the book. Video clips are available free of charge at: www.pilatesanytime.com/fascia. Use redemption code FASCIA.

Chapter 11 Aging well, a fascia-focused movement perspective

FIGURE 11.2

Mat Workout (2016)

http://www.pilatesanytime.com/u/fm104

FIGURE 11.2

Foot Festival (2013)

http://www.pilatesanytime.com/u/fm105

FIGURE 11.2

Foot Festival (2013)

http://www.pilatesanytime.com/u/fm106

TABLE 11.5 H

Reformer Workout (2016)

http://www.pilatesanytime.com/u/fm67

TABLE 11.5 A1

Wunda Chair Workout (2012)

http://www.pilatesanytime.com/u/fm107

TABLE 11.5 A2

Wunda Chair Workout (2012)

http://www.pilatesanytime.com/u/fm108