Abstract: Most widely used relaxation methods produce both a generalized “relaxation response” and specific effects related to particular characteristics of the method. This chapter reviews the effects of three of the most widely used relaxation techniques: progressive muscle relaxation, autogenic training, and clinically standardized meditation. Progressive relaxation most directly affects muscular systems; autogenic training produces autonomic effects; and meditation methods show cognitive effects. The chapter outlines the pathways by which each method addresses muscular, autonomic, and cognitive manifestations of stress.

A number of relaxation techniques have been used to help people manage stress. Most prominently, these include progressive relaxation (PR), biofeedback, autogenic training (AT), various meditation methods, and several cognitive interventions. There is considerably less empirical data available to evaluate the relative effectiveness of other procedures. These include listening to relaxing music, doing aerobic exercise, controlled breathing, postural relaxation methods (such as those described by F. M. Alexander, 1974, and Moshe Feldenkrais, 1977), and other methods.

Documented Applications: Specific Effects
For almost three decades, an unresolved question for stress management practitioners has been whether these techniques all elicit a single "relaxation response", as proposed by Benson (1975). An alternate hypothesis is that they have specific effects, as proposed by Davidson and Schwartz (1976): specific cognitive effects for cognitively oriented methods, autonomic effects for autonomically oriented methods, and muscular effects for skeletal muscularily oriented methods. Davidson and Schwartz hypothesize that progressive relaxation (PR) therapy has predominantly somatic effects, because it emphasizes development of a muscular skill. Autogenic Training (AT), on the other hand, might be expected to generate both cognitive and somatic effects (Linden, 1993). It emphasizes achieving of body homeostasis through self-suggestion and it involves repeating an internal verbal formula (a cognitive process) that has a specific somatic focus, e.g., "My arms are warm", "My forehead is cool," etc.

In assessing specific cognitive effects of various stress management techniques, the term "cognitive" requires definition. We use it broadly to denote either 1) the act of thinking about something or 2) the content of a thought, e.g., that an event is stressful. The specific effects theory would predict greater effects for cognitively-focused treatments on both types of cognitive activity. Meditation methods target the first of these activities. They can also affect the latter, by providing an alternate activity through which the practitioner can block generic "worry" activity that could reinforce a negative or catastrophic interpretation of events. Mental focus on a verbal mantra, according to this hypothesis, might be expected to inhibit any other type of verbal activity, including worry. Mantra meditation's greatest and most direct effect might therefore be expected to be a reduction in the quantity of verbal thought processes. Cognitive therapy (Beck, 1993) is more specifically focused on modifying the content of cognitions. It therefore should be expected to have greater effect on this aspect of cognition than meditation therapy.

The research literature has revealed considerable evidence for specific effects, although these sometimes are superimposed on a more generalized relaxation response (Lehrer & Woolfolk, 1993). PMR tends to have the greatest muscular effects (e.g., for treating tension headaches, muscular spasms, etc.), AT the greatest autonomic effects (for treating migraine
headaches, hypertension, etc.), and mantra meditation the greatest cognitive effects (for treating anxiety conditions, etc.).

**Anatomy, Physiology, and Psychophysiology**

The overlap among these methods is most striking when people have become very expert at them. Thus, Jacobson (1938) reports cases of patients given extensive training only in muscle relaxation who concomitantly produce significant decreases in blood pressure, improvement in various gastrointestinal problems, and decreased anxiety levels. At extraordinarily low levels of muscle tension throughout the body, people appear not even to be able to think. The research of Jacobson (1938) and McGuigan (Lusebrink & McGuigan, 1989) have found that visual imaging inevitably involves tension in the muscles of the eyes, while verbal thoughts involve sub-vocalization and tension in the mouth and throat. Kinesthetic thoughts involve muscle tension throughout the body, particularly including the eyes and the area of the body targeted by thoughts. Thus, blocking muscle tension in the facial muscles may have a direct effect in blocking cognitive activity, similarly to mantra meditation. Additionally, because of a direct connection between the reticular arousal system and muscle efferents (Gellhorn, 1958), a dramatic decrease in muscle activity throughout the body can produce a major decrease in sympathetic arousal, and, presumably, vice versa. More recently, it has also been determined that skeletal muscle activity is closely related to sympathetic activation (Passatore, Deriu, Grassi, & Roatta, 1996; Potts, Hand, Li, & Mitchell, 1998), so more direct pathways may exist between muscle relaxation and decreased sympathetic arousal. Jacobson (1938) instructed patients that anxiety was inevitably accompanied by muscle tension, and that elimination of muscle tension directly reduced anxiety. Jacobson claimed that even low-levels of muscle tone can be eliminated by learning the most subtle level of muscle control.

Similarly, autonomic changes mediated by autogenic training may produce muscular and cognitive relaxation. In each autonomic exercise, the individual mentally repeats a specific verbal
formula. This activity may thus block cognitive activity by a pathway similar to that of mantra meditation. Also, changes in cognitive activity produce related changes in physiological functioning. Worry, preparation for activity, hopelessness, and the assessment of danger all produce physiological changes. Any method that effectively blocks maladaptive mental activity should also produce correlated psychophysiological effects.

Novices at any of these methods might be expected to experience less generalized effects, because deeper levels of relaxation usually are not achieved until the individual has become relatively expert in any of the methods. The literature on these methods must be interpreted with this consideration in mind, because almost all studies of all methods have involved relatively brief exposure, particularly compared to the many months (and even years) of training undertaken by serious meditators, and by serious students of Jacobson’s progressive (1938) relaxation and disciples of Schultz’s autogenic training (Schultz & Luthe, 1969).

Other factors besides strength of effect may also be important in deciding the type of intervention to use in any particular case. Whether a person likes practicing a particular method may be critically important. A technique that is taught but not practiced has no therapeutic effect.

Additionally, Smith (1999) hypothesized that these relaxation methods are best taught in a specific order, beginning with the most physical (progressive relaxation), gradually progressing toward more mental and abstract (autogenic training), and finally to meditation, the most abstract. In support of this recommendation, he notes that Eastern meditative disciplines begin training with physical exercises, and then progress gradually to methods that are more specifically directed toward experiencing mental states (sense of “oneness”, enlightenment, etc.)

We also note that all techniques involve multiple response components. Meditation methods are the most complex. Stemming from Eastern religious traditions, they all involve physical as well as mental focus, although the major “goal” is usually more of a subjective state. In addition to achieving a sense of immediacy, mental clarity, and sometimes bliss, these methods are often accompanied by a world-view, lifestyle, and system of values that also would promote such a mental (and through it, physiological) effect. Thus some of these methods may train people in
self-management through many converging pathways simultaneously. Even the methods focused more narrowly on physical effects have some mental effects, as mentioned earlier.

**Diseases Treated**

Stress management and relaxation methods have been incorporated in treatment components for most diseases and disorders involving autonomic, emotional, and immune system dysfunction, because of the well-known relationship between stress and vulnerability to these disorders (Critelli & Ee, 1996).

**Treatment Protocol: Jacobson’s Muscle Relaxation Method**

“Progressive relaxation” has been applied within several quite different muscle relaxation methods. This chapter will emphasize the work of Edmund Jacobson himself, because it provides the most intensive physiological training. Specific contrasts between Jacobson’s method and other “progressive relaxation” methods have been described elsewhere (Lehrer and Woolfolk, 1993).

*Learning principles and treatment protocol.* The method involves the following principles:

1) Train awareness of muscle tension in specific muscles, and simultaneous training in control of this tension.

2) Avoid external methods for “producing” relaxation (such as use of suggestion, “relaxing” environments, etc.).

3) Train muscles or muscle groups one at a time, until awareness and control of each muscle is individually learned.

4) Achieve zero tension in each muscle (as measured either subjectively or by surface electromyography).

5) Use the “method of diminishing tensions”, whereby the trainee is taught to recognize muscle tension sensations using progressively lower levels of deliberate tension in each muscle.

6) Achieve a state of complete passivity, because doing anything inevitably involves muscle
tension.

In addition to presenting the rationale that anxiety and stress-related symptoms are inextricably coupled with muscle tension, the following essential procedural points are repeated throughout training:

# We call relaxation a switching off or "going negative" to indicate that no effort is required to relax.
# An effort to relax is a failure to relax.
# By learning to “switch off” when tense, the trainee will not only feel more relaxed but also will save energy that can be used more efficiently for other things. Wasting energy in muscle tension and nervous habits can cause fatigue, much as leaving the lights on unnecessarily can run down an automobile battery. Jacobson uses the metaphor of “switching off” as analogous to running a machine. When the power switch is off, the machine is completely inactive. This is the goal of muscle relaxation. To “switch off” is to remain completely relaxed, without doing anything.
# Practice this technique for one hour every day in order to learn how to detect and control tension. Apply relaxation skills 24 hours a day. This is called differential relaxation. The therapist must teach the trainee how to perform differential relaxation by practicing relaxing while carrying out in the office activities such as reading and conversing that are part of daily living.

# The goal is to notice muscle tension automatically throughout the day, and to be able to relax at will during daily activities.

Feelings of anxiety are related to muscle tension. Nervousness, tension, or even thinking about an anxious situation, inevitably produces muscle tension. The goal of training is to recognize tension and to relax it away voluntarily.
# Learning relaxation is a gradual process. It may take several days or several weeks before any benefits are noticed.

# By individually tensing and relaxing various muscles throughout the body, the trainee will learn to notice and control tension. Tensing muscles does not automatically produce relaxation. It just teaches the trainee to recognize and control feelings of muscle tension.

# For each muscle, first ask the trainee to tense it just enough to feel the “control sensations” (i.e., the sensations accompanying muscle tension) and to distinguish these from other sensations that also might accompany a particular muscular maneuver (e.g., straining a joint, or passive stretching of a muscle). Then proceed to use the “method of diminishing tensions”, whereby the individual detects tension at progressively lower levels of contraction, until the individual is just imagining the contraction.

# After the Method of Diminishing Tensions, instruct the trainee to switch off. Ask if the trainee still feels residual tension in the muscle. This is the sensation that the trainee should try to detect in the body at other times when tension may be a problem. Explain that the relaxation, not the tensing, is the most important activity of the session.

# Relaxing is the opposite of doing. Trying too hard will prevent relaxation.

# Emphasize that tensing the muscles is not the way to relax. It is the way to recognize what one is doing when tense. The trainee must develop control over the muscles, so voluntary relaxation is possible.

# Troubleshooting Problem Muscles At any point during training, a trainee may experience difficulty in recognizing tension, may find it difficult to discriminate tension from other interoceptive stimuli (like the stretching of counter-posing muscles), or may just not "get it." Here are five strategies to assist the trainee in recognizing and acquiring control of muscle tension.
G Therapists use their own hands to offer resistance to the movement that the trainee has been instructed to make. This increases muscle sensations and makes them easier to perceive.

G Trainees touch the place where they should be feeling a signal that gives them control, and the therapist then has them make the movement, asking if any sensation of tension can be felt there.

G The therapist can lightly touch the spot where trainees should be feeling a control signal and then have them make the movement, asking if any sensation of tension can be felt there.

G The therapist can tell trainees that this area may be an individual trouble spot," and if so, with practice the perception of sensations from it should become easier. The more generally relaxed the trainee is, the easier it will be to feel the tension.

G Surface EMG biofeedback can be used on occasion to verify whether the trainee's perceptions of tension are in fact valid.

# Home Practice. After each session, review the general instructions with the trainee. The trainee is instructed to spend one hour a day practicing what has been learned, and to add each muscle group to those learned in previous sessions. Minimum muscle tension should be used, just enough to allow the trainee to recognize the sensations of tension. In addition, instruct the trainee to check his/her muscles several times during the day and release tension, particularly when experiencing emotional or physical tension.

PROGRESSIVE RELAXATION OF THE ARMS

For each of these steps, start first with the dominant arm and then repeat for the non-dominant arm after several minutes of relaxation. Try not to tell the trainee where the sensations of tension
should be felt, unless the trainee appears to become frustrated. Let the trainee discover this through repeated tensing. If the sensations cannot be perceived after several attempts and some counterforce, move to another muscle group. Eventually, however; the therapist may point out the correct spot.

1. Keeping the arm relaxed on the arm of a chair, the trainee is instructed to bend the hand back at the wrist at a 45-degree angle. Observe tension in the back of the upper part of the forearm (the forearm extensor muscle). Point out the differing sensations of tension in this muscle (on the back of the forearm, approximately two-thirds of the distance to the elbow). This sensation should be contrasted with the more easily perceived sensation of strain in the wrist joint and the passive stretching of the opposing muscle (on the under-side of the arm). Actual muscle tension is usually perceived as a slight squeezing sensation, whereas joint strain may actually be painful, and passive sensations may appear as qualitatively different stretching sensations. When the sensations are correctly perceived, instruct the trainee to switch off.

2. After several minutes of relaxation, the instruction is repeated for the other arm.

3. Bend the hand forward from the wrist. Observe tension in the inside (ventral) surface of the forearm, the flexor.

Sensations of stretching may occur in the extensor, as may strain in the wrist.
4. Keeping the forearm relaxed, bend the arm back at the elbow to about 45°, as if moving to touch the shoulder with the back of the hand. Tension is observed in the biceps. Turn the palm up for stronger sensations.

5. Press the hand and forearm down on the surface of the armrest or couch (use a book under the wrist if the tension is difficult to feel and more bending is needed). Observe tension in the back of the upper arm (triceps).
PROGRESSIVE RELAXATION OF THE LEGS

Relaxation of the leg muscles is best done in a reclining position on a bed, couch, or reclining chair. For each of these steps, start first with one leg and then repeat for the other leg.

1. Bend the foot at the ankle, pointing the toes towards the head. Observe tension along the front of the lower leg (leg extensor), and stretching sensations in the flexor.

2. Bend the foot down at the ankle, pointing the toe away from the body. Observe tension in the calf (flexor).

3. Extend the lower leg, straightening the knee. Tension will be felt on the top of the lap.
4. Press the heel back, bending at the knee, as if trying to kick oneself in the rear end. Observe tension along the back of the thigh.

5. Lying supine with one leg dangling off the side of the bed, or sitting in a chair, raise the knee of the dangling leg. Observe tension in muscles deep in the abdomen, toward the back and near the hip.
6. Place a pillow under the back of the knee if supine. Press the back of the knee and upper leg down onto the pillow. If sitting in a chair, press foot down onto the floor. Observe tension in the buttock.

PROGRESSIVE RELAXATION OF THE TRUNK

1. Squeeze the abdomen in. Observe tension all over the abdomen.

2. Arch the back. Observe tension on both sides of the lower spine.

3. Bend the shoulders back. Observe tension in the back between the shoulder blades.

4. Bring the left arm over and across the chest, pointing to the opposite wall. Let the arm just fall over the chest and relax when a tension signal is noticed. Observe tension in the front of the chest, near the left arm (pectoral muscles).

5. Raise the shoulders as if in a shrug. Observe the tension along the top of the shoulders and in the back of the neck.

6. Concentrate on breathing. Feel the sensation of tension in the chest when inhaling. When exhaling, switch off. If the tension is not noticeable, take a slightly deeper breath. Observe a
vague tenseness all over the chest and/or abdomen while inhaling.

**PROGRESSIVE RELATION OF THE NECK**

This training is sometimes combined with the training in session 3.

1. Bend the head back so that the chin points to the ceiling. Observe the tension in the back of the neck.

2. Raising the head slightly, bend the chin down to the chest. Feel the tension in the sides of the neck towards the front.

3. Facing forward, bend the head to the left as if trying to touch the left ear to the shoulder. Observe the tension on the left side of the neck, and stretching on the right.

4. Repeat this, bending the head to the right.

**PROGRESSIVE RELAXATION OF THE EYE MUSCLES**

1. Wrinkle the forehead by raising the eyebrows. Feel the tension diffusely over the entire forehead.
2. Frown or bring the eyebrows together. Observe tension in the forehead, above the nose.

3. Close the eyes tightly. Observe tension all over and around the eyelids.

4. With eyelids closed, look up and notice tension toward the top of the eyeball. Look down and notice tension toward the bottom of the eyeball. Look to the right and notice tension on the right of the eyeball, and stretching to the left. Then repeat this looking to the left, and feel the tension on the opposite side.

5. With the eyes closed and without deliberating moving the eyeballs, imagine being at a tennis game, sitting at the net. Visualize the ball as it goes from side to side. Observe the tension inside the eyeballs from side to side. Thereafter, notice tension in the eyeball whenever a visual thought occurs.

PROGRESSIVE RELAXATION OF THE SPEECH REGION

1. Clench the teeth. Observe the tension in the jaw and temples.
2. Open the mouth and jaws. Observe the tension under the chin and stretching in the jaw.

3. As if smiling, show the teeth. Observe tension in the cheeks.

4. Push the tongue against the front teeth. Observe tension in the tongue.

5. Press tip of tongue down to the bottom of the mouth and pull it backwards toward the throat.
   Observe tension in the tongue and in the floor of the mouth.

6. Purse the lips. Feel the tension in and around the lips

7. Count out loud from one to ten, noticing tension in the area of the vocal cords as well as in the tongue, lips, chest, etc. Muscle tension should be differentiated from the vibrations of the cords.

   Then say the alphabet. Begin in a normal speaking voice, and gradually speak more softly, reaching a whisper by the letter L, and only thinking the alphabet by the time your reach the letter Q. It is helpful for the therapist to speak along with the trainee at first. Tension also may be observed in the cheeks, lips, tongue, jaw muscles, throat, chest, and perhaps abdomen. If trainees have difficulty perceiving this tension, they should count in a high-pitched voice to increase the tension.
DIFFERENTIAL RELAXATION AND USING PROGRESSIVE RELAXATION IN DAILY LIFE

Give the trainee a book to read, with instructions to continue relaxing even while reading. Give feedback, instructions, and encouragement. Talk with the trainee about situations or circumstances that may arouse some feelings of stress or emotion. Note generalized tension, particularly in the arms, legs, and facial muscles, and remind the trainee to try to keep relaxed while talking. Give immediate feedback when tension is noticed. Speak with the trainee about applications of differential relaxation in daily life and the use of scheduled relaxation periods during times of stress.

Treatment Protocol: Autogenic Training

Autogenic training was developed by the German physician Johannes Schultz, who lived and worked contemporaneously with Edmund Jacobson, in the first part of the 20th century. In developing this technique he was heavily influenced both by European applications of hypnosis and hypnotic phenomena, and by Japanese methods of Zen meditation. Elements of both are combined in the technique. More complete descriptions of the method and its effects are available elsewhere (Schultz & Luthe, 1969)

Although autogenic training is essentially a self-hypnotic technique, there is some debate among practitioners whether it should be considered to be a type of hypnosis, primarily because it formal hypnotic induction does not take place, and because no hypnotist is involved.

The autogenic method is taught while the trainee sits or lies in the “autogenic position.” This involves lying supine, with arms at the side and legs uncrossed; or sitting on a chair, with the head’s center of gravity balanced on the neck, so that the head does not fall, with the arms on the lap, and
the muscles relatively relaxed. As in progressive relaxation, the practice and training sessions are a method by which the trainee is taught a skill that can be applied at any time, even while doing other activities.

Some practitioners (Norris & Fahrion, 1993) use biofeedback methods, particularly hand temperature warming, along with autogenic training. Freedman, however (1991) found that the effects of brief exposure to autogenic training tend to differ somewhat from the effects of finger temperature warming biofeedback. The latter method tends to produce warmer hands, while autogenic training produces a deeper sense of relaxation. Freedman points out that the physiological mechanism for hand warming is rather complex, involving both a decrease in alpha and an increase in beta sympathetic activation. Relaxation, which tends to reduce sympathetic arousal, may have mixed effects on finger temperature.

Indeed, Schultz (Schultz & Luthe, 1969) did not classify autogenic training as a “relaxation” technique. He argued that improved self-regulation, not deep relaxation, is the goal for autogenic training. He conceptualized the method as freeing the body from inappropriate blockage of psychophysiological energy, so that it can regulate itself more effectively.

The method begins with the six “standard exercises”. These involve having the trainee perform mental repetition of “autogenic formulas” involving specific body sensations. As in progressive relaxation, the trainee is advised not to “try” to achieve a particular sensation, but to engage only in “passive concentration” on it, i.e., to imagine what the sensation might be like, but not to try to achieve it. Schultz points out that the act of doing the autogenic exercise produces beneficial effects regardless of whether the specific sensations are experienced; and, indeed, that about half of trainees do not experience the suggested sensations during early stages of treatment.

The exercises are usually given one at a time, at approximately equal intervals. The trainee
is instructed to practice them initially for very brief periods (30 seconds - 1 minute) several times each day, and gradually to increase the practice time.

The six standard exercises are as follows:

I. **Heaviness in the limbs**
   
   A. My right arm is heavy  
   B. My left arm is heavy  
   C. My right leg is heavy  
   D. My left leg is heavy  

II. **Warmth in the limbs**
   
   A. My right leg is warm  
   B. My left leg is warm  
   C. My right leg is warm  
   D. My left leg is warm  

III. **My heartbeat is calm and regular.**

IV. **It breathes me (automatic breathing).** Although this phrase sounds awkward in English, it conveys the meaning of a passivity with regard to breathing. The trainee is instructed to allow breathing to occur automatically, without any voluntary effort.

V. **My solar plexus is warm** (warmth in the area slightly in front of the spine, below the sternum)

VI. **My forehead is cool**

   These formulas are often interspersed with the formula “My mind is at peace.”

   Each exercise is followed by specific “termination” instructions: squeeze the fists two
times, take a slow deep breath, slowly let it out, and then open the eyes.

Practicing autogenic exercises can be accompanied by unanticipated and often unpleasant side effects. Although all methods of relaxation training can produce “relaxation-induced anxiety” on occasion, autogenic training tends to produce these sensations more frequently than muscle relaxation (Heide & Borkovec, 1983), for reasons that are unknown. Although this experience occurs even to the most experienced autogenic training practitioners, it is most common among novices to the method. Schultz (Schultz & Luthe, 1969) describes these events as “autogenic discharges,” caused by a sudden discharge of pent-up nervous energy. This “hydraulic” model of emotional regulation is not accepted in modern psychology. Alternatively, the phenomenon could be ascribed to disinhibition and consequent lapses in self-regulation. Other forms of disinhibition frequently occur during autogenic training, including a dream-like uncritical stream of consciousness, similar to that described in psychoanalytic terminology as “primary process thinking.” Physical sensations are common experiences, particularly pain or discomfort related to previous illnesses, injuries, or surgeries. Intense emotion, fear, and/or tearfulness are not uncommon. Perhaps these sensations are normally inhibited by higher neural circuitry that is temporarily disabled during autogenic exercises.

Although autogenic discharges can sometimes cause sufficient discomfort to necessitate termination of training, they also can have beneficial effects. Schultz argues that release of pent-up energy allows the body to regain its equilibrium. Alternatively, we could interpret the beneficial effects as similar to those commonly prescribed by behavior therapists for treating panic disorder and other conditions involving fear and avoidance of particular sensations. Exposure and response prevention (deliberate experience of the unpleasant sensations or stimuli and blocking of the usual
methods of avoiding them) are considered to be critical components in treating a variety of psychological ailments (Lang, Craske, & Bjork, 1999). Autogenic discharges may produce just such an effect. Through autogenic discharges, the unpleasant sensations are re-experienced, sometimes repeatedly. Either through extinction of a classically conditioned emotional response or by cognitive restructuring in response to deliberate thought about them, the sensations no longer produce as great an emotional response.

Considering the specific hypnotic aspects of autogenic training can be helpful to the clinician. In inducing a hypnotic trance, the hypnotist commonly instructs the subject only to experience what the subject is, in fact, experiencing anyway. This is a well-known method for overcoming resistance to hypnotic suggestion. In autogenic training, this is done by avoiding any instructions to experience anything that will not, in fact, occur. The standardized nature of the autogenic training situation allows the experienced practitioner to predict the full variety of responses to the autogenic situation, and provide appropriate instructions. Thus, in passive concentration instructions, the vast majority of trainees can easily imagine specific body sensations, although actually experiencing them may be more difficult. Hence, the trainee is specifically instructed not to try to experience them; and even the unpleasant side effects of autogenic training are reinterpreted as beneficial, and part of the therapeutic process. Also, thinking about a particular sensation can, at times, bring the sensation about. Often a trainee may feel frightened about various physical sensations, including those associated with relaxation, and may avoid thinking about them. Autogenic training raises awareness of these sensations, and allows the trainee to habituate to these sensations. Because fear of one’s own body can contribute to anxiety, habituation to physical sensations can increase the sense of well-being. This further reinforces the hypnotic power of the autogenic instructions.
After learning the standard exercises, autogenic methods are often used to induce physiological changes in specific areas using “organ-specific formulas”, and to produce self-hypnotically-induced behavioral changes.

**Treatment Protocol: Clinically Standardized Meditation**

Among the clinically oriented meditation techniques, “clinically standardized meditation” (CSM) (Carrington, 1978), the “respiratory one method” (ROM) (Benson, 1975) and “mindfulness meditation” (Kabat-Zinn, 1982) have been the most widely used to date. These techniques were devised with clinical objectives in mind.

Optimal use of meditation in a clinical setting depends upon teaching the trainee to manage the technique successfully — a consideration that can easily be overlooked. Unless routine problems arising during the practice of meditation are handled correctly, the likelihood of obtaining satisfactory compliance is poor. If the technique is adjusted to meet the needs of the particular trainee, however, compliance is often excellent (Carrington, Collings, Benson, Robinson, Wood, Lehrer, Woolfolk, & Cole, 1980).

It is doubtful that meditation can ever be taught effectively through written instructions, because correct learning of the technique relies on the communication of the “meditative mood.” The mood refers to a subtle atmosphere of tranquility best transferred through nuances of voice and tonal quality (Carrington, 1977). Meditation can be taught successfully by means of tape recordings (Carrington et al., 1980) providing the latter effectively convey this elusive meditative mood. In addition, the recorded teaching system should be thorough so that the trainee learns to handle any minor problems that may arise on the way to mastery of the technique.

The CSM method (which incorporates ROM as an alternative form of meditation) teaches meditation with cassette tapes and a programmed instruction text, and comprises a total training
program in meditation. Because of these advantages, the following discussion on method is confined to CSM. Since instruction in this method can also be carried out in person by instructors trained in this method, however, the person-to-person instruction protocol is the one summarized here.

Whatever the method of instruction (recorded or in person), close clinical supervision of the meditation practice is strongly recommended. Clinicians are in a strategic position to introduce the idea of learning CSM to their trainees by referring to specific difficulties or symptoms that the trainee has previously identified. Given the absence of any validated predictive measures (Carrington, et al., 1980), a clinician attempting to assess the suitability of meditation for a particular trainee must seek to determine whether this trainee shows one or more meditation-responsive symptoms or difficulties, such as anxiety or physical discomfort.

Training should occur in a quiet, uncluttered room where the trainee can be alone. This room should contain two comfortable straight-backed chairs and a visually pleasant object such as a plant or vase, upon which the trainee can gaze when entering and exiting from meditation. While these arrangements seem simple, they should be carefully followed for maximum effect.

Trainees receiving personal instruction first select a soothing sound (“mantra”) from a list of 16 such sounds in the workbook. They are instructed to choose the one that sounds most pleasant and soothing to them, or to make up a mantra according to simple instructions. The mantras used in CSM are resonant sounds (often ending in the nasal consonants “m” or “n”) that have no meaning in the English language, but that, in pre-testing, have been shown to have a calming effect on many people. Such sounds as “Ah-nam”, “Shi-rim”, and “Ra-mah” are among those used. After the trainee has selected a mantra, training is conducted in a peaceful setting removed from any disturbances that may detract from the “meditative mood”. The instructor walks quietly, speaks in
low tones, and typically conveys by his or her behavior a respect for the occasion of learning meditation.

When teaching meditation, the instructor first repeats the trainee’s mantra out loud in a rhythmical manner to demonstrate how this is done. The trainee then repeats the mantra out loud in unison with the instructor, and finally alone. He or she is next asked to “whisper it” and then simply to “think it to yourself” silently, with eyes closed. Instructor and trainee then meditate together for a period of 10 minutes, after which the trainee remains seated for a minute or two with eyes closed, allowing the mind to return to “everyday thoughts”. The trainee is then asked to open his or her eyes very slowly. At this point, the instructor answers any questions the trainee may have about the technique and corrects any misconceptions; he or she then leaves the room so that the trainee can meditate alone for a stated period of time (10 - 20 minutes). The experience of meditating on one’s own is included in order to “wean” the trainee as soon as possible from dependency on the instructor’s presence when meditating and allow for generalization of the experience to the trainee’s life outside of the office.

Immediately following the instruction session, the trainee completes a post-instruction questionnaire and reviews his or her responses with the instructor. In a post-instruction interview, procedures for home meditation practice are clarified, and instructions are given for the trainee’s meditation program during the next week. The trainee is then told about possible side effects of meditation (Carrington, 1999) and is taught how to handle these should they occur. The trainee is usually instructed to practice meditating for approximately 20 minutes, twice daily, although shorter periods are prescribed when the trainee experiences transitory unpleasant effects.

Individual follow-up interviews are held at intervals. Alternatively, group meetings are scheduled where new meditators can gather to share experiences, meditate in a group, or pick up
new ideas on handling any problems that may have arisen in their practice. Trainees then learn to adjust their techniques to suit their own individual needs and life styles. A careful follow-up program leads to much more satisfactory compliance with a continued program of meditation.

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Jacobson’s progressive muscle relaxation technique:

Differences from conventional ‘progressive relaxation’. Experience it.

(Advanced workshop)

Paul Lehrer, PhD
University of Medicine and Dentistry of New Jersey, Piscataway, NJ, USA
Progressive Muscle Relaxation

- Teach profound control over muscle tension
- Thereby decrease sympathetic arousal and psychophysiological reactivity
- Treat tension-related diseases
  - Almost all diseases have tension components
- Even *thinking* is related to muscle activity
USEFUL REFERENCES

Progressive muscle relaxation

- Teach profound control over muscle tension
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- Treat tension-related diseases
  - Almost all diseases have tension components
- Psychological experience of relaxation is indirect
History of Progressive Relaxation

- Early work on the experience of thinking
- Fire in Chicago
- Influence of Walter Cannon
  - Wisdom of the body
  - “homeostasis”, autonomic balance
- Influence of William James (peripheralism)
- Influence of Titchner (introspection)
- Muscle control and the startle reflex
  - Margaret Miller
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- McGuigan’s cognitive research
  - Verbal thought and the muscles
  - Visual thought and the muscles
  - Kinesthetic imagination and the muscles
  - Hallucinations and the muscles
Other Muscular Activity Correlates

- Sympathetic ns connections (Hubbard and Gevirtz) (muscle sympathetic reflexes)
- Individual differences in relaxation time
  - Athletics: Vaschillo
    - The best athletes have faster relaxation time than others
    - Training in HRV improves athletic performance and decreases relaxation time
  - Jacobson’s research
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Gellhorn: Neurophysiological basis of progressive relaxation

- Muscle afferents and the reticular system
- Curare studies and somnolence in animals
- Autonomic balance and the hypothalamus
- Davison’s counter-argument: human curare studies: anxiety persists under curare
  - Development of CBT and cognitive approaches to PMR
Gellhorn references (books)

- Emotions and emotional disorders: a neurophysiological study
- Physiological foundations of neurology and psychiatry.
- Principles of autonomic-somatic integrations: physiological basis and psychological and clinical implications.
- Autonomic nervous system in psychiatric disorder.


PMR Data from our Laboratory

- Taped relaxation instructions have minimal effects
- High degree of muscle tension produces prolonged tension (vs. the "pendulum effect" of Bernstein and Borkovec)
- Live instruction in PMR produces diminished autonomic reactivity to stress in anxious patients
Taped Relaxation Training

Relaxation training = uninstructed relaxation

Habituation to gradually increasing electric shock in paradigm of systematic desensitization
HR and Skin Conductance Changes in Response to Loud Tones

- Anxious pts vs healthy volunteers
- PMR vs waiting list

![Graph showing changes in heart rate and skin resistance between anxious and control subjects.](image_url)

Tested 3 psychophysiological hypotheses generated from assumptions underlying post-Jacobsonian progressive relaxation techniques, assumptions that conflict with E. Jacobson's (1938, 1964, 1970) method:
Hypotheses

(1) Greater repeated high effort tense-release trials (TRTs) should produce greater sensitivity to muscle tension (MT).

(2) Paying attention to muscles will deepen relaxation.

(3) An immediate reduction in MT to below baseline will occur after tension in a contracted muscle is released. 28 undergraduates undertook TRTs, using forearm extensor and frontalis muscles.
Tense-release Cycles Are Not Sufficient Relaxation Training

- 28 S’s tensed and released forearm extensor and frontalis muscles
- Correlations between self-report of tension and EMG were moderate during relaxation, but did not increase across successive tense-release trials
- Paying attention to either muscle produced increased tension in the frontal area
- Tense-release trials produced gradual decreases in frontal EMG, but no changes in forearm EMG.

Conclusions

(1) No evidence was found that high-level muscle contractions improve perception of muscle tension or that paying attention to muscles deepens relaxation.

(2) There was mixed evidence that repeated contractions produce subsequent relaxation.
Muscle relaxation causes a sudden decrease in sympathetic arousal, and a “parasympathetic rebound”

- Gellhorn: Sympathetic arousal causes increased parasympathetic reactivity

Thus the immediate effects of relaxation are

- Decreased HR
- Increased RSA
- Decreased pulmonary function (peak expiratory flow)
Physiological Changes During Relaxation in Asthma
Long-term Effect of Relaxation Therapy on Asthma

- Small improvement in asthma (less physiological reactivity?)
Progressive relaxation produces small but significant improvement in spirometry: Generally relaxation produces bronchoconstriction.
SOME FORMAL ATTRIBUTES OF JACOBSON's METHOD

- Emphasis on low-level tension
- Training in improved perception of low-level tension
  - Perhaps of muscle spindle activity
- Biofeedback-like training vs. suggestion


SOME KNOWN CLINICAL EFFECTS OF PMR (sometimes with EMG biofeedback) FOR STRESS-RELATED PROBLEMS

- Headaches
- Anxiety
- Insomnia
- TMJ pain
- Back pain
History of Progressive Relaxation

- Early work on the experience of thinking
- Fire in Chicago
- Influence of Walter Cannon
  - Wisdom of the body
  - “homeostasis”, autonomic balance
- Influence of William James (peripheralism)
- Influence of Titchner (introspection)
- Muscle control and the startle reflex
  - Margaret Miller
Differential Advantages for PMR: Muscular Tension

- Muscle tension-related physical problems
  - Tension headaches > migraine headaches
  - Spasmodic dysmenorrhea vs. congestive dysmenorrhea

- Stronger than mantra meditation for autonomic dysregulation
  - Hypertension
Characteristics of Progressive Relaxation

- The goal is elimination of muscle tension
- Physiological criterion vs. suggestion
  - Don’t give suggestions to relax
  - Don’t even suggest what the sensation should be
- Muscle education as the goal
  - Learn perception of muscle sensations
  - Control tension all day
Important Components

- Emphasis on muscle learning
  - Don’t *tell* trainee where to feel tension
  - One muscle at a time
- Place resistance on muscle movement where necessary
- Method of diminishing tensions
- Differential relaxation
Differential Relaxation

Differential relaxation involves engaging in various activities, while simultaneously relaxing muscles that are not needed in the performance of these activities. The trainee is encouraged to engage in activities such as talking to another, reading, etc. while keeping the muscles relaxed.
Some Applications of PMR

- Irritable bowel syndrome
- Hypertension
- Anxiety disorders
- Headache
- Everyday stress
- Insomnia
Important Components

- Emphasis on muscle learning
  - Don’t *tell* trainee where to feel tension
  - One muscle at a time
- Place resistance on muscle movement where necessary
- Method of diminishing tensions
- Differential relaxation
GUIDELINES FOR PERFORMING JACOBSON’S PROGRESSIVE MUSCLE RELAXATION

- There will be a series of instructions to tense and release specific muscles.
- The patient is told to “switch off” for about 20 seconds after each instruction.
- Repeat, decreasing tension each time.
- Focus on sensations of minimal amounts of muscle tension.
  - “Tense so little that I can hardly see you are doing it.” If larger tension is made at this point, correct the patient.
- Try to perceive residual muscle tension after relaxing completely.
- Eliminate residual tension by stopping doing anything.
For each muscle, only use sufficient muscle tension for the patient to feel the relevant muscle sensations.

- Tense only for a few seconds. Be careful that the patient does not do full extension or flexion of the limbs at any time. This could cause injury.
- After doing the “method of diminishing tensions,” ask the patient to “switch off” for at least 2 minutes.
  - During this time the patient is to do nothing.
  - Imagine that the limb does not belong to him/her, and that (s)he has no control over it.
  - Don't try too hard to relax. Trying causes muscle tension.
Modifications of Jacobson’s Approach

- Newer approaches: Paul, Bernstein & Borkovec, Lazarus
  - Maximal tension
  - Hypnotic suggestion
  - Larger muscle groups
  - “Relax” as a transitive verb
  - “Relaxation patter”
  - All at once vs. one muscle at a time
  - Brief relaxation training
Differences from Jacobson’s Method

- Rely more on suggestion
  - Jacobson: *thinking* you are relaxed is different from *being* relaxed
- Maximal tension does not teach perception of more subtle tension of everyday life
- Teach a skill rather than ‘induce’ relaxation through relaxing atmosphere, etc.
  - More detailed training on specific muscles
    - Particularly muscles in symptom areas
  - *Sometimes* more prolonged training
JACOBSON’S METHOD
Instruct the patient to relax comfortably, with closed eyes, and just sit quietly and do nothing.

Instruct the patient to bend the hand back from the wrist, separately for each arm. The therapist should demonstrate. Correct the patient if the patient also bends the elbow.
Relaxation of the Arm

- Contrast feelings of tension in the forearm extensor (dorsal aspect [back, hairy part] of the forearm) from those of stretching in the flexor (anterior [front] of the forearm) and sensations of strain in the wrist joint.
  - Ask the patient where the tension sensations are felt.
  - Note that the wrist joint sensations are the easiest of the sensations to feel, but they are not muscle tension.
  - Flexor muscle sensations are different sensation from tension.
    - Tension is in the extensor a very faint "squeezing" sensation.
    - The flexor is passively stretched. Almost a burning sensation
  - Provide resistance against the movement if the patient does not perceive it.
Other Arm Instructions
Relaxation of the Legs (similar instructions to arms)

Extensor

Feel on top of lap

Flexor

Feel under thigh
Further Leg instructions

Feel in lower abdomen

Feel in buttocks
REMINDER

- Use method of diminishing tensions
- Relax for several minutes after each instruction
- Perceive residual tension
- Do *nothing* to make residual sensations disappear
Schedule of training

- Schedule every two weeks
- Session 1: Arms and possibly legs
- Session 2: Trunk and breathing, possibly neck
- Session 3: Facial muscles
- Add sessions if patient has difficulty
- Where possible, apply pressure in opposite direction if patient cannot feel sensations
EXPECTED DIFFICULTIES

- Some patients have poor muscle sensations
  - Taking medication with Parkinson-like side effects
  - Parkinson’s disease
  - Hypertensives

- May require extra training, or use another technique first

- Relaxation-induced anxiety – probably from hyperventilation
  - Reduced metabolism, but breathing doesn’t slow fast enough
  - Rare with this technique; more common with others
MUSCLES OF THE TRUNK

- Squeeze the abdomen in. Observe tension all over the abdomen.
- Keeping the shoulders and buttocks on the chair, arch the back. Observe tension on both sides of the lower spine.
- Bend the shoulders back against the chair as if trying to touch the tips of the shoulders to the chair. Observe tension in the back between the shoulder blades.
- Bring the left arm over and across the chest, pointing to the opposite wall. Observe tension in the front of the chest, near the left arm.
- Raise the shoulders as if in a shrug. Observe the tension along the top of the shoulders and in the back of the neck.
RELAXED BREATHING

- Feel breath go into abdomen, not chest
  - Abdominal tension produces chest breathing
  - Chest breathing produces hyperventilation
- Feel breath go into lower back
- Feel breath go into pelvis and upper legs
PROGRESSIVE RELAXATION OF THE NECK

- Bring right ear down to right shoulder. Observe tension on the right side of neck, stretching on the left.
- Repeat with the left.
- Bend head back. Feel tension in back of the neck.
- Bend head forward. Feel tension in the front of the neck, a little to either side.
PROGRESSIVE RELAXATION OF THE EYE AND FOREHEAD

- Raise eyebrows; feel tension in the forehead
- Frown with forehead, feel tension above the nose
- Close eyes tightly, feel tension around the eyes
- Look to the left, feel tension in the left of the eyeball, stretching in the right
- Look to the right...
- Look up, feel tension in the top of the eyeball
- Look down, feel tension in the bottom of the eyeball, a little to the side
VISUALIZATION PRACTICE

- Imagine sitting at a tennis game at the net
- Without deliberately moving the eyeballs, vividly imagine the ball going from the left to the right, and right to the left
- Feel eye tension during spontaneous visualization
- Relax the eyes completely, and note lack of visual thoughts
RELAXATION OF THE MOUTH AND SPEECH REGION

- Smile, feel tension in the cheeks
- Clench jaw, feel tension in the jaw and temples
- Purse lips, feel tension around the lips
- Press tongue against the front teeth, feel tension in the tongue
PROGRESSIVE RELAXATION OF THE VOCAL CORDS

- Count out loud from one to ten, feel tension (not vibrations) in the vocal cords
- Count again, whispering by ‘3’ and just *thinking* the numbers by ‘5’
- Feel tension when thinking a number
- Monitor muscle sensations during verbal thoughts
- Note vocal sensations during spontaneous verbal thoughts.
NOTE

When the vocal and eye muscles are completely relaxed it is impossible to think!