Chapter 12
Neuromuscular Relaxation

Chapter 9 presented a neurophysiological rationale for the use of relaxation response in the treatment of stress-related disorders. In developing that rationale, we reviewed the research efforts of Gellhorn (1958a, b, 1964b, 1967), Weil (1974), and Malmo (1975). A reader of these respective literatures is likely to be impressed by the convergence these independent authors reached regarding the critically central role that the neuromuscular system plays in the determination of emotional and stress-related manifestations. Yet it was Gellhorn (1958a, b, 1964b) who, through a series of well-designed experiments, demonstrated that the nuclear origin of the SNS, the posterior hypothalamus, is dramatically affected by neuromuscular proprioceptive feedback from the skeletal musculature. Such findings led him (1964b) to conclude "that states of abnormal emotional tension are alleviated in various "relaxation" therapies which impinge on the posterior hypothalamus" (p. 457). This chapter explores the clinical corollary of this notion.

The purpose of this chapter is to provide a clinically useful introduction to a genre of interventions termed *neuromuscular relaxation* (NMR). As used here, this term refers to a process by which an individual can perform a series of exercises to reduce the neural activity (*neuro*) and contractile tension in striate skeletal muscles (*muscular*). This process usually consists of isotonic and/or isometric muscular contractions performed by the patient with initial instruction from the clinician. The proper practice of NMR ultimately leads to the elicitation of the relaxation response.

History

The NMR procedure presented in this chapter comes from four primary sources: (1) the "progressive relaxation" procedures developed byJacobson (1970), (2) the research of Bernstein and Borkovec (1973), (3) research protocols developed by this text's senior author, and (4) the clinical work of Bhalla (1980) applying neuromuscular interventions to the field of physical medicine and stress.

G.S. Everly and J.M. Lating, *A Clinical Guide to the Treatment of the Human Stress Response*, DOI 10.1007/978-1-4614-5538-7_12,

Edmund Jacobson is often considered the originator of relaxation techniques. His distinguished career took him from undergraduate studies at Northwestern to Harvard, where he worked with William James, among others, and received his PhD in 1910, to a fellowship with Edward Titchner at Cornell, and finally to Rush Medical School (part of the University of Chicago). After receiving his MD, Jacobson did psychophysiological research until his death in 1983 (see Gessel, 1989, for a biographic article of Jacobson). According to Gessel, Jacobson's "contributions, taken in their totality, create the basis for a comprehensive discipline of neuromuscular psychophysiology" (p. 5).

Early research by Jacobson and his colleague Carlson on the knee-jerk reflex led to the observation that in participants who appeared most deeply relaxed, the knee-jerk reflex was absent or noticeably diminished (Gessel, 1989). This type of work led Jacobson (1938) to conclude that striated muscle tension plays a major role in anxiety states. By teaching individuals to reduce striated muscle tension, Jacobson reported success in reducing subjective reports of anxiety. Later work in the area of mind–body functioning led Jacobson to hypothesize that all thought occurs with collateral skeletal muscle activity of varying, and often extremely low, response amplitudes. As Jacobson stated, "It might be naive to say that we think with our muscles, but it would be inaccurate to say that we think without them" (cited in McGuigan & Lehrer, 2007, p. 58).

Gellhorn (1958b, 1964b), who was particularly impressed with Jacobson's research, offered a neurophysiological rationale for the use of progressive relaxation in the treatment of stress-related disorders. After the 1940s, Charles Atlas developed a program of muscular "dynamic tension" for general health, but the model developed by Jacobson gained greater popularity among practicing clinicians.

Jacobson called his system "progressive relaxation." It consists of a series of exercises in which the patient tenses (contracts) and then relaxes selected muscles and muscle groups so as to achieve the desired state of deep relaxation. Jacobson considered his procedure "progressive" for the following reasons:

1. The patient learns progressively to relax the neuromuscular activity (tension) in the selected muscle. This process may require several minutes to achieve maximal NMR in any selected muscle.
2. The patient tenses and then relaxes selected muscles in the body in such a manner as to progress through the principal muscle groups, until the entire body, or selected body area, is relaxed.
3. With continued daily practice, the patient tends progressively to develop a "habit of repose" (1978, p. 161)—a less stressful, less excitable attitude.

Progressive relaxation gained considerable popularity when Wolpe (1958) used the same basic relaxation system in his phobia treatment called "systematic desensitization." This treatment paradigm, which is a classic behavioral therapeutic intervention, consists of relaxing the patient before and during exposure to a hierarchy of anxiety-evoking stimuli. Wolpe has successfully employed the tenet that an

individual cannot concurrently be relaxed and anxious; that is, relaxation acts to inhibit a stress response. A comprehensive, excellent review of Jacobson's work is that of McGuigan and Lehrer (2007).

Mechanisms of Action

Jacobson (1978) argues that the main therapeutic actions of the NMR system reside in having the patient *learn* the difference between tension and relaxation. This learning is based on having the patient enhance his or her awareness of proprioceptive neuromuscular impulses that originate at the peripheral muscular levels and increase with striated muscle tension. These afferent proprioceptive impulses are major determiners of chronic diffuse anxiety and overall stressful sympathetic arousal, according to Jacobson. This conclusion is supported by the research of Gellhorn, who demonstrated the critical role played by afferent proprioceptive impulses from the muscle spindles in the determination of generalized ergotropic tone (Gellhorn, 1958a,b, 1964b, 1967). The neuromuscular mechanisms of action were discussed in detail in Chap. 9. Please refer back to the work of Gellhorn, Malmo, and Weil discussed in that chapter.

Once the patient learns adequate neuromuscular awareness, he or she may then effectively learn to reduce excessive muscle tension by consciously and progressively "letting go," or reducing the degree of contraction in the selected muscles. It has been argued that it is difficult for "unpracticed" individuals to achieve a similar degree of conscious relaxation, because they are not educated in the sensations of tension versus conscious deep relaxation—as a result, measurable "residual tension" remains during conscious efforts to relax.

Empirical support for the impact of progressive muscle relaxation on the endocrine and immune systems comes from a study of undergraduates who either received or did not receive Abbreviated Progressive Relaxation Training and then had salivary cortisol and salivary immunoglobulin A (sIgA) measured (Pawlow & Jones, 2005). Compared to the 14 control participants, the 41 participants who received the one-hour relaxation intervention had lower post-intervention salivary cortisol levels and higher levels of post-intervention sIgA concentration and secretion rates. A study of 30 volunteers by Lowe, Bland, Greenman, Kirkpatrick, and Lowe (2001) demonstrated a similar increase in IgA, accompanied by decreased heart rate and cortisol following four weekly sessions of progressive relaxation training for 15 participants, compared to the 15 neutral control participants (who received a shipping weather forecast).

Other studies on progressive relaxation have suggested that there are two principal therapeutic components at work. Although it is generally accepted that the traditional Jacobsonian concept of *learned awareness* of the differences between the tension of contraction and relaxation experienced on the release of contraction is an important therapeutic component, there may be more. It has been suggested

that the actual procedure of *contracting* a muscle before attempting to relax it may add impetus to the total amount of relaxation achieved in that muscle, over and above the process of learned awareness (Borkovec, Grayson, & Cooper, 1978).

Research on Clinical Applications and Effects

A review of research and clinical literature on the genre of techniques considered part of NMR (including Jacobson's procedures) reveals myriad stress-related therapeutic applications. Specifically, neuromuscular or progressive relaxation has been suggested to be effective for the following:

1. Non-insulin-dependent diabetes mellitus (Henry, Wilson, Bruce, Chisholm, & Rawling, 1997).
2. Peptic ulcers (Thankachan & Mishra, 1996).
3. Bronchial asthma (Nickel et al., 2005).
4. Chronic tension headache (Sadoughi, Nouri, Kajbaf, Akkashe, & Molavi, 2009)
5. Pain (Chen & Francis, 2010; Pavlek, 2008).
6. Tinnitus (Jakes, Hallam, Rachman, & Hinchcliffe, 1986).
7. Psychobiological well-being during pregnancy (Urech et al., 2010).
8. Anxiety reduction in patients with acute schizophrenia (Chen et al., 2009) and in debilitating test anxiety among medical students (Powell, 2004).
9. Assistance in the treatment of cancer chemotherapy (Carey & Burish, 1987; de Carvalho, Matins, dos Santos, 2007; Demiralp, Oflaz, & Komurcu, 2010).
10. Symptom severity associated with PTSD (Zucker, Samuelson, Muench, Greenberg, & Gervitz, 2009).
11. Assistance in the treatment of HIV infection and AIDS (Kocsis, 1996).
12. Buffering the negative impact of watching the news (Szabo & Hopkinson, 2007).
13. Children and adolescents overcoming stress (Klien, 2008).

Manzoni, Pagnini, Castelnuovo, & Molinari (2008) reported the results of a 10-year meta-analytic review of 27 studies that assessed relaxation training (including Jacobson's progressive relaxation) for anxiety. Their results showed a medium–large effect size (Cohen's d of 0.57 for within analysis and 0.51 for the between group analysis), and the authors concluded that there is consistent and significant efficacy in using relaxation training in mitigating anxiety.

Given these research findings, it seems that NMR strategies may be an effective component in a variety of treatment programs designed to mitigate the impact of both chronic stress and stress that exacerbates a disease process. We now present a structure for clinical implementation.

How to Implement a Physically Active Form of Neuromuscular Relaxation: Preparation

To review, NMR represents a series of exercises during which the participant tenses (contracts) and then releases (relaxes) selected muscles in a predetermined and orderly manner. Some preliminary activities that the clinician should perform before implementing the procedure are as follows:

1. In addition to the general precautions for relaxation mentioned in an earlier chapter, determine whether the patient has any muscular or neuromuscular contraindications: for example, nerve problems, weak or damaged muscles, or skeletal problems that would be enhanced through the neuromuscular exercises. When in doubt, avoid that specific muscle group until a qualified opinion can be obtained.
2. Ask about the patient's previous knowledge or experience of NMR techniques. Because the clinician must consider whether such knowledge or experience will facilitate or be detrimental to the current treatment situation, it is usually helpful to discuss in relative detail any previous exposure that the patient may have had with NMR techniques.
3. Provide the patient with background and rationale for use of NMR techniques.
4. Discuss with the patient the proper environment for the practice of NMR techniques: (a) quiet, comfortable surroundings; darkened, if possible, in order to enhance concentration on bodily sensations; (b) loose clothing; remove contact lenses, glasses, and shoes if desired; (c) body supported as much as possible (with the exception of neck and head, if the patient falls asleep inadvertently).
5. Educate the patient about the difference between the desired muscle "tension" and undesirable muscle "strain." Tension is indicated by a tightened, somewhat uncomfortable, sensation in the muscles being tensed. Strain is indicated by any pain in the muscle, joints, and tendons, as well as any uncontrolled trembling in the muscles. Strain is actually excessive muscle tension.
6. Instruct the patient in proper breathing: Do not hold the breath while tensing muscles. Instead, breathe normally, or inhale on tensing and exhale on relaxing the muscles.
7. Before beginning the actual protocol with the patient, informally demonstrate all the exercises you will be employing. Take this opportunity to answer any questions that the patient may have.
8. Finally, explain to the patient exactly "how" you will provide the instructions. For example, "In the case of each muscle group that we focus upon, I will always carefully describe the relaxation exercise to you first, before you actually do the exercise. Therefore, don't begin the exercise until I say, 'Ready? Begin.'"

The order of these steps may vary. In order to facilitate awareness of some of this preliminary information, the clinician may present a handout to patients.

How to Implement Neuromuscular Relaxation: Procedure

Whenever possible, begin the total protocol with the lowest areas of the body to be relaxed and end with the face, because once a muscle has been tensed and then relaxed, we attempt to ensure that it is not inadvertently retensed. The quasi-voluntary muscles of the face are the most susceptible to retensing; therefore, we relax them last to eliminate the opportunity.

The Sequential Steps to Follow for Each Muscle Being Relaxed

Once the clinician is ready to initiate the actual protocol, he or she should be sure to follow a fundamental sequence of steps for *each* muscle group.

Step 1. Describe to the patient the specific muscle(s) to be tensed and how it/they will be contracted. "We are now going to tense the muscles in the calf. To begin, I'd like you to leave your toes flat on the floor and raise both of your heels as high as you can."

Step 2. Have the patient initiate the response with some predetermined cue: "Ready? Begin."

Step 3. Have the patient hold the contraction for 3 to 5 s. During this time, you may wish to encourage the patient to exert an even greater effort: "Raise your toes higher, higher, even higher."

Step 4. Signal the patient to relax the concentration: "And now relax."

Step 5. Facilitate the patient's awareness of the muscles just relaxed by having him or her search for feelings of relaxation: "Now sense how the backs of your legs feel. Are they warm, tingling? Do they feel heavy? Search for the feelings."

Step 6. The clinician may wish to encourage further relaxation: "Now let the muscles relax even more. They are heavier and heavier and heavier."

Step 7. Pause at least 5–10 s after each exercise to allow the patient to experience relaxation. Pause 15–20 s after each major muscle group.

Step 8. When possible, go directly to the opposing set of muscles. In this case, it would involve leaving the heels flat on the floor and raising the toes as high as possible.

Example Protocol

The following brief protocol includes previously discussed components. See whether you can identify the major preliminary activities (only a few can be included

in this example) and the sequenced steps (some sample muscle groups have only six or seven of the steps to avoid monotony).

As you read the example, make notes in the margins provided as to what changes you might make in order to make the protocol more effective for your needs in teaching a general NMR protocol.

Background Information. As early as 1908, researchers at Harvard University discovered that stress and anxiety are related to muscle tension. Muscle tension is created by a shortening or contraction of muscle fibers. The relationship between stress and anxiety, on one hand, and muscle tension, on the other, is such that if you are able to reduce muscle tension, stress and anxiety will be reduced as well.

Progressive NMR is a tool that you can use to reduce muscle tension and, therefore, stress and anxiety. It is a progressive system by which you can systematically tense and then relax major muscle groups in your body, in an orderly manner, so as to achieve a state of total relaxation. This total relaxation is made possible by two important processes.

First, by tensing a muscle and then relaxing it, you will actually receive a sort of running start, in order to achieve a greater degree of muscular relaxation than would normally be obtainable.

Second, by tensing a muscle and then relaxing it, you are able to compare and contrast muscular tension and muscular relaxation. Therefore, we see that the basic premises underlying your muscular relaxation are as follows:

1. Stress and anxiety are related to muscular tension.
2. When you reduce muscular tension, a significant reduction in stress and anxiety will be achieved as well.
3. NMR provides you with the unique opportunity to compare and contrast tension with relaxation.
4. NMR has been proven to be a powerful tool that can be used to achieve relaxation and peace of mind. However, relaxation is an active skill and, like any skill, it must be practiced. The mistake that most individuals make is to rush through this relaxation procedure. NMR works, but it takes practice and patience to succeed. But, after all, aren't your health and well-being worth at least 15 min a day?

Preliminary Instructions. Before beginning the progressive NMR procedure, let us review some basic considerations. First, find a quiet place without interruptions or glaring lights. You should find a comfortable chair to relax, though you will also find progressive relaxation useful when performed lying in bed in order to help you fall asleep at night. Loosen tight articles of clothing. Glasses, jewelry, and contact lenses should be removed.

Second, the progressive NMR system requires you to tense each set of muscles for two periods, lasting about 5 s each. However, it is possible to tense each set of muscles up to several times if you continue to feel residual tension. Muscular tension is not equal to muscular strain. They are not the same. You will know that you have strained a muscle if you feel pain in the muscle or any of the joints around it, or if it begins to shiver or tremble uncontrollably. In either case, these should be

signs to you to employ a lesser degree of tension, or simply avoid that exercise. The entire NMR procedure lasts about 20–30 min, should you wish to relax your entire body. The time may be less if you choose to relax only a few muscles groups.

Last, do not hold your breath during contractions. Breathe normally, or inhale as you tense and exhale as you release the tension.

Actual Instructions. You are now ready to relax progressively the major muscle groups in your body, in order to achieve a state of total relaxation. I would like you to settle back and get very, very comfortable. You may loosen or remove any tight articles of clothing, such as shoes or coats, ties, or glasses. You should also remove contact lenses. Try to get very, very comfortable. I would like you to close your eyes. Just sit back and close your eyes. Begin by directing your attention to your breathing. The breath is the body's metronome. So let us become aware of the metronome. As you inhale, become aware of how the air comes in through your nostrils and down into your lungs, and how your stomach and chest expand, and how they recede as you exhale. Concentrate on your breathing. (*Provide 30 s pause here*.)

In the case of each muscle group that we focus on, I shall always carefully describe the relaxation exercise to you first, before you are actually to do the exercise. Therefore, do not begin the exercise described until I say, "Ready? Begin."

Chest. Let us begin with the chest. At my request, and not before, I would like you to take a very, very deep breath. Breathe in all the air around you. Let us do that now. Ready? Begin. Take a very deep breath. A very deep breath; hold it… and relax. Just exhale all the air from your lungs and resume your normal breathing. Did you notice tension in your chest as you inhaled? Did you notice relaxation as you exhaled? If you had to, could you describe the difference between tension and relaxation? Let us keep that in mind as we repeat this exercise. Ready? Begin. Inhale very deeply, very deeply. Hold it, and relax. Just exhale and resume your normal breathing. Could you feel the tension that time? Could you feel the relaxation? Try to concentrate on that difference in all the muscle groups that we shall be attending to. (*Always pause 5–10 s between exercises.*)

Lower legs. Let us go now to the lower legs and the muscles in the calf. Before we begin, place both your feet flat on the floor. Now, to engage in this exercise, I should like you simply to leave your toes flat on the floor, and raise both your heels at the same time as high as they will go. Ready? Begin. Raise your heels. Raise them both very high (see Fig. 12.1). Hold it, and relax. Just let them fall gently back to the floor. You should have felt some contraction in the back of your calves. Let us repeat this exercise. Ready? Begin. Raise the heels high. Hold it, and relax. As you relax, you may feel some tingling, some warmth, perhaps some heaviness as the muscle becomes loose and relaxed. To work the opposite set of muscles, leave both your heels flat on the floor, point both sets of your toes very high. Point them as high as you can toward the ceiling. This is the same motion that you would make if you lifted your foot off the accelerator pedal in your car (see Fig. 12.2). Except that, we shall do both feet at the same time. Let us do that now. Ready? Begin. Raise the toes very high. Hold it, and relax. Now let us repeat this exercise. Ready? Begin. Raise the toes high. Hold it, and relax. You should feel some tingling or heaviness in your

Fig. 12.1 Raising heels

Fig. 12.2 Raising toes

lower legs. That feeling is there. You must simply search for it. So take a moment and try to feel that tingling, warmth, or perhaps that heaviness that tells you that your muscles are now relaxed. Let those muscles become looser and heavier, and even heavier. (*Pause for 20 s.*)

Thighs and stomach. The next set of muscles that we shall concentrate on is those of the thigh. This exercise is a simple one. At my request, I should like you simply to

Fig. 12.3 Extending legs

Fig. 12.4 Digging heels

extend both your legs out in front of you as straight as you can (see Fig. 12.3). (*If this is uncomfortable for the patient, let him or her exercise one leg at a time.*) Remember to leave your calves loose. Do not tense them. Let us do that now. Ready? Begin. Straighten both your legs out in front of you. Very straight. Hold it, and relax. Just let the feet fall gently to the floor. Did you feel tension in the top of your thighs? Let us repeat this exercise. Ready? Begin. Straighten both your legs out. Hold it, and relax. To work the opposite set of muscles, I should like you to imagine that you are at the beach and are digging your heels down into the sand (see Fig. 12.4). Ready? Begin. Dig your feet down into the floor. Harder. And relax. Now let us repeat this exercise. Ready? Begin. Dig your heels down into the floor and relax. Now the top of your legs should feel relaxed. Let them become more and more relaxed—more and more relaxed. Concentrate on that feeling now. (*Pause here 20 s.*)

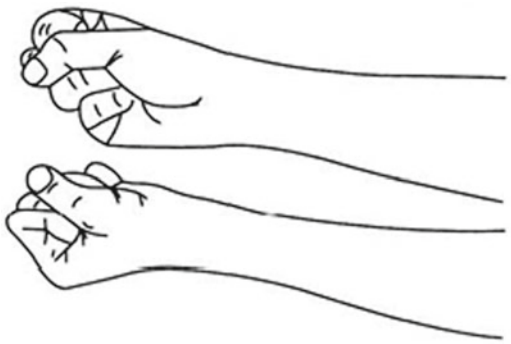

Fig. 12.5 Clenching fists

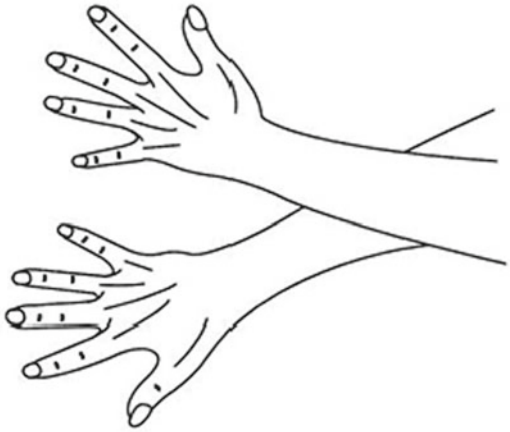

Fig. 12.6 Spreading fingers

Hands and arms. Let us move now to the hands. The first thing that I should like you to do, with both your hands at the same time, is make very tight fists (See Fig. 12.5). Tighten your fists and arms together. Ready? Begin. Clench your fists very tightly. Tighter. Hold it, and relax. This exercise is excellent if you type or do a lot of writing during the day. Now let us repeat. Ready? Begin. Clench both your fists very tightly. Hold it, and relax. To work the opposing muscles, simply spread your fingers as wide as you can (see Fig. 12.6). Ready? Begin. Spread your fingers very wide. Wider. Hold it, and relax. Now let us repeat this exercise. Ready? Begin. Spread the fingers wide. Wider. Widest of all. Hold it, and relax. Concentrate on the warmth or tingling in your hands and forearms. (*Pause here 20 s.*)

Shoulders. Now let us work on the shoulders. We tend to store a lot of our tension and stress in our shoulders. This exercise simply consists of shrugging your shoulders vertically up toward your ears. Imagine trying to touch your ear lobes with the tops of your shoulders (see Fig. 12.7). Let us do that now. Ready? Begin. Shrug your shoulders up high. Higher than that. Hold it, and relax. Now let us repeat. Ready? Begin.

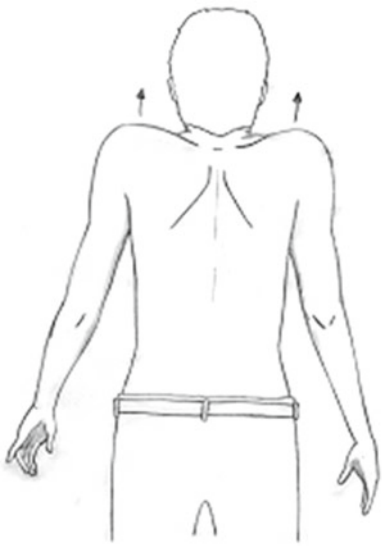

Fig. 12.7 Raising shoulders

Fig. 12.8 Smiling widely

Shrug the shoulders. Higher. Hold it, and relax. Let us repeat this exercise one more time. Ready? Begin. Shrug the shoulders as high as you can. Hold it, and relax. Very good. Now just concentrate on the heaviness in your shoulders. Let your shoulders go, let them completely relax—heavier and heavier. (*Pause here 20 s.*)

Face. Let us move now into the facial region. We shall start with the mouth. The first thing I should like you to do is smile as widely as you possibly can (see Fig. 12.8). An ear-to-ear grin. Ready? Begin. Hold it, and relax. Now let us repeat this exercise. Ready? Begin. Grin very wide. Wider. Hold it, and relax. The opposite set of muscles will be activated when you pucker or purse your lips together, as if

Fig. 12.9 Puckering lips

Fig. 12.10 Squinting eyes

you were trying to give someone a kiss (see Fig. 12.9). Ready? Begin. Pucker the lips together. Purse them together very tightly. Hold it, and relax. Now let us repeat that exercise. Ready? Begin. Purse the lips together. Hold it, and relax. Let your mouth relax. Let the muscles go—let them relax, more and more; even more.

Now let us move up to the eyes. (Be sure to remove contact lenses.) I should like you to keep your eyes closed, but to clench them even tighter. Imagine that you are trying to keep shampoo suds out of your eyes (see Fig. 12.10). Ready? Begin. Clench the eyes tightly, and relax.

Let us repeat this exercise. Ready? Begin. Clench the eyes, tighter. Hold it, and relax.

The last exercise consists simply of raising your eyebrows as high as you can. Now, remember to keep your eyes closed, but raise your eyebrows as high as you can (see Fig. 12.11). Ready? Begin. Raise the eyebrows high. Hold it, and relax. Now let us repeat this exercise. Ready? Begin. Raise the eyebrows higher. Highest of all. Hold it, and relax. Let us pause for a few moments to allow you to feel the relaxation in your face. (*Pause 15 s.*)

Fig. 12.11 Raising eyebrows

Closure. You have now relaxed most of the major muscles in your body. To make sure that they are all relaxed, I shall go back and name the muscles that we have just activated and just relaxed. And, as I name them, let them go even further into relaxation. You will feel a sense of relaxation descend over your entire body in a warm wave. You will feel the muscular relaxation now in your forehead, and as it goes down into your eyes, down into your cheeks, you can feel the heaviness of relaxation descend into your jaws, into your neck, down through your shoulders, to the chest and arms, to the stomach, into your hands. Relaxation is descending into your legs, into the thighs, and calves, and down to the feet. Your body now feels very heavy. Very relaxed. This is a good feeling. So take a moment and enjoy this feeling of relaxation. (*Pause here 2 min.*)

Reawaken. Now I want you to bring your attention back to yourself and the world around you. I shall count from 1 to 10. With each count, you will feel your mind become more and more awake, and your body more and more refreshed and responsive. When I reach 10, open your eyes, and you will feel the *best* you've felt all day—you will feel alert, refreshed, full of energy, and eager to resume your activities. Let us begin: 1–2 you are beginning to feel more alert, 3–4–5 you are more and more awake, 6–7 now begin to stretch your hands and feet, 8 now begin to stretch your arms and legs, 9–10 open your eyes *now!* You feel alert, awake, your mind is clear and your body refreshed.

Summary

This chapter has presented an introduction to a series of techniques known as *neuromuscular relaxation,* which has been employed in the mitigation of the human stress response. The chapter highlighted the work of Edmund Jacobson, considered by many to be the originator of relaxation training.

The mechanisms of therapeutic action include learning the difference between the feelings of tension and relaxation, which is predicated on enhanced awareness

Table 12.1 Summary checklist of NMR components

Preparation for implementation

1. Identify contraindications and precautions
2. Inquire as to previous knowledge/experience in techniques
3. Provide the patient with background/rationale for use of technique
4. Describe proper environment for practice of technique
5. Instruct the patient regarding the difference between muscle "tension" and muscle "strain"
6. Instruct the patient in proper breathing
7. Informally demonstrate all specific muscular contractions to be used
8. Describe "how" you will provide instruction and cues

Implementation of sequential steps for each muscle being relaxed

1. Describe the specific muscle and "how" it will be contracted
2. Signal the patient to begin contraction
3. Hold contraction and encourage greater contraction
4. Signal the patient to release tension, i.e., relax
5. Facilitate patient awareness of muscles just relaxed through verbal and intonational cues
6. Encourage further relaxation
7. Pause and allow the patient to become aware of sensations
8. Proceed with opposing muscle group, if applicable

of proprioceptive neuromuscular impulses. It has also been suggested that the actual process of contracting a muscle before attempting to relax it may increase the relaxation response beyond learned awareness.

We then reviewed the preparation and actual procedures involved in implementing a series of exercises that are part of a brief NMR protocol. It is not a prescription for use with patients so much as an example of how such a protocol may be created. Usually, greater specificity is included for muscle groups, and even individual muscles, depending on the requirements of the patient. It is worth noting that Jacobson emphasizes the utility of relaxing the facial muscles, particularly the throat, mouth, and eyes, to obtain maximal relaxation. Therefore, far more specialization directed toward those muscle groups may be considered in developing a protocol:

1. The clinician may encourage the patient to develop his or her own personalized protocol. He or she may further encourage or provide the patient with a home practice audiotape.
2. Jacobson's text, *You Must Relax* (1978), Davis, Eshelman, and McKay's *Relaxation and Stress Reduction Workbook* (1988) and Bernstein, Borkovec, and Hazlett-Stevens' (2000) *New Directions in Progressive Relaxation Training: A Guidebook for Helping Professionals* are excellent resources for additional, far more specific exercises. However, in the final analysis, it is the clinician's discretion to assess the suitability of any form of NMR on an individual basis.
3. Table 12.1 may be used as a checklist of important procedural information that should be addressed when teaching NMR to patients. As each step is completed, simply check it off. This same table may be used to evaluate a clinical student's mastery of these procedures. As in the first edition, it is designed to be reprinted from this text and used clinically or in educational settings.

4. Finally, Appendix B contains a different version of NMR, consisting of a physically passive form that uses focused sensory awareness and directed concentration for the reduction of striated muscle tension. The clinician may consider this as a potential clinical alternative to the form of NMR just described.

Acknowledgements We would like to thank David Essien and Andrea N. Everly for their artistic contributions to this chapter.

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