



The Biofeedback Certification International Alliance

(formerly the Biofeedback Certification Institute of America)

Blueprint of Knowledge Statements for Board Certification in Biofeedback

The provider certified in Biofeedback will have knowledge of:

I. ORIENTATION TO BIOFEEDBACK – 4 hours

- A. Definitions of biofeedback
- B. History of biofeedback
 - 1. Pioneers in biofeedback
 - 2. Forces leading to the emergence of biofeedback (e.g., operant conditioning, self-regulation, cybernetics, miniaturization, computerization, founding of the Biofeedback Society of America)
- C. Concepts of feedback and control in biological systems
- D. Overview of principles of human learning as they apply to biofeedback
 - 1. Learning theory (e.g., habituation, classical and operant conditioning, discrimination, generalization, extinction)
 - 2. Application of learning principles to biofeedback training (e.g., reinforcement, discrimination training, length and number of sessions, massed vs. spaced practice, generalization to the life situation)
- E. Research methodology
 - 1. Differences between correlational and randomized controlled outcome studies
 - 2. Threats to internal validity
 - 3. Specific and nonspecific treatment effects
 - 4. Control group designs
 - 5. Case study designs
 - 6. Small-N designs
 - 7. Meta-analysis
 - 8. Criteria for clinical efficacy
- 2. Traumatic stress and posttraumatic stress disorder
- C. Psychophysiological reactions to stressful events
 - 1. Negative affect, e.g., anxiety, anger, hopelessness, depression
 - 2. Acute stress: Cannon's fight-or-flight response
 - a. Sympathetic-adrenomedullary activation
 - b. Relationship to panic disorder and somatization
 - 3. Chronic stress: Selye's general adaptation syndrome
 - a. Hypothalamic-pituitary Adrenocortical activation
 - b. Stages of the general adaptation syndrome
 - c. Health consequences of chronic stress
 - 4. Immune system disruption
 - a. Psychoneuroimmunology (PNI)
 - b. Implications of PNI for immune-related illness

II. STRESS, COPING, AND ILLNESS – 4 hours

- A. Stress and the biopsychosocial model of illness
- B. Stressful life events and risk of illness
 - 1. Assessing stressful life events

III. PSYCHOPHYSIOLOGICAL RECORDING – 8 hours

- A. Descriptions of most commonly employed biofeedback modalities: SEMG, skin temperature, electrodermal activity, EKG and heart rate variability, respiration, EEG
 - 1. Sensors and sensor placements
 - 2. Characteristic signals
 - 3. Signal processing and feedback displays

- B. Sources of artifact
 1. How to identify and eliminate environmental noise, including 60 Hz, radio frequency, and electrostatic interference
 2. How to evaluate instrument noise levels
 3. How to perform a continuity check on electrodes and cables
 4. How to identify and correct electrical short circuits
 5. How to identify and correct extraneous biologic activity in recordings
 6. The relationship of skin impedance to amplifier input impedance; effects on physiological recordings

C. Identification and elimination of electrical shock hazards

- D. Essential electronic terms and concepts for biofeedback applications, including:
 1. Conduction and insulation
 2. Voltage (E)
 3. Current (I)
 4. Resistance (R)
 5. Ohm's Law ($E=IR$)
 6. Power
 7. Impedance
 8. Electrode impedance
 9. Input impedance
 10. Signal-to-noise ratio
 11. Amplifiers: single-ended and differential amplifiers
 12. Common mode rejection
 13. Artifact
 14. Amplitude
 15. Integration methods: integral average voltage, peak voltage, peak-to-peak voltage, and root mean square voltage
 16. Bandpass
 17. Frequency response curve
 18. Volume conduction
 19. Time constant
 20. Power spectrum
 21. Optical isolation
 22. Telemetry

IV. SURFACE ELECTROMYOGRAPHIC (SEMG) APPLICATIONS – 8 hours

- A. Muscle anatomy and physiology; antagonistic and synergistic muscle groups
- B. Central nervous system
Neuroanatomy, neurophysiology, and pathology relevant to cerebral vascular

accident, cerebral palsy, spinal cord injury, peripheral nerve injury, and chronic pain

- C. Chronic neuromuscular pain
 1. Ascending and descending pain pathways
 2. Gate control theory
 3. Neuromatrix theory
 2. Trigger point mechanisms
 3. SEMG differences between chronic pain subjects and normal subjects
- D. General treatment considerations
 1. SEMG assessment strategies
 2. SEMG down-training strategies
 3. SEMG up-training strategies
- E. Target muscles, typical electrode placements, and SEMG treatment protocols for specific neuromuscular conditions
 1. Tension-type headache
 2. Temporomandibular disorders
 3. Posterior neck and upper back pain
 4. Low back pain
 5. Urinary and fecal incontinence
 6. Paresis and spasticity secondary to central nervous system disorders and injuries
 7. Worksite ergonomic applications

V. AUTONOMIC NERVOUS SYSTEM (ANS) APPLICATIONS – 8 hours

- A. Structure and function of the autonomic nervous system
 1. Sympathetic and parasympathetic divisions
 2. Anatomy and autonomic innervation of the cardiovascular, GI, and respiratory systems
 3. Physiological mechanisms underlying commonly employed biofeedback modalities, including electrodermal activity, skin temperature, heart rate, respiration, heart rate variability
 4. Homeostasis, dysregulation, and self-regulation of ANS activity
 5. The effects of commonly employed medications on autonomic activity
- B. Psychophysiological Concepts
 1. Tonic and phasic activity
 2. Orienting, arousal, and habituation
 3. Situational specificity of physiological response

4. Individual response stereotypy
5. Physiological differentiation of emotional states

- C. General applications of autonomic biofeedback
1. Psychophysiological stress profiling
 2. Biofeedback-assisted relaxation
 3. Psychotherapy process monitoring
- D. Pathophysiology, biofeedback modalities, and treatment protocols for specific ANS biofeedback applications
1. Migraine headache
 2. Raynaud's disease
 3. Hypertension
 4. Cardiac arrhythmias
 5. Hyperventilation syndrome

VI. ELECTROENCEPHALOGRAPHIC (EEG) APPLICATIONS – 4 hours

- A. Specific central nervous system structures and neurotransmitter pathways subserving important psychological states and activities, including sleep-wakefulness, affect and emotion, pain, motor function, and executive function.
- B. Neuronal sources of scalp EEG activity
- C. EEG patterns and their behavioral correlates, including delta, theta, alpha, low beta, high beta, and SMR frequency ranges
- D. Clinical uses and efficacy of EEG biofeedback in the treatment of attention deficit disorder, mild closed head injuries, substance abuse, epilepsy, migraine, insomnia, anxiety and affective disorders, including the specific EEG parameters and recording sites used for feedback training
- E. Potential effects of prescribed and nonprescribed drugs on clinical presentation, EEG measures, and EEG biofeedback learning tasks

VII. ADJUNCTIVE INTERVENTIONS – 8 hours

- A. Intake procedures
1. Interview techniques for charting of presenting problems, medical and personal history, psychopathology, and coping resources

2. Psychophysiology and biofeedback principles used in explaining treatment rationale, setting expectations, and motivating compliance
3. Recognition of secondary gains the client may obtain from symptoms
4. Development of a treatment plan based on knowledge of relevant research and established criteria for treatment selection

- B. Relaxation methods: Procedures, indications and contraindications
1. Progressive muscle relaxation
 2. Autogenic training
 3. Guided imagery
 4. Hypnosis
 5. Meditation

- C. Psychotherapeutic techniques
1. Empathy and rapport
 2. Strategic use of verbal and non-verbal behavior
 3. Optimizing nonspecific (placebo) effects

- D. Cognitive interventions
1. The effect of cognitions (e.g., appraisals, schemas, self-talk) on stress levels, presenting complaints, and treatment outcomes
 2. Methods of cognitive intervention, e.g., reframing, cognitive restructuring, stress inoculation, modification of automatic thoughts

- E. Nutritional considerations pertinent to stress-related disorders

- F. The effects of exercise on mood, physiological functioning, and presenting symptoms

VIII. PROFESSIONAL CONDUCT – 4 hours

- A. Responsibility and competence
1. Responsibilities and liability in provision of services
 2. Demonstrated competence in all aspects of service provided
 3. Limiting scope of practice to areas of professional training and qualifications
 4. Experimental vs. commonly accepted biofeedback treatment
 5. Contraindications to treatment

6. Familiarity with the ethical principles of BCIA and one's primary profession
 7. Advertising, marketing of services, and public statements
 8. Continuing education and training
- B. Client rights
1. Privacy, confidentiality, and privileged communication
 2. Informed consent to assessment and treatment
 3. Accepting clients, abandonment, and appropriate referral
 4. Universal precautions in biofeedback
 5. Equal access to health care
- C. Supervision and Consultation
1. Appropriate consultation and supervision in biofeedback
 2. Purposes of supervision and consultation
 3. The process of supervision
 4. Guidelines for seeking supervision
- D. Professional relationships
1. Dual relationships
 2. Conflicts of interest and exploitation of clients
 3. Consultation, referral, and relationships with other professionals
 4. Medical and medication monitoring
 5. Procedures for dealing with unethical behavior of colleagues
- E. Record keeping
1. Technical and legal records
 2. Legally required records and retention
 3. Documentation of medical history
 4. Security of records to ensure confidentiality