



# Biofeedback Certification Institute of America Blueprint Knowledge Statements

## Pelvic Muscle Dysfunction Biofeedback Certification

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### I. APPLIED PSYCHOPHYSIOLOGY & BIOFEEDBACK - 5

#### A. Introduction to Biofeedback

1. Definition of biofeedback
2. History of biofeedback
3. Biofeedback modalities overview
4. Basic concepts of feedback and control in biological systems
5. Overview of principles of human learning as they apply to biofeedback:
  - a. Learning theory, e.g. habituation, classical and operant conditioning, discrimination, generalization, extinction
  - b. Applications of learning theory to biofeedback training, e.g. reinforcement, discrimination training, length and number of sessions, massed vs. spaced practice, generalization to life situations.

#### B. Surface EMG Instrumentation

1. Essential terms and concepts for EMG biofeedback:
  - a. Conduction and insulation
  - b. Voltage (E)
  - c. Current (I)
  - d. Resistance (R)
  - e. Ohm's Law ( $E=IR$ )
  - f. Power
  - g. Impedance
  - h. Electrode impedance
  - i. Input impedance
  - j. Signal-to-noise ratio
  - k. Amplifier and differential amplifier
  - l. Common mode rejection
  - m. Artifact
  - n. Amplitude
  - o. Integrator
  - p. Bandpass

- q. Frequency response curve
- r. Volume conduction
- s. Time constant
- t. Integral average voltage
- u. Peak-to-peak voltage
- v. Root mean square voltage
- w. Power spectrum
- x. Optical isolation
- y. Ground fault interruption
2. Sources of artifact:
  - a. How to identify artifact and correct environmental noise levels, including 60 Hz, radio frequency and electrostatic interference
  - b. How to evaluate instrument noise levels
  - c. How to perform a continuity check on electrodes and cables
  - d. How to identify and correct electrical short circuits
  - e. How to identify and correct extraneous biologic activity in recordings
  - f. How to identify and eliminate electrical shock hazards
3. Principles of EMG sensor placements:
  - a. Skin preparation
  - b. Wide and narrow
  - c. Size and type
  - d. Relationship to muscle striations
4. Selected EMG placement sites.
  - a. Frontal (wide)
  - b. Temporal/suprahyoid (wide)
  - c. Cervical trapezius (wide)
  - d. Upper trapezius (wide)
  - e. Upper trapezius (narrow)
  - f. Forearm extensor bundle (wide)
  - g. Wrist to wrist and ankle to ankle
  - h. Dorsal lumbar (wide)
  - i. Lateral, low back (quadratus lumborum and external obliques)
  - j. External abdominal oblique

- k. Gluteus maximus
- l. Hip adductor/adductor longus gracili
- m. Perivaginal/perirectal

- 5. General EMG Assessment Considerations - Factors affecting interpretation
  - a. Posture
  - b. Adipose tissue
  - c. Static and dynamic norms consideration
  - d. Volume conduction
  - e. Age and gender
  - f. Protocols
- 6. Signal processing and feedback displays.

### **C. Biofeedback and Distress**

- 1. Stress and the biopsychosocial model of illness
- 2. Stressful life events and risk of illness
- 3. Psychophysiological reactions to stressful events
  - a. Acute stress: Cannon's fight or flight response
  - b. Chronic stress: Selye's general adaptation syndrome
  - c. Psychosocial mediators of stress, e.g., Cognitive appraisals, Personality dispositions, Social support

### **D. Neuromuscular Relaxation Training**

- 1. Relaxation techniques assisted by EMG biofeedback
  - a. Progressive muscle relaxation
  - b. Autogenic training, guided imagery
  - c. Hypnosis and self-hypnosis
  - d. Meditation
  - e. Diaphragmatic breathing and paced respiration
  - f. Quick relaxation exercises (body scanning, abdominal breathing, etc.)
  - g. Cognitive interventions: e.g., reframing, self talk
- 2. Integrating relaxation into daily life
- 3. Overview of additional biofeedback modalities used for neuromuscular relaxation and autonomic regulation, i.e., heart rate variability, thermal, electrodermal, and EEG

## **II. PELVIC FLOOR ANATOMY, SURFACE EMG ASSESSMENT OF PELVIC FLOOR MUSCULATURE AND CLINICAL PRACTICE PROCEDURES 5.5**

### **A. Introduction: Patient Populations and Behavioral**

- 1. Introduction to elimination disorders treated with biofeedback assisted behavioral therapy.
- 2. Overview and history of biofeedback and behavioral modalities utilized

### **B. Anatomy: Pelvic Floor Structures**

- 1. Anatomy of pelvic floor muscles and structures
- 2. Pelvic bony structures
- 3. Pelvic diaphragm
- 4. Urogenital diaphragm
- 5. Urinary and anal sphincters
- 6. Smooth and striated muscles

### **C. Surface EMG Pelvic Floor Muscle Assessment**

- 1. Vaginal and rectal surface EMG placements
- 2. Infection control
- 3. Protocols for evaluation
- 4. Baselines
- 5. Phasic and tonic muscle testing
- 6. Endurance
- 7. Dyssynergia testing
- 8. Interpretation of data

### **D. EMG Instrumentation Options**

- 1. Sensors
- 2. Surface EMG instruments
- 3. Home training devices

### **E. Preparation for Clinical Practice**

- 1. BCIA *Ethical Principles of Biofeedback*
- 2. Patient education
  - a. Biofeedback procedures
  - b. Relevant basic anatomy and physiology
- 3. Patient intake
  - a. Medical and symptom history
  - b. Bowel and bladder assessment forms
  - c. Bladder/bowel/ pain diaries
  - d. Treatment planning
  - e. Report generation
- 4. Communication with other health care providers

### **III. CLINICAL DISORDERS: BLADDER DYSFUNCTION – 4.5**

#### **A. Anatomy and Physiology: Urological**

1. Anatomy and physiology of urine storage and micturition
2. Bladder anatomy
3. Normal bladder storage and emptying
4. Somatic and autonomic innervation

#### **B. Physiological Basis and Testing for Disorders: Urinary Related Problems**

1. Varieties of bladder disorders:
  - a. Stress urinary incontinence
  - b. Urge urinary incontinence
  - c. Mixed urinary incontinence
  - d. Overflow urinary incontinence
  - e. Functional urinary incontinence
  - f. Urinary hesitancy and frequency
  - g. Bladder sphincter dyssynergia
  - h. Interstitial cystitis
  - i. Prostatitis
2. Overview of Medical Diagnostic Procedures
3. Urodynamics

#### **C. Medical and Behavioral Treatment Modalities: Urologic**

1. Neuromuscular reeducation and therapeutic exercise assisted by vaginal/rectal surface EMG and other EMG placements sites for bladder disorders.
  - a. Uptraining: pelvic floor muscle motor recruitment and strengthening strategies and exercise protocols
  - b. Downtraining: Strategies and treatment protocols for pelvic floor muscle hypertonis and detrusor hyperactivity
  - c. Coordination training: treatment protocols for bladder sphincter dyssynergia
2. Other behavioral methods specific to bladder disorders
  - a. Patient education
  - b. Urge suppression techniques
  - c. Bladder retraining
  - d. Dietary counseling relating to bladder dysfunction
  - e. Vaginal weights
  - f. Toileting strategies
  - g. Pelvic floor muscle electrical stimulation

3. Non-behavioral treatment modalities
  - a. Pharmacological
  - b. Surgical
  - c. Electrical
  - d. Physical interventions
4. Practice limitations and appropriate referral guidelines

### **IV. CLINICAL DISORDERS: BOWEL DYSFUNCTION 4.5**

#### **A. Anatomy and Physiology: Gastrointestinal**

1. Gastrointestinal anatomy and physiology
2. Digestive structures and processes
3. Stool continence
4. Defecation
5. Somatic and autonomic innervation

#### **B. Physiological Basis and Testing for Disorders: Gastrointestinal**

1. Gastrointestinal disorders
  - a. Fecal incontinence
  - b. Constipation
  - c. Pelvic floor dyssynergia
  - d. Irritable bowel syndrome
  - e. Colonic inertia
2. Medical diagnostic procedures
  - a. Manometric and defecographic evaluation
  - b. Transit time study

**C. Medical and Behavioral Treatment Modalities:  
Gastrointestinal**

1. Neuromuscular reeducation and therapeutic exercise assisted by vaginal/rectal surface EMG and other EMG placements sites for bowel disorders
  - a. Uptraining: pelvic floor muscle motor recruitment and strengthening strategies and exercise protocols
  - b. Downtraining: Strategies and treatment protocols for pelvic floor muscle hypertonis and bowel urgency
  - c. Coordination training: treatment protocols for normal defecation patterns
  - d. Bowel sensory awareness training
2. Other behavioral methods specific to bowel disorders
  - a. Patient education
  - b. Dietary counseling
  - c. Toileting strategies
3. Non-behavioral interventions for bowel disorders
  - a. Pharmacological
  - b. Surgical
  - c. Electrical
  - d. Physical interventions
4. Practice limitations and appropriate referral guidelines

**V. CLINICAL DISORDERS: CHRONIC  
PELVIC PAIN SYNDROMES 4.5**

**A. Physiological Basis of Disorders:  
Pain, General**

1. Psychophysiological basis of pain
2. Basic pain mechanisms involving pelvic floor pain
3. Bone, nerve, and tendon
4. Pain-stress-muscle tension relationships, role of trauma

**B. Physiological Basis of Disorders: Pain-Syndromes  
Related to Pelvic Floor Dysfunction**

1. Chronic pelvic pain syndromes
  - a. Vulvodynia (vulvar vestibulitis, dysesthetic vulvodynia dysparunia)
  - b. Protagia fugax
  - c. Levator ani syndrome
2. Co-morbidities
  - a. irritable bowel syndrome
  - b. fibromyalgia
  - c. urinary disorders
  - d. trauma
  - e. interstitial cystitis
  - f. prostatitis

**C. Medical and Behavioral Treatment Modalities:  
Pain**

1. Neuromuscular reeducation and therapeutic exercise assisted by vaginal/rectal surface EMG and other EMG placements sites for chronic pelvic pain syndromes
  - a. Strategies and treatment protocols for pelvic floor muscle hypertonis and instability
  - b. Postural corrective strategies
2. Other behavioral methods specific to pelvic pain
  - a. Patient education
  - b. Dietary counseling relating to pain control
  - c. General relaxation modalities
3. Non-behavioral interventions for pelvic pain syndromes
  - a. Pharmacological
  - b. Surgical
  - c. Electrical
  - d. Physical interventions
4. Basic sexual history taking, sexual counseling
5. Practice limitations and appropriate referral guidelines