CHAPTER 10
Human Neuroscience

INTRODUCTION

This chapter on human neuroscience provides protocols used to assess neurologic and mental function in humans. Included are clinical procedures for evaluating common neurologic disorders, e.g., Parkinson disease and Alzheimer’s disease. Such procedures provide a means of tracking the progression and severity of neurologic disorders, which is essential for assessment of the efficacy of therapeutic treatments. In addition, these protocols may be particularly useful for distinguishing critical differences between animal models and these human disorders. Other protocols provide methods used for the evaluation of sensory, motor, cognitive, and memory functions.

Parkinson disease (PD) is a progressive neurologic condition that causes motor and nonmotor manifestations. Treatment provides symptomatic benefit but no current treatment has been proven to slow disease progression. UNIT 10.1 describes methods for rating the severity of disease by measurement of motor manifestations, assessment of ability to perform daily functional activities, and symptomatic response to medication. It describes the most common rating scales, including the unified Parkinson disease rating scale (UPDRS), Hoehn and Yahr staging, and the Schwab and England rating of activities of daily living. In addition to description of their implementation, some common applications of these scales are described.

The electroencephalogram (EEG) is the most common tool used in sleep research. UNIT 10.2 describes methods for recording and analyzing the EEG, including detailed protocols for recorder calibration, electrode application, EEG recording, and computer EEG analysis with power spectral analysis. Computer digitization of an analog EEG signal is discussed, along with EEG filtering and the parameters of fast Fourier transform (FFT) power spectral analysis. Sample data are provided for a typical night’s analysis of EEG during NREM (non-REM) and REM sleep.

Alzheimer’s disease (AD) is the most common form of dementia in older adults. UNIT 10.3 reviews the major cognitive and behavioral impairments associated with AD and the practical application of current neuropsychological procedures used to assess these deficits.

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