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Measurement of Membrane Capacitance in Voltage-ClampRecording of Secretory Events; Power Supplies and Signal Sources; Electronic Voltmeters; Electrometers; The Cathode Ray Oscilloscope; LCD Screen Oscilloscopes; Important Properties of Oscilloscopes; Digital Electronics, Logic; A/D and D/A Conversions; Computers; 3 Electrochemistry; Introduction, Properties of Electrolytes; Electrolytes; The Metal/Electrolyte Interface; Capacitance of Polarized Electrodes; Faradaic Processes; Practical Electrodes; Electrochemical Cells, Measuring Electrodes; The Silver/Silver Chloride Electrode
Non-Faradaic ProcessesElectrokinetic Processes; Liquid Junction Potentials; Membrane Potentials; Derivation of the Equilibrium Potential; The Reversal Potential; Ion Selectivity; Electrodes Sensitive to pH and Other Ions; Electrodes: Practical Aspects; The Glass Micropipette; Patch Electrodes; The Semi-Permeable Patch; Ground Electrodes; Volume Conduction: Electric Fields in Electrolyte Solutions; Homogeneous Electric Field; Monopole Field; Dipole Field; 4 Signal Analysis; Introduction; Analysis of Analogue Potentials; Systems Analysis; Convolution; The Laplace Transform
The Fourier TransformOdd and Even Functions; Linearity; Analogue-to-Digital and Digital-to-Analogue Conversions; Signal Windowing; Digital Signal Processing; Signal Averaging; Autocorrelation; Crosscorrelation; The Discrete Fourier Transform; The Detection of Signals of Known Shape; Digital Filters; Fourier Filters and Non-Causal Filters; Non-Linear Systems Analysis; The Formal Method: Wiener Kernel Analysis; The Informal Method: Output Shape Analysis; The Importance of Non-Linearity; Analysis of Action Potential Signals; Population Spike and Gross Activity; Recording from the Skin Surface
The Electrocardiogram

Sommario/riassunto

Introduction to Electrophysiological Methods and Instrumentation covers all topics of interest to electrophysiologists, neuroscientists and neurophysiologists, from the reliable penetration of cells, the behaviour and function of the equipment, to the mathematical tools available for analysing data. It discusses the pros and cons of techniques and methods used in electrophysiology and how to avoid their pitfalls. Particularly in an era where high quality off-the-shelf solutions are readily available, it is important for the electrophysiologist to understand how his or her equipme