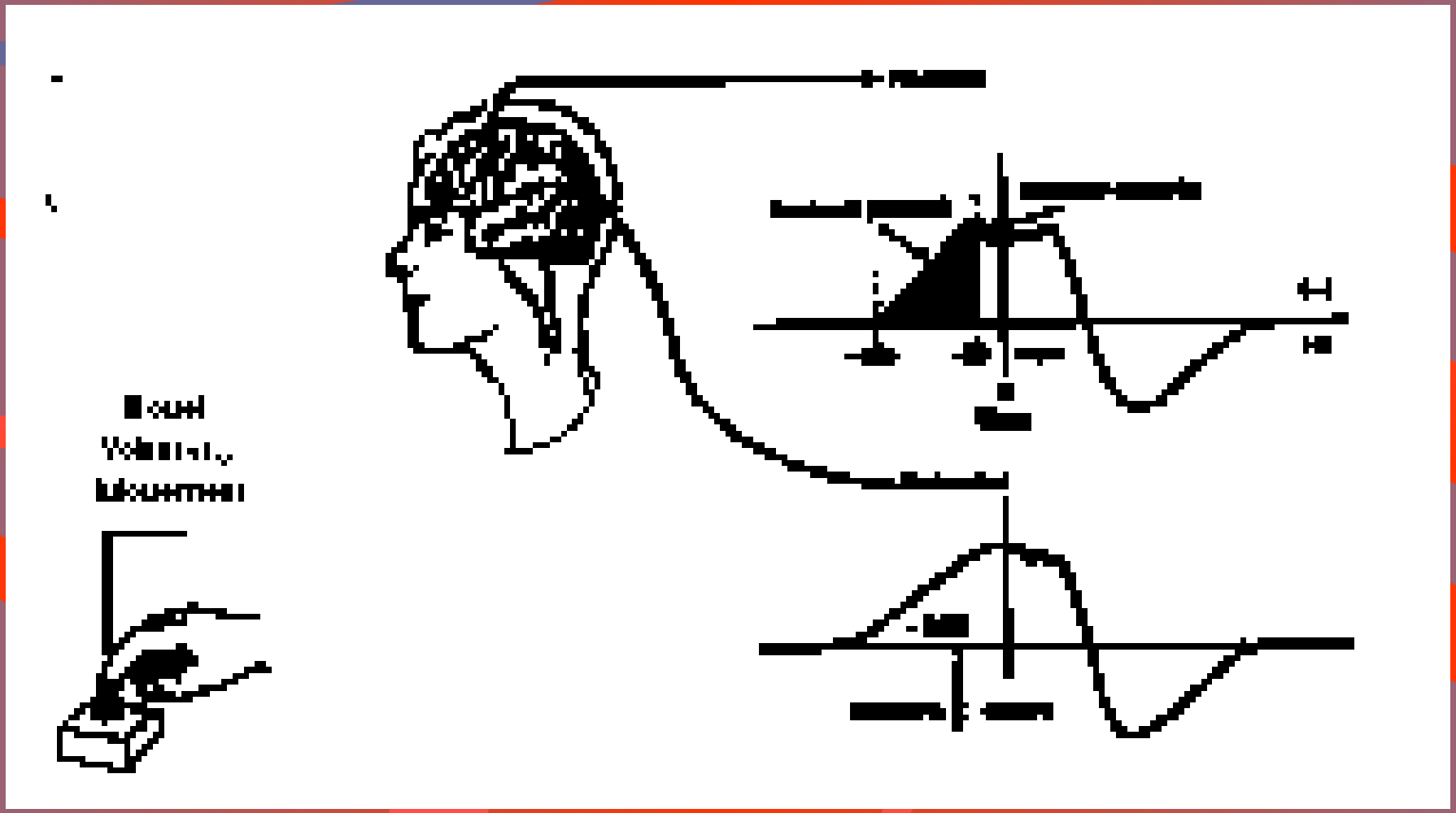
Thermography

Nervous System Current Flow



Problems

- New paradigms
- Vitalism vs. mechanism
- Volta vs. Galvani
- “current of injury”
- Transfer of energy within living cells – Gyorgyi in 1937

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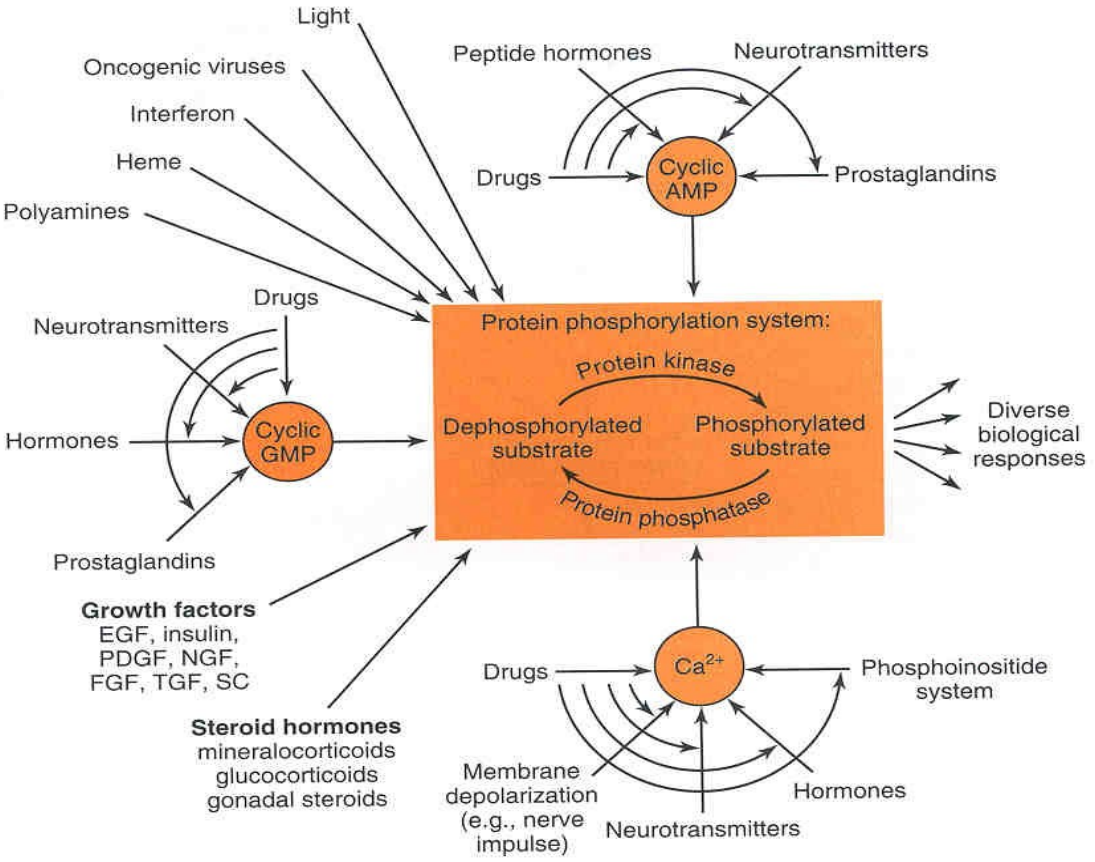

FIG. 1. Schematic diagram of the role played by protein phosphorylation in mediating some of the biological effects of a variety of regulatory agents. Many of these agents regulate protein phosphorylation through altering intracellular levels of a second messenger, cyclic AMP, cyclic GMP, or Ca^{2+}. Other agents appear to regulate protein phosphorylation through mechanisms that do not involve these second messengers. Most drugs regulate protein phosphorylation by affecting the ability of first messengers to alter second-messenger levels *(curved arrows)*. A small number of drugs (e.g., phosphodiesterase inhibitors, Ca^{2+} channel blockers, lithium) regulate protein phosphorylation by directly altering second-messenger levels *(straight arrows)*. (EGF) epidermal growth factor; (PDGF) platelet-derived growth factor; (NGF) nerve growth factor; (FGF) fibroblast growth factor; (TGF) transforming growth factor; (SC) somatomedin C. (From Nestler and Greengard [1].)

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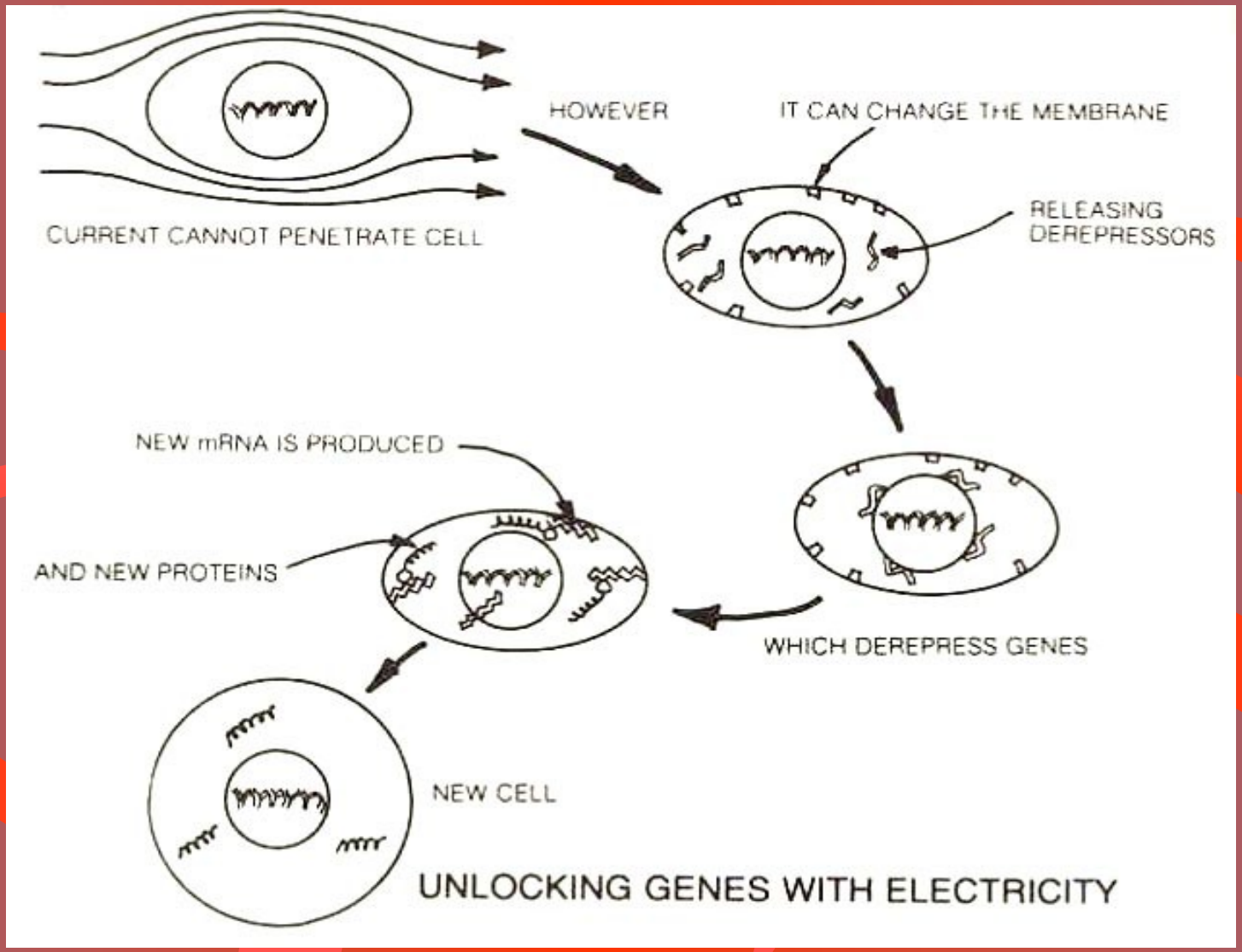
HOWEVER
IT CAN CHANGE THE MEMBRANE
CURRENT CANNOT PENETRATE CELL
RELEASING
DEREPRESSORS
NEW mRNA IS PRODUCED
AND NEW PROTEINS
WHICH DEREPRESS GENES
NEW CELL
UNLOCKING GENES WITH ELECTRICITY

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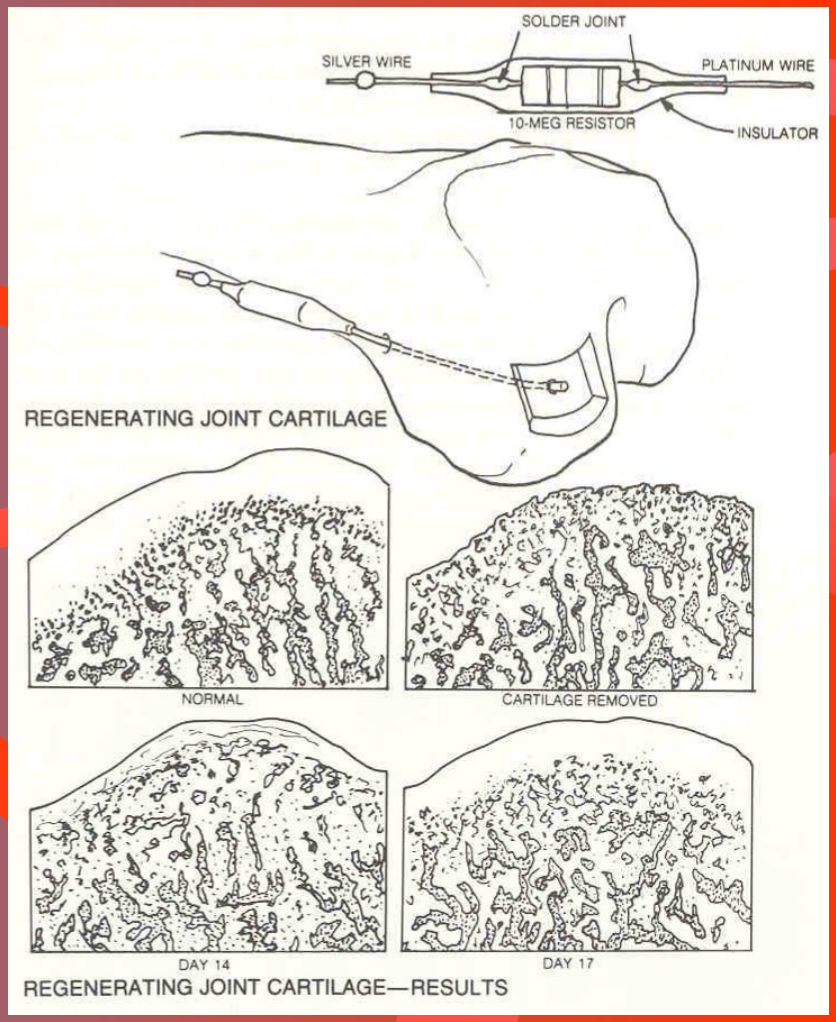
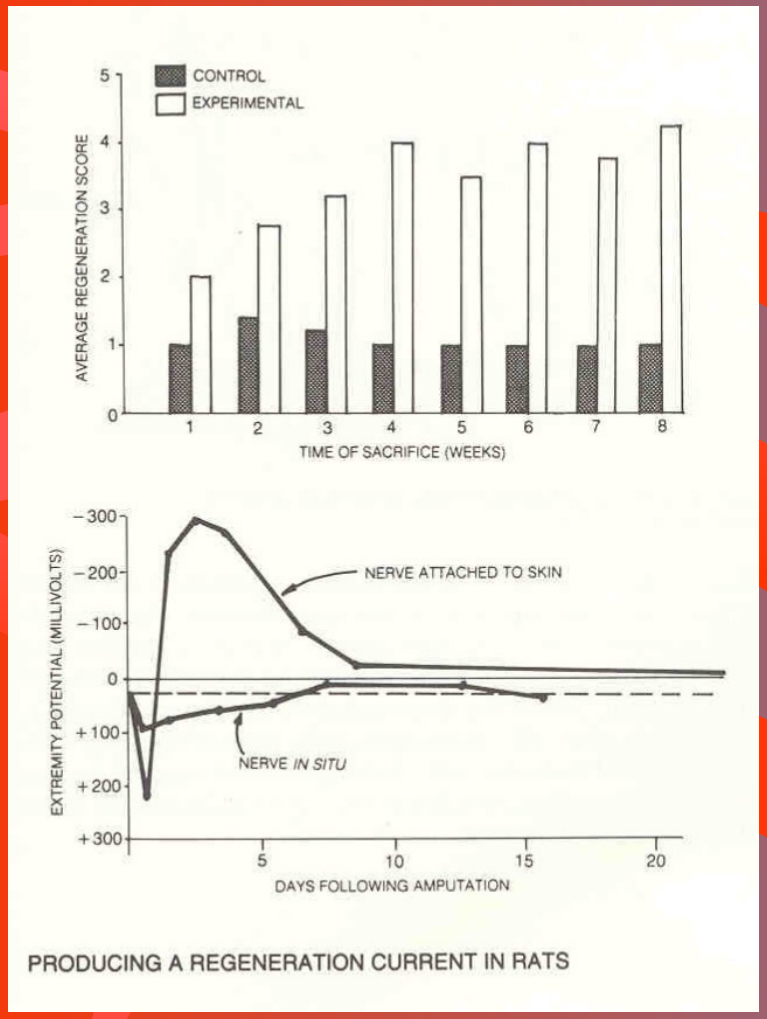


REGENERATING JOINT CARTILAGE—RESULTS



PRODUCING A REGENERATION CURRENT IN RATS

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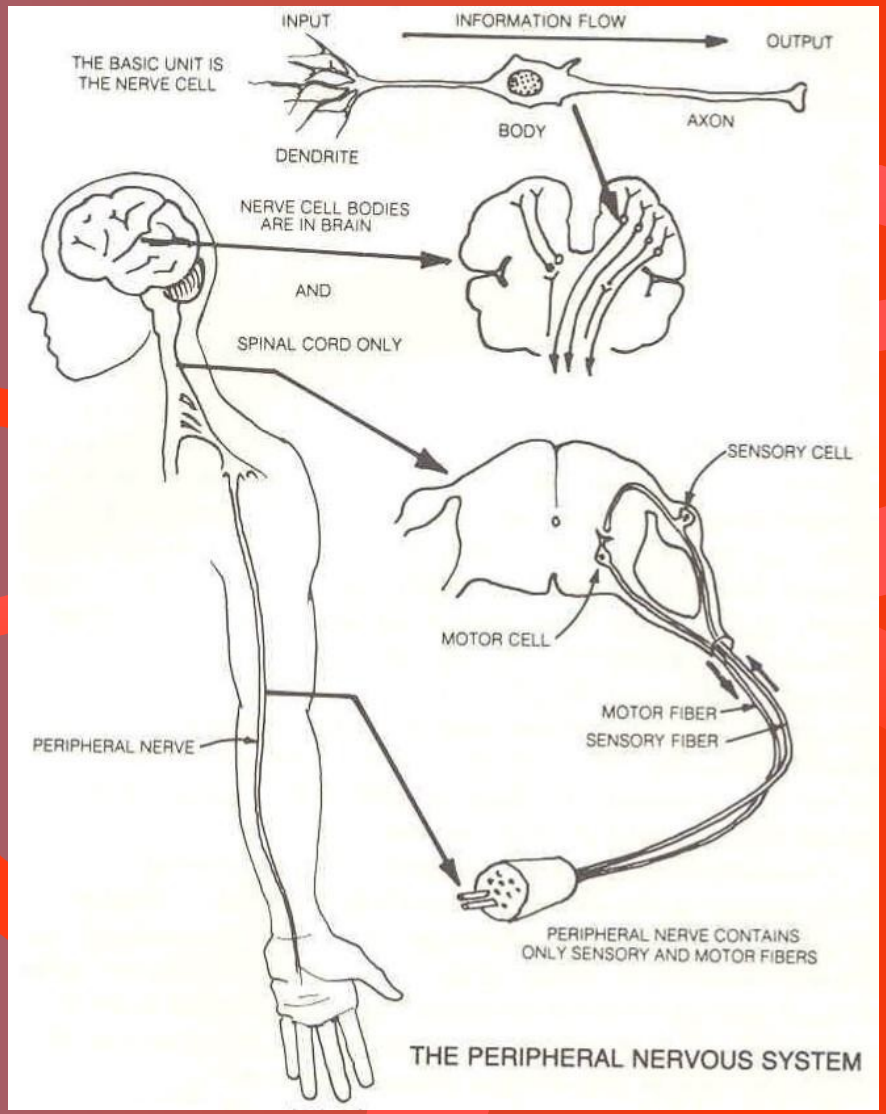
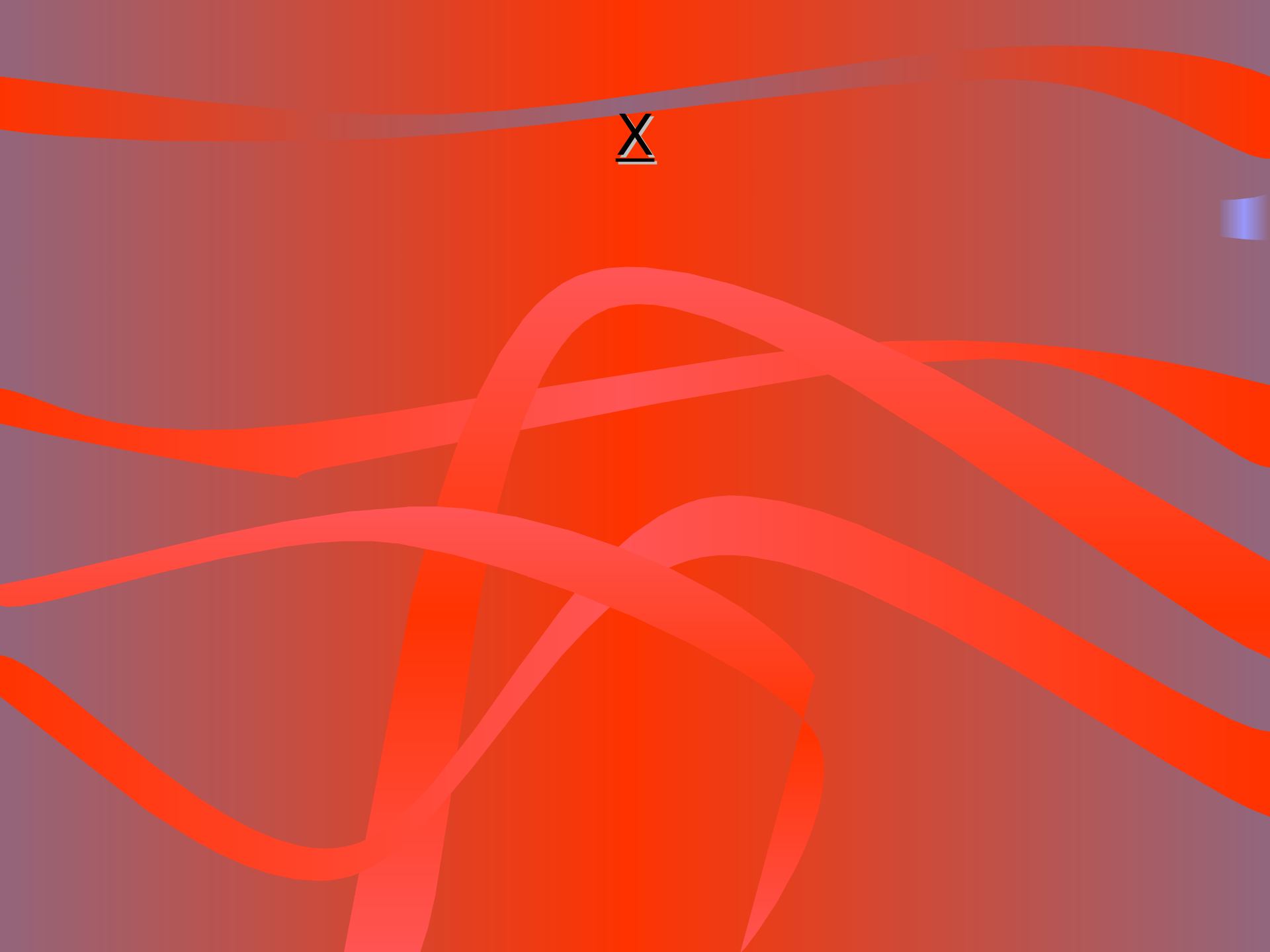

INPUT
INFORMATION FLOW
OUTPUT
THE BASIC UNIT IS
THE NERVE CELL
BODY
AXON
DENDRITE
NERVE CELL BODIES
ARE IN BRAIN
AND
SPINAL CORD ONLY
SENSORY CELL
MOTOR CELL
MOTOR FIBER
SENSORY FIBER
PERIPHERAL NERVE
PERIPHERAL NERVE CONTAINS
ONLY SENSORY AND MOTOR FIBERS
THE PERIPHERAL NERVOUS SYSTEM

Table 10.3 Common operations in sensory transduction

Transduction operations	Operations in single sensory cells	Operations in cell populations
Detection	Perireceptor mechanisms: filters: carriers: tuning; inactivation Sensitivity Rapidity	Perireceptor mechanisms: filters; carriers; tuning; inactivation Different thresholds
↓		
Amplification	Positive feedback Active processes Signal/noise enhancement	Positive feedback Signal/noise enhancement
↓		
Encoding/ discrimination	Intensity coding Quality coding Temporal differentiation	Different dynamic ranges Quality independent of intensity Center–surround antagonisms Opponent mechanisms Construction of maps
↓		
Adaptation and termination	Desensitization Negative feedback Temporal discrimination Repetitive responses	Temporal discrimination
↓		
Sensory channel gating	Open or close conductance gating	
↓		
Electrical response	Depolarization or hyperpolarization	
↓		
Transmission to brain	Electrotonic spread Active properties Synaptic output or impulse discharges	Spatial patterns: maps and image formation Temporal patterns: directional selectivity, etc.

From Shepherd (1991b)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