



HORMONES

SECOND STAGE

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MEDICAL BIOCHEMISTRY

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RECEPTORS AND SIGNALING MECHANISMS:

A RECEPTOR IS DEFINED AS ANY BIOLOGIC MOLECULE TO WHICH A DRUG BINDS AND PRODUCES A MEASURABLE

RESPONSE. THUS, ENZYMES, NUCLEIC ACIDS, AND STRUCTURAL PROTEINS CAN ACT AS RECEPTORS FOR DRUGS OR

ENDOGENOUS AGONISTS. HOWEVER THE RICHEST SOURCES OF RECEPTORS ARE MEMBRANE-BOUND PROTEINS THAT

TRANSDUCE EXTRACELLULAR SIGNALS INTO INTRACELLULAR RESPONSES.

THESE RECEPTORS MAY BE DIVIDED INTO FOUR FAMILIES: 1) LIGAND-GATED ION CHANNELS, 2) G PROTEIN-COUPLED RECEPTORS, 3)

ENZYME-LINKED RECEPTORS, AND 4) INTRACELLULAR RECEPTORS. GENERALLY, HYDROPHILIC LIGANDS INTERACT WITH

RECEPTORS THAT ARE FOUND ON THE CELL SURFACE (A, B, C). IN CONTRAST, HYDROPHOBIC LIGANDS ENTER CELLS THROUGH THE LIPID

BILAYERS OF THE CELL MEMBRANE TO INTERACT WITH RECEPTORS FOUND INSIDE CELLS.

TRANSMEMBRANE SIGNALING MECHANISMS:

A. LIGAND BINDS TO THE EXTRACELLULAR DOMAIN OF A LIGAND-GATED CHANNEL. B. LIGAND BINDS TO A DOMAIN OF A

TRANSMEMBRANE RECEPTOR WHICH IS COUPLED TO A G PROTEIN. C. LIGAND BINDS TO THE EXTRACELLULAR DOMAIN OF A

RECEPTOR THAT ACTIVATES A KINASE ENZYME. D. LIPID-SOLUBLE LIGAND DIFFUSES ACROSS THE MEMBRANE TO INTERACT WITH ITS

INTRACELLULAR RECEPTOR. R = INACTIVE PROTEIN.

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HORMONES DEFINITION AND TRANSMISSION:

SOME COMMONLY USED MECHANISMS FOR TRANSMISSION OF REGULATORY SIGNALS BETWEEN CELLS: ENDOCRINE SIGNALING (HORMONE TRAVELS

THROUGH BLOOD VESSEL TO TARGET CELL), DIRECT CONTACT (VIA GAP JUNCTION), AND SYNAPTIC SIGNALING (NERVE CELL RELEASE

NEUROTRANSMITTER TO TARGET CELL). HORMONES ARE CHEMICAL MESSENGERS PRODUCED BY GLANDS IN THE ENDOCRINE SYSTEM.

THEY TRAVEL THROUGH THE BLOODSTREAM TO TARGET ORGANS AND TISSUES, REGULATING A WIDE ARRAY OF BODILY

FUNCTIONS. DEFINITION OF HORMONES: HORMONES ARE: BIOCHEMICAL SUBSTANCES PRODUCED IN ONE PART OF THE BODY THAT

EXERT THEIR EFFECTS ON OTHER PARTS. REGULATORS OF VARIOUS PHYSIOLOGICAL PROCESSES, INCLUDING GROWTH

METABOLISM, REPRODUCTION, MOOD, AND IMMUNE RESPONSE.

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TYPES OF HORMONES :

HORMONES ARE CATEGORIZED BASED ON THEIR CHEMICAL STRUCTURE AND FUNCTION:

1. PEPTIDE HORMONES: STRUCTURE: COMPOSED OF AMINO ACIDS. EXAMPLES: INSULIN,

GLUCAGON, GROWTH HORMONE. FUNCTION: REGULATE METABOLISM, GROWTH, AND ENERGY BALANCE.

2. STEROID HORMONES: STRUCTURE: DERIVED FROM CHOLESTEROL.

EXAMPLES: CORTISOL, ESTROGEN, TESTOSTERONE. FUNCTION: INVOLVED IN METABOLISM, IMMUNE RESPONSE, AND SEXUAL DIFFERENTIATION.

**3. AMINO ACID DERIVATIVES: STRUCTURE:
DERIVED FROM SINGLE AMINO ACIDS. EXAMPLES:
THYROID HORMONES (E.G., THYROXINE),
ADRENALINE. FUNCTION: REGULATE
METABOLISM AND STRESS RESPONSE.**

**4. FATTY ACID DERIVATIVES: STRUCTURE:
DERIVED FROM FATTY ACIDS. EXAMPLES:
PROSTAGLANDINS. FUNCTION: INVOLVED IN
INFLAMMATION, BLOOD FLOW, AND THE
FORMATION OF BLOOD CLOTS.**

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MAJOR HORMONES AND THEIR FUNCTIONS:

INSULIN: REGULATES GLUCOSE LEVELS IN THE BLOOD.

THYROID HORMONES (T3 AND T4): REGULATE METABOLISM AND ENERGY USE. CORTISOL: KNOWN AS THE STRESS HORMONE; REGULATES

METABOLISM AND IMMUNE RESPONSE. ESTROGEN AND TESTOSTERONE: INVOLVED IN SEXUAL

DEVELOPMENT, REPRODUCTION, AND SECONDARY SEXUAL CHARACTERISTICS.

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HORMONAL DISORDERS:

HORMONAL DISORDERS OCCUR WHEN THERE IS AN IMBALANCE IN HORMONE LEVELS, WHICH CAN RESULT IN VARIOUS HEALTH ISSUES. HERE ARE SOME COMMON DISORDERS:

1. DIABETES MELLITUS: DESCRIPTION: RESULTING FROM INSUFFICIENT INSULIN PRODUCTION (TYPE 1) OR INSULIN RESISTANCE (TYPE 2). SYMPTOMS:

INCREASED THIRST, FREQUENT URINATION, FATIGUE, BLURRED VISION.

2. HYPOTHYROIDISM: DESCRIPTION: UNDERACTIVE THYROID LEADING TO INSUFFICIENT PRODUCTION OF THYROID HORMONES. SYMPTOMS: FATIGUE, WEIGHT GAIN, COLD INTOLERANCE, DEPRESSION.

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3. HYPERTHYROIDISM: DESCRIPTION: OVERACTIVE THYROID WITH EXCESS THYROID HORMONE PRODUCTION

SYMPTOMS: WEIGHT LOSS, RAPID HEARTBEAT, ANXIETY, HEAT INTOLERANCE.

4. POLYCYSTIC OVARY SYNDROME (PCOS): DESCRIPTION: HORMONAL DISORDER IN WOMEN CAUSING

IRREGULAR MENSTRUAL CYCLES AND EXCESS ANDROGENS. SYMPTOMS: IRREGULAR PERIODS, WEIGHT GAIN, ACNE, EXCESSIVE HAIR GROWTH.

**5. CUSHING'S SYNDROME: DESCRIPTION:
CAUSED BY EXCESS CORTISOL PRODUCTION,
OFTEN DUE TO**

**A TUMOR. SYMPTOMS: WEIGHT GAIN,
THINNING SKIN, FATIGUE, HIGH BLOOD
PRESSURE.**

**6. ADDISON'S DISEASE: DESCRIPTION: ADRENAL
GLANDS DO NOT PRODUCE SUFFICIENT
HORMONES (CORTISOL AND ALDOSTERONE).
SYMPTOMS:**

**FATIGUE, LOW BLOOD PRESSURE, WEIGHT
LOSS, DARK SKIN PATCHES.**

CONCLUSION:

UNDERSTANDING HORMONES, THEIR TYPES, AND ASSOCIATED DISORDERS IS CRUCIAL IN THE FIELDS OF MEDICINE

AND HEALTH. HORMONAL IMBALANCES CAN AFFECT OVERALL WELL-BEING AND QUALITY OF LIFE, MAKING AWARENESS

AND MANAGEMENT OF THESE CONDITIONS VITAL. IF YOU'D LIKE TO

EXPLORE ANY SPECIFIC HORMONE OR DISORDER FURTHER,

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**THANK YOU FOR
YOUR ATTENTION !**