Structure and Activity of Adrenocorticoids

These are synthesized in the cortex (shell) of adrenal glands that are located on top of kidneys, hence the name adrenocorticoids; biochemically they are divided into glucocorticoids (hydrocortisol, cortisol) and mineralocorticoids (aldosterone) on the basis of their activity; Addison’s disease, Cushings disease and Conn’s syndrome are pathologic conditions related to adrenal cortex and the hormones produced in them; importance of adrenocorticoids is most dramatically observed in adrenalectomized animals; there is an increase of urea in blood, muscle weakness, decreased liver glycogen and decreased resistance to insulin, lowered resistance to trauma (cold, chemical shock) (glucocorticoid activity) and electrolyte disturbances (mineralocorticoid activity). Glucocorticoids regulate biosynthesis and metabolism of carbohydrates, proteins and lipids. In addition, glucocorticoids are affect the immune system and are used as anti-inflammatory agents.

Biosynthesis of Adrenocorticoids

Metabolism of Adrenocorticoids

Classical steroid hormone mechanism wherein cortisol (aldosterone) diffuses into the nucleus of cell, binds to its specific receptor, resulting in the transcription of specific proteins. Hydrocortisone leads to lipocortin, which is an inhibitor of phospholipase A2. This enzyme is involved in the mediation of inflammatory signal wherein it releases prostaglandins, leukotrienes from cell membrane. By inhibiting phospholipase A2 lipocortin (and hence cortisol) behaves as an anti-inflammatory agent. Aldosterone in turn leads to release aldosterone-induced protein, which regulates Na⁺-K⁺-ATPase pump, thereby regulating electrolyte balance.
Systemic Corticosteroids

Only a handful of corticosteroids are used clinically by the oral route, including hydrocortisone, cortisone, prednisone, prednisolone, methylprednisolone, dexamethasone, fludrocortisone, betamethasone and triamcinolone. Numerous esters are available as pro-drugs.

Topical Corticosteroids

Clobetasol propionate, diflorasone diacetate, halobetasol propionate are very high potency anti-inflammatory creams; beclomethasone, betamethasone dipropionate, deoximetasone, fluocinolone, halcinonide, triamcinolone acetonide are high potency; flurandrenolide, fluticasone, mometasone are medium potency; alclometasone, desonide, dexamethasone are low potency.

Inhaled or Intranasal Corticosteroids

Pulmonary and nasal pharmacokinetics become important determinants for the potential of an inhaled or nasally applied corticosteroid to cause systemic effects.