Disorders in adrenal cortex hormone secretion

Addison’s disease or ‘ adrenal insufficiency’ is a condition in which the adrenal glands do not produce sufficient amounts of the hormone cortisol (Mayo 2006). This hormone helps to control the blood pressure, cardiovascular activity, immune responses, insulin function, metabolism, etc in the body (NIDDK 2004). In some cases, a hormone that controls the blood pressure and the fluid balance in the body (aldosterone) is also affected (NIDDK 2004). The adrenal glands are present above the kidneys and produce several other hormones required for normal functioning of the body (Mayo 2006).

Addison’s disease can occur in both sexes equally and in all age groups, but is more common in the middle-age group (Mayo 2006). The pituitary gland and the hypothalamus (structures present in the skull) control the activity of the adrenal gland by ensuring proper production and release of the cortisol hormone. The hypothalamus produces a hormone CRH (corticotropin-releasing hormone), that stimulates the pituitary to produce the ACTH hormones that further stimulates the adrenal glands to release cortisol (NIDDK 2004).

Addison’s disease may develop due to deficient production of cortisol by the adrenal gland (primary insufficiency) or due to decreased stimulation from the pituitary gland (secondary insufficiency) (NIDDK 2004). Primary adrenal insufficiency may develop due to an immune dysfunction. Most of the cases of develop due to the body’s defense mechanism attacking the tissues of the adrenal cortex and resulting in deficient production of the hormone (NIDDK 2004). Primary adrenal insufficiency may also develop in association with ‘

Polyendocrine Deficiency Syndrome', in which several hormonal levels are deficient due to a genetic disorder (NIDDK 2004).

Several other causes including tuberculosis, infections, hemorrhage, tumors, spread of tumors, surgery, etc, of the adrenal glands could result in primary insufficiency (Mayo 2006). Secondary adrenal insufficiency can develop due to reduced production of ACTH by the pituitary glands or CRH by the hypothalamus (Mayo 2006). The ACTH production stimulates the adrenal glands to produce cortisol, and the CRH hormone encourages the pituitary to release ACTH (NIDDK 2004). The level of ACTH is controlled by a negative feedback mechanism.

Tumors that affect the pituitary, surgical removal of the gland, radiotherapy to the head and neck region, reduced supply of blood to the pituitary, etc, could also result in secondary adrenal insufficiency (NIDDK 2004). Pheochromocytoma is a tumor that arises from adrenal glands that result in excessive production of the hormones epinephrine and nor-epinephrine (Mayo 2006). These hormones control the blood pressure, the rate at which the heart beats and several other activities in the body (Nanda 2006).

They are required especially in stressful conditions such as fright, flight and fight, emotionalstress, etc (Mayo 2006). The tumor develops from the inner portion of the adrenal gland known as ' adrenal medulla' (Nanda 2006). Most of the Pheochromocytoma are benign or self-limiting in nature (about 90 %), and only a small proportion is cancerous (10 %) (Nanda 2006). The tumor can occur in both sexes and in all age-groups, but is more common in the middle-age group. The exact cause Pheochromocytoma is still not

understood. The tumor usually develops from the chromaffin cells present in the adrenal medulla (Mayo 2006).

The tumor generally arises from one of the adrenal glands, and in rare cases it develops from both (about 10 %) (NCI 2005). Pheochromocytoma can also develop from extra-adrenal sites in about 10 to 15 % of all cases (NCI 2005), as the chromaffin cells are present in various tissues of the body (Mayo 2006). Multiple endocrine neoplasia, type II (MEN-II) is a condition in which tumors develop from various endocrine glands present in the body such as the thyroid, the parathyroid, adrenal glands, etc, resulting in hormonal imbalances (Mayo 2006).

Such patients usually develop bilateral tumors in the adrenal glands (NCI 2005). Pheochromocytoma can exist in Van-Hippel-Lindau Disease that tends to affect several organs in the body. It can also be associated with neurofibromatosis in which tumors develop in various parts including the skin, optic nerve and the bones (Mayo 2006). The other conditions in which Pheochromocytoma can exist include tuberous sclerosis, cerebellar hemangioblastoma, Sturge-Weber’s syndrome, etc (NCI 2005).