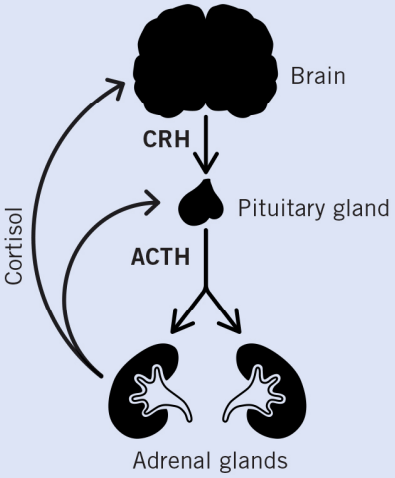
How Cortisol Levels are Controlled and Why Replacement Medication is Needed Post-Surgery

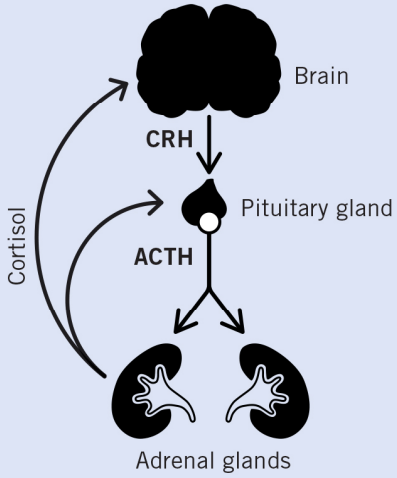
Proper levels of cortisol are necessary for life, thus cortisol levels are tightly controlled by the body. Control of cortisol levels involves the hypothalamus, a part of the brain that secretes a hormone, CRH, which then stimulates the pituitary gland to make ACTH. ACTH then stimulates the adrenal glands to make cortisol. This is called the hypothalamic-pituitary-adrenal (HPA) axis.

1) NORMAL FUNCTION



The pituitary gland secretes ACTH which causes the adrenal glands to secrete cortisol. Cortisol acts on body tissues, including the hypothalamus and pituitary gland. High cortisol levels normally direct the hypothalamus to decrease CRH output and the pituitary gland to decrease ACTH production, thus maintaining appropriate cortisol levels.

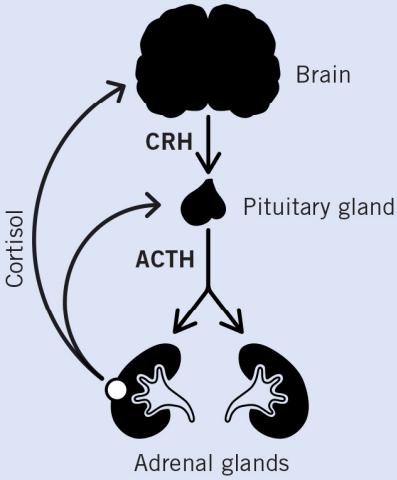
2) PITUITARY OR ECTOPIC TUMOR



The pituitary tumor (outline circle), or an ectopic tumor located outside the pituitary, secretes excessive ACTH, which causes the adrenal glands to secrete excessive amounts of cortisol. High cortisol levels cause the hypothalamus to decrease CRH output. High cortisol levels also act directly on normal pituitary tissue, causing it to drastically decrease ACTH output. The pituitary tumor continues to produce ACTH, thus high cortisol levels are maintained.

Following successful surgery, the remaining normal pituitary tissue needs time to recover and start producing ACTH. Replacement medication is required until the normal pituitary tissue recovers.

3) ADRENAL TUMOR



The adrenal tumor (outline circle) secretes excessive amounts of cortisol. The excessively high cortisol directs the hypothalamus to decrease CRH output and the normal pituitary gland to stop secreting ACTH. Over a period of time, the normal adrenal tissue stops making cortisol. The adrenal tumor continues to produce excessive cortisol, thus high cortisol levels are maintained.

Following successful surgery, the pituitary gland needs time to recover and start producing ACTH and the normal adrenal tissue also needs time to recover and start producing cortisol, thus replacement medication is required.

This brochure was reviewed for accuracy by Dr. Mary Lee Vance, University of Virginia, Charlottesville, VA, Winter, 2016

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