

Weight-related hypothalamic dysfunction: a memorable case

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The effect of weight loss on hypothalamic function is complex and not fully understood. There is interplay between neuropeptides (e.g., leptin, ghrelin) and the hypothalamus with the postulated aim of energy conservation and prevention of pregnancy during unfavourable conditions. We present a memorable case.

CASE

- A 35-yr-old lady presented with secondary amenorrhea of 17 years duration. She attained menarche at age 13. At age 18 her periods became scanty and then stopped. For this she had a 3-year course of the contraceptive pill to induce uterine withdrawal bleeding.
- She never exercised excessively but admits she did lose a stone in weight during examination stress as a teenager around the time her periods stopped.
- At presentation she had normal secondary sexual features and a body weight of 47.9 kg and height of 1.55 m (BMI 19.9).

INVESTIGATION

- After stopping the contraceptive pill her endocrine profile revealed results consistent with hypogonadotropic hypogonadism and mild central hypothyroidism (see baseline results in Table 1).
- Bone density scan revealed spinal osteopenia (T-score -2.4) and MRI scan revealed a grossly normal pituitary gland.

TREATMENT

- Because of ongoing tiredness, she had a trial of Levothyroxine 50mcg daily. Her TSH level fell to 0.02mU/L while her FT4 rose above normal (23.8pmol/L). Upon advice we gradually withdrew the Levothyroxine. Her TSH rose to 0.1mU/L and FT4 fell to 18.0pmol/L on 25mcg/day of Levothyroxine, with further improvement (TSH 0.47mU/L, FT4 9.6pmol/L) six weeks after stopping Levothyroxine.
- She declined oestrogen replacement because of side-effects but continued calcium-vitamin D supplements.

Table 1 – Results of serial her endocrine profile and weight measurements (2014-2018)

Blood test	Normal reference range	Baseline 2014	Follow-up results		
			2015	2017	2018
Oestradiol	100-750 pmol/L	<37	165	150	96
Follicle stimulating hormone	2-13 U/L	5	7	6	10
Luteinising hormone	1-13 U/L	2	2	7	6
Prolactin	0-500 mU/L	249	162	-	233
Testosterone	0.2-3.0 nmol/L	<0.2	-	-	-
Thyroid Stimulating Hormone	0.3-4.2 mU/L	1.35	1.34	1.66	1.74
Free Thyroxine	12.0-22.0 pmol/L	10.1	10.3	10.5	10.2
Free Triiodothyronine	3.1-6.8 pmol/L	3.1	3.3	3.4	3.3
Insulin Like Growth Factor	16.1-39.8 nmol/L	18.1	-	-	-
0-min Pre-Synacthen Cortisol	-	553	-	-	-
30-minute Post-Synacthen Cortisol	>450 nmol/L	876	-	-	-
Body Mass Index	18.5-24.9	19.9	21.4	21.2	21.0

OUTCOME AND FOLLOW-UP

Weight-loss-related hypothalamic dysfunction was discussed (particularly during her teenage years). Her weight did increase slightly along with her oestrogen levels. She remains well with a current weight of 50.4kg and her thyroid function tests continue to show slightly low but stable FT4 levels.

CONCLUSIONS

This case highlights the complex interplay between weight loss and hypothalamic function. The resultant endocrine abnormalities, especially thyroid function and gonadal function, could be protective mechanisms and may revert to normal with weight gain. Hasty hormone replacement therapy could make things worse.