CASE F—EVALUATION OF HIGH URINE OUTPUT

A 54 year old man is hospitalized on the psychiatry service for treatment of manic-depressive disorder; he is currently receiving lithium carbonate treatment. He states that he is always thirsty, and he has a daily urine output of over 8 liters per day. A consult is placed to the endocrinologists to rule out nephrogenic diabetes insipidus, and they call the laboratory to ask for help in interpreting the accompanying results. What would be the most likely reasons for a high urine output? Which of them have low urine osmolality? What is the most likely cause in this case?

SPECIMEN	Na	K	Cl	CO_2	BUN	Creatinine	Glucose	Osmolality
Serum	126	3.0	92	25	10	1.1	145	269
Urine	< 10	3.5	< 15			31.7		53

The laboratory results in this case are very similar to those in case C, and, in fact, this is another example of water intoxication, this case due to psychogenic compulsion to drink water.

In this case, the initial evaluation was based on a difference in urine output rather than the decreased serum sodium. Increased urine output is usually due to one of two major disorders: water intoxication or diabetes insipidus. In both of these disorders, urine osmolality is low, since ADH production or response is decreased in both. In water intoxication, as in this case, ADH production is appropriately decreased by decreased plasma osmolality; in this case, thirst is an inappropriate response, since volume status is normal. In diabetes insipidus, ADH is either absent (central diabetes insipidus) or ineffective (nephrogenic diabetes insipidus). Lithium can produce nephrogenic diabetes insipidus, which was the concern of the psychiatrists in this case.

In this patient, simple water restriction led to resolution of the hyponatremia and lowered the urine output. In many cases, however, the diagnosis is not as easy to determine. Prolonged water ingestion tends to reduce the high concentration in the kidney which is needed to produce maximal urine concentration. If this has occurred, then cessation of water ingestion may not immediately decrease urine output, and the patient may become dehydrated. In such a case, the diagnosis of diabetes insipidus is often made, and the patient is required to take ADH indefinitely. It is often advisable, particularly if the serum sodium is initially low (as in this case) to repeat the results after a period of water restriction (using ADH therapy, if necessary).