

**REM: A PUBLICATION FOR RESIDENTS AND FELLOWS**

## IMAGES: Identification and Effect of Periodic Limb Movements in End-Stage Renal Disease

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Sleep disorders are prevalent in patients with end-stage renal disease (ESRD). In those patients on nocturnal dialysis, it is important to perform objective sleep assessment during regular dialysis. We present the case of a man on continuous cycler peritoneal dialysis with disabling fatigue and moderate restless legs syndrome (RLS). Actigraphy demonstrated excessive nocturnal movement. Unattended home polysomnography, performed during his regular peritoneal dialysis, confirmed frequent nocturnal periodic limb movements with disturbed sleep. Treatment with low dose pramipexole led to improved RLS and marked improvement in his energy. Clinicians caring for patients with ESRD should have a low threshold for objective sleep assessment given that sleep disorders are common, disabling and eminently amenable to treatment.

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### INTRODUCTION

Disabling fatigue is common in patients with end-stage renal disease (ESRD).<sup>1</sup> There are many potential reasons contributing to this, including uremia, anemia, psychosocial distress, and sleep disorders such as obstructive sleep apnea, which is highly prevalent in patients with ESRD.<sup>1</sup> A history, clinical examination, and blood work may help to identify contributing factors.<sup>2</sup> There should be a low threshold for objective sleep assessment as many sleep disorders are not apparent during routine clinical assessment.<sup>3</sup> If the patient is on nocturnal dialysis, objective assessment of sleep should ideally be performed during their regular dialysis. This precludes laboratory-based polysomnography (PSG), where lack of appropriate plumbing and staff training may not facilitate dialysis. Unattended home PSG is increasingly recognized as safe and reliable,<sup>4</sup> and facilitates sleep assessment during nocturnal dialysis. Actigraphy is an unobtrusive screening tool that can confirm the sleep schedule.

### REPORT OF CASE

A 54-year-old man with ESRD secondary to immunoglobulin A nephropathy and hypertension was seen in consultation in the sleep clinic. He had been on continuous cycler peritoneal dialysis for 2 years and was listed for a kidney transplant. He worked full-time and lived with his wife and young children. He consumed three caffeinated drinks per day.

He reported marked, disabling fatigue. His blood work was satisfactory including replete iron stores (ferritin 477 ng/mL; transferrin saturation 31%). He had a regular sleep schedule (lights out 9:00 PM, awake at 6:00 AM). He did not report any disturbances from nocturnal dialysis cycler alarms.

Screening identified moderate restless legs syndrome (RLS) with an International Restless Legs Syndrome Questionnaire

score of 17/40, and normal sleep quality with a Pittsburgh Sleep Quality Index score of 4/21.

In accordance with our research protocol, wrist actigraphy was performed for 1 week using the Philips Respironics Actiwatch 2 (Murrysville, Pennsylvania, United States), which uses a light sensor and an accelerometer to detect white light and movement, respectively. Actigraphy concurred with the “lights off” and “lights on” times recorded in the sleep diary. However, although his sleep diary recorded sleep through the night, actigraphy detected very little sleep during a full week of monitoring, because of excess nocturnal movement (**Figure 1**).

He proceeded to unattended in-home PSG, using the Weinmann SOMNolab 2 PSG System (Hamburg, Germany), a level II sleep testing device. The patient performed his regular peritoneal dialysis on the night of PSG. The study was scored in accordance with The AASM Manual for the Scoring of Sleep and Associated Events: Rules, Terminology and Technical Specifications.

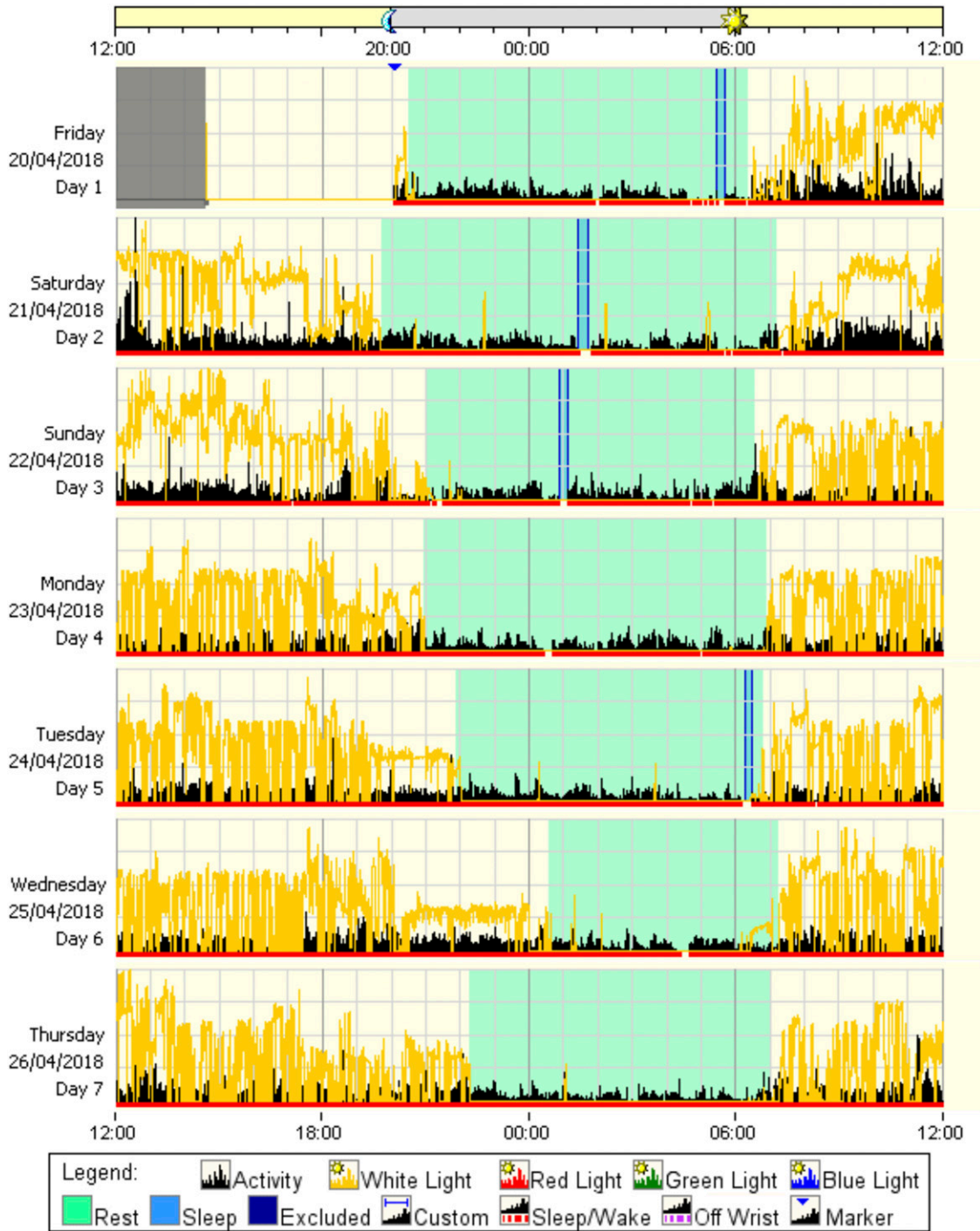
PSG (specifically leg electromyography) demonstrated a periodic limb movement (PLM) index of 146 events/h of sleep. This was associated with frequent arousals (77 arousals/h of sleep), and a sleep efficiency of 66%. A large proportion of sleep time was spent in the light stages, with little time spent in the deeper stages (N1 18%, N2 60%, N3 9%, R 13%). The apnea-hypopnea index was normal at 4 events/h.

The patient began to receive low-dose pramipexole and noted a marked self-reported improvement in energy. His 3-month follow-up International Restless Legs Syndrome Questionnaire score was 5 and his follow-up Pittsburgh Sleep Quality Index score was 3.

### DISCUSSION

Despite normal self-reported sleep duration and quality, this man’s disabling fatigue was secondary to RLS with frequent

**Figure 1**—Wrist actigraphy over 1 week.



Wrist actigraphy over 1 week showed a regular sleep schedule. However, little of the time spent in bed resting (green) is actually recorded as sleep (blue) due to patient movement (black).

nocturnal PLM. This case highlights the importance of objective sleep assessment in the context of ESRD. Although actigraphy is not recommended in place of electromyography for the diagnosis of PLM, actigraphy performed for other reasons may identify abnormal sleep and excessive movement and highlight the need for diagnostic PSG. In those jurisdictions with limited access to PSG, triage with screening actigraphy may be helpful.

It is important to accurately identify RLS with nocturnal PLM or PLM disorder where present in patients with ESRD, because they may lead to sleep disturbance and fatigue. PLM is also associated with sympathetic nervous system activity and nocturnal hypertension, which may add to the already elevated cardiovascular risk in patients with ESRD.<sup>5,6</sup> Treatment of this disorder may lead to marked improvements in sleep quality.<sup>7,8</sup>

and potentially a reduction in future cardiovascular disease risk.<sup>6</sup> Because there is an association between iron deficiency and RLS, iron supplementation is the first-line treatment in those patients with RLS who are also iron deficient.<sup>9</sup> Iron was not supplemented in this case, because his iron stores were replete.

Clinicians caring for patients with ESRD should have a high level of suspicion for sleep disorders including RLS and sleep apnea as these disorders are prevalent, disabling, and eminently amenable to treatment.

## ABBREVIATIONS

ESRD, end-stage renal disease  
 PLM, periodic limb movement  
 PSG, polysomnography  
 RLS, restless legs syndrome

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## SUBMISSION & CORRESPONDENCE INFORMATION

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