**Supplementary Material**

The patient had a previous diagnosis of asymptomatic Multiple Myeloma (MM) of IgG-lambda type, made 8 years before, in a regular hematologic follow-up.

Neurologic examination revealed gait impairment, due to bilateral steppage and sensory ataxia. She had severe, bilateral, symmetric weakness and atrophy affecting semidistal and distal muscles of all limbs, paraesthesias and hypoesthesia in a “stocking-and-glove” pattern and loss of deep tendon reflexes. Cranial nerves were spared. She had no symptoms or signs of autonomic dysfunction.

Nerve conduction studies (NCS) were consistent with an axonal sensory-motor polyneuropathy (Supplementary Table).

Laboratory tests confirmed a serum IgG-lambda monoclonal gammopathy with an IgG concentration of 4370 mg/dL (range: 700-1600) and a slight increase in free  LCs (28.9 mg/L; range: 5.7-26.3) with a serum  ratio of 0.13 (range: 0.26-1.65), and no Bence Jones proteinuria. Remaining routine laboratory studies were all normal, including complete blood count, renal function tests, electrolytes, beta-2 microglobulin, and auto-antibodies for systemic autoimmune disorders.

The cerebrospinal fluid analysis showed slight hyperproteinorrachia (48 mg/dl; range: 20-40) without pleocytosis. A contrast-enhanced brain and spine MRI and a whole-body CT proved both unremarkable, as well as cardiac investigations (EKG, echocardiography, NT-proBNP determination). Whole-body 18F-FDG PET/CT revealed a focal area of increased uptake in the soma of a thoracic vertebra (D10), not visible on skeletal X-rays.

After providing written informed consent, the patient underwent left sural nerve biopsy. H&E staining revealed a small endoneural, proteinaceous deposit turning out negative for Congo red stain. Direct immunofluorescence using anti-light chains (LCs), anti-IgG, and anti-transthyretin antibodies showed diffuse deposits of lambda LCs, diagnostic for Light Chain Deposition Disease (LCDD) neuropathy (Figure 1 A-H). No other tissue biopsy was performed.

Considering these pathological findings, a bone marrow needle aspiration was performed, showing a plasmacytosis (15.8%) with some cellular atypia.

The patient was then treated with chemotherapy according to the following scheme: nine cycles of melphalan, bortezomib, and dexamethasone, followed by bortezomib and dexamethasone.

Follow-up hematologic investigations after treatment were unremarkable (not detectable serum M component; normalization of free lambda LCs and kappa/lambda ratio; plasma cells on bone marrow needle aspiration=0.5%). Moreover, a follow-up whole-body 18F-FDG PET/CT showed the disappearance of the previously reported focal area of increased uptake and follow-up neurological and neurophysiological evaluations at 6, 12 and 24 months showed stabilization of the neuropathy.