Title: Action Myoclonus – Renal Failure Syndrome *GeneReview* — Supplemental information about specialized studies for biologic and histologic findings
Authors: Amrom D, Andermann F, Andermann E
Date: December 2015
Note: The following information is provided by the authors listed above and has not been reviewed by *GeneReviews* staff.

Information about specialized studies for biologic and histologic findings

Biologic Findings

- **Blood.** Enzyme activity: beta-glucocerebrosidase (β-GC) levels may be normal or low normal in leucocytes, elevated in serum, but are 10% of control levels in fibroblasts (Family D in Badhwar et al [2004]; Unpublished data) [Balreira et al 2008, Dardis et al 2009, Zeigler et al 2014].

- **The plasma chitotriosidase activity** (a biomarker of Gaucher disease [GD]). Normal

- **CSF.** Normal

Histologic Findings

Brain. Macroscopic examination may be normal [Badhwar et al 2004] or show dilatation of the lateral ventricles, less black pigmentation than normal in the substantia nigra, as well as spreading of brownish pigmentation along its lower border [Andermann et al 1986]. In two Japanese patients, one with juvenile onset and one with late onset, the cerebellum appeared somewhat small with atrophy of the folia in the superior parts of the vermis and hemispheres, and shrinkage of the pontine tegmentum. In addition, in patient 2, the globus pallidus appeared somewhat atrophic [Fu et al 2013].

Microscopic examination shows no neuronal loss or significant gliosis [Andermann et al 1986, Badhwar et al 2004]. In two Japanese patients, neuronal loss and/or gliosis were not present in the cerebral cortex but were observed to various degrees in some regions of the subcortical gray matter (globus pallidus and subthalamic nucleus), in the brainstem (pontine tegmentum, vestibular and inferior olivary nuclei), and in the cerebellum (cortical Purkinje cells and dentate nucleus) [Fu et al 2013].

Electron microscopy of the cerebellar cortex, performed in the layer of Bergmann astrocytes, shows the presence of osmiophilic bodies surrounded by an incomplete membrane, suggesting an intracellular location, probably in astrocytic processes [Andermann et al 1986, Badhwar et al 2004]. The report on two Japanese patients shows that the pigment granules appear as membrane-bound, and were exclusively located in the astrocytic cytoplasm [Fu et al 2013].

Thus this condition is characterized by extraneuronal but not intraneuronal storage of pigmented material of hitherto unknown nature, and system neurodegeneration may appear as well.

Spinal cord. Spinal cord pathology performed in two Japanese patients showed myelin pallor and axon loss in the anterolateral column and the central part of the posterior column, suggesting neurogenic atrophy [Fu et al 2013].

Bone marrow. Bone marrow biopsy is normal, and in particular does not show Gaucher cells [Balreira et al 2008, Chaves et al 2011].

References

Andermann E, Andermann F, Carpenter S, Wolfe LS, Nelson R, Patry G, Boileau J. Action myoclonus-renal failure syndrome: a previously unrecognized neurological disorder unmasked by advances in nephrology. Adv Neurol. 1986;43:87-103.

Badhwar A, Berkovic SF, Dowling JP, Gonzales M, Narayanan S, Brodtmann A, Berzen L, Caviness J, Trenkwalder C, Winkelmann J, Rivest J, Lambert M, Hernandez-Cossio O, Carpenter S, Andermann F, Andermann E. Action myoclonus-renal failure syndrome: characterization of a unique cerebro-renal disorder. Brain. 2004;127:2173-82.

Balreira A, Gaspar P, Caiola D, Chaves J, Beirao I, Lima JL, Azevedo JE, Miranda MC. A nonsense mutation in the LIMP-2 gene associated with progressive myoclonic epilepsy and nephrotic syndrome. Hum Mol Genet. 2008;17:2238-43.

Chaves J, Beirao I, Balreira A, Gaspar P, Caiola D, Sa-Miranda MC, Lima JL. Progressive myoclonus epilepsy with nephropathy C1q due to SCARB2/LIMP-2 deficiency: clinical report of two siblings. Seizure. 2011;20:738-40.

Dardis A, Filocamo M, Grossi S, Ciana G, Franceschetti S, Dominissini S, Rubboli G, Di Rocco M, Bembi B. Biochemical and molecular findings in a patient with myoclonic epilepsy due to a mistarget of the beta-glucosidase enzyme. Mol Genet Metab. 2009;97:309-11.

Fu YJ, Aida I, Tada M, Tada M, Toyoshima Y, Takeda S, Nakajima T, Naito H, Nishizawa M, Onodera O, Kakita A, Takahashi H. Progressive myoclonus epilepsy: extraneuronal brown pigment deposition and system neurodegeneration in the brains of Japanese patients with novel SCARB2 mutations. Neuropathol Appl Neurobiol. 2013.

Zeigler M, Meiner V, Newman JP, Steiner-Birmanns B, Bargal R, Sury V, Mengistu G, Kakhlon O, Leykin I, Argov Z, Abramsky O, Lossos A. A novel SCARB2 mutation in progressive myoclonus epilepsy indicated by reduced beta-glucocerebrosidase activity. J Neurol Sci. 2014. Apr 15;339(1-2):210-3.