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**Catalogue# RPCA-UCHL1: Rabbit Polyclonal Antibody to Ubiquitin C-Terminal Hydrolase 1**

**The Immunogen:** Ubiquitin C-terminal hydrolase 1 (UCHL1) has several other names, such as ubiquitin carboxyl esterase L1, ubiquitin thiolesterase, neuron-specific protein PGP9.5 and Park5. It was originally identified as a major component of the neuronal cytoplasm from 2-dimensional gel analysis of brain tissues, and was given the name PGP9.5 (1). The protein is extremely abundant, and was estimated to be present at a concentration of 200-500 µg/g wet weight, representing a major protein component of neuronal cytoplasm (1). This has been claimed to represent 1-2% of total brain protein. It was later found that a ubiquitin C-terminal hydrolase enzyme activity was associated with the PGP9.5 protein, resulting in the renaming of PGP9.5 to ubiquitin C-terminal hydrolase 1.

This is the first of a family of ubiquitin C-terminal hydrolases which have been characterized, and is expressed heavily in neurons in the brain. The ubiquitin C-terminal hydrolases cleave ubiquitin from other molecules. This activity is important to generate mono-ubiquitin from genes which encode polyubiquitin chains or ubiquitin fused to other proteins. The activity is also important to remove ubiquitin from partially degraded proteins, allowing the ubiquitin monomer to be recycled. Regulation of the ubiquitin pathway is very important and many disease states are associated with defects in this pathway. The covalent ubiquitin conjugates may then be degraded in the proteasome.

Genetic knockout of UCHL1 in mice results in a motor neuron degeneration similar to the spontaneous gracile axonal dystrophy (gad) mutant mice (3). The gad mice have point mutations in the UCHL1 gene. Point mutations in the UCHL1 gene are associated with some forms of human Parkinson's disease (4). Recent studies suggest that UCHL1 also has a ubiqutinyl ligase activity, being able to couple ubiquitin monomers by linking the C-terminus of one with lysine 63 of the other (5).

Since UCHL1 is heavily expressed in neurons, antibodies to UCHL1 can be used to identify neurons in histological sections and in tissue culture. The great abundance of this protein in neurons means that it is released from neurons in large amounts following injury or degeneration, so the detection of UCHL1 in CSF and other bodily fluids can be used as a biomarker. UCHL1 was also discovered as a gene mutated in some rare familial forms of Parkinson's disease. Park5 was characterized as the gene causative of this form of Parkinson's and on analysis the Park5 gene proved to encode an I93M point mutations in the UCHL1 gene, which reduces the ubiquitin hydrolase activity. Interestingly a common allelic variant of UCHL1, the S18Y polymorphism is actually protective against Parkinson's disease. For a recent excellent review co-authored by the discoverer of UCHL1/Pgp9.5 see reference 5. The HGNC name for this protein is UCHL1.

**Antibody Characteristics:** Antibody was raised in rabbit against recombinant full length human UCHL1 purified from *E. coli*. This antibody is serum with total protein content about 60 mg/mL. Store at 4°C or -20°C. Avoid repeat freezing and thawing.

**Suggestions for use:** Try at dilutions of 1:500 and higher for immunofluorescence. For western blots try at 1:2,000. A suitable control tissue is rat spinal cord or peripheral nerve homogenate. The UCHL1 protein runs at about 24 kDa on SDS-PAGE gels, and is a prominent component of brain, spinal cord and especially cortical extracts.

**References:**

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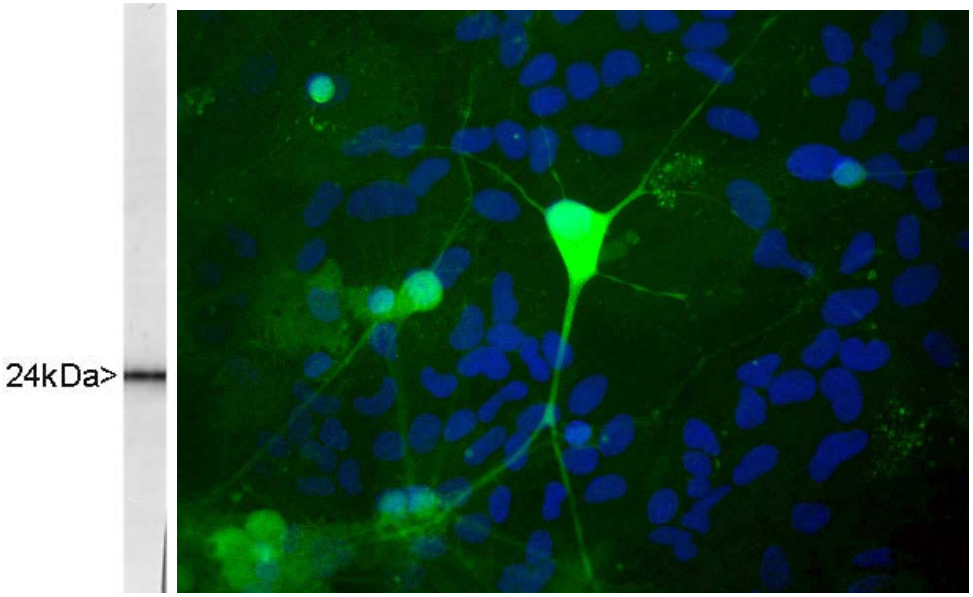
2. Wilkinson KD, Lee KM, Deshpande S, Duerksen-Hughes P, Boss JM, Pohl J. The neuron-specific protein PGP 9.5 is a ubiquitin carboxyl-terminal hydrolase. Science. 1989 246:670-3 (1989).

3. Kurihara LJ, Kikuchi T, Wada K, Tilghman SM. Loss of Uch-L1 and Uch-L3 leads to neurodegeneration, posterior paralysis and dysphagia.Hum Mol Genet. 10:1963-70 (2001).

4. Liu Y, Fallon L, Lashuel HA, Liu Z, Lansbury PT Jr. The UCH-L1 gene encodes two opposing enzymatic activities that affect alpha-synuclein degradation and Parkinson's disease susceptibility. Cell 111:209-18 (2002).

5. Day IN, Thompson RJ. UCHL1 (PGP 9.5): Neuronal biomarker and ubiquitin system protein. Prog Neurobiol. 2009 Oct 30.




**Figures: Left:** Blot of whole bovine brain extract stained with RPCA-UCHL1 showing a strong and clean band at about 24 kDa. **Right:** Rat mixed neuron/glial cultures stained with Rabbit UCHL1 (green). Blue is a DNA stain. Note that the UCHL1 stains neurons strongly and specifically, and that the staining is concentrated in the cell bodies, though some does extend into the dendrites also. Surrounding glial cells are not stained with this antibody, though many are present as visualized using the DNA stain.

**Omim link:** http://omim.org/entry/191342

**Limitations:** This product is for research use only and is not approved for use in humans or in clinical diagnosis.