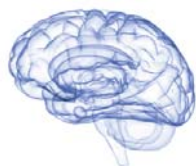


# FocusOn

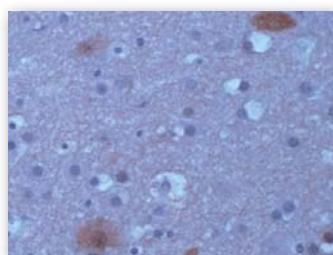


## Antibodies for Parkinson's Disease

Parkinson's disease (PD) is a chronic, progressive neurodegenerative disorder of the central nervous system characterized by tremor, muscle rigidity, postural abnormalities and slowed movement (bradykinesia), with dementia manifesting in 20 % of the afflicted. Onset before age 20 is categorized as juvenile-onset, before age 50 as early-onset and after age 50 as late-onset PD. After Alzheimer's disease, PD is the second most common neurodegenerative disorder. Symptoms occur from decreased stimulation of the motor cortex by the basal ganglia, resulting from insufficient formation of dopamine produced in the dopaminergic neurons in the midbrain (especially in the substantia nigra).

Mutations in SNCA, UCHL1, PARK8/LRRK2 and PARK3 result in autosomal dominant PD, while mutations in PARK2, PARK7, and PINK1 result in autosomal recessive PD. NR4A2 and SNCAIP have been identified as susceptibility genes for PD.

**Alpha-synuclein (SNCA)** is an acidic neuronal protein. Accumulation of insoluble fibrils of aggregated SNCA protein is found in the central pathologic feature of PD, the Lewy bodies. Therefore, PD is generally considered a synucleinopathy.

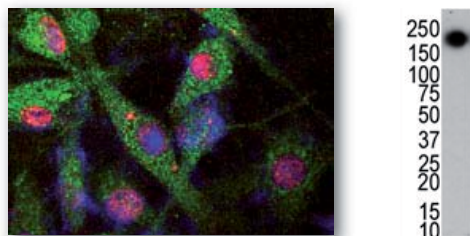


*Fig. 1: Formalin-fixed, paraffin-embedded (FFPE) human brain tissue stained with alpha-synuclein antibody Cat.-No. Ap15807PU-N*

**Ubiquitin carboxy-terminal hydrolase L1 (UCHL1)** is a deubiquitinating enzyme. Expression of UCHL1 is highly specific to neurons and to cells of the diffuse neuroendocrine system and their tumors. A polymorphism in the UCHL1 gene appears to reduce the risk of developing PD, but it is unclear how this variation protects against PD. In contrast, a point mutation in the gene encoding this protein is implicated as the cause of PD in one case. The gene is also associated with Alzheimer's disease and required for normal synaptic and cognitive function.

**Leucine-rich repeat kinase 2 (PARK8/LRRK2)** is a large, complex protein with multiple enzymatic and protein-interaction domains, each of which are targeted by pathogenic mutations in familial PD.

**Parkin (PARK2)** is an E3 ligase in the ubiquitin-proteasome system and plays an important role in juvenile-onset PD. Malfunctions due to muta-

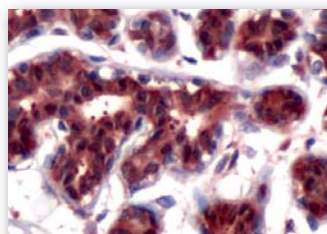


*Fig. 2: Immunofluorescence of tau-stable SY5Y cells with PARK8/LRRK2 antibody Cat. No.: AP13698PU-N (green; phosphorylated tau is red). Nuclear staining was performed with Dapi (blue). In WB, PARK8/LRRK2 was detected in mouse brain lysate with Cat.No. AM11057PU-N*

tions in the PARK2 gene may lead to reduced degradation of proteins toxic to dopaminergic neurons. Phosphorylation of parkin at Ser101 and Ser378 may have an important regulatory role on its E3 ubiquitin ligase activity. Parkin has been shown to interact with SNCA, PARK8/LRRK2 and STUB1/CHIP (STIP1 homology and U-Box containing protein 1/C terminus of HSC70-interacting protein), which might contribute to PD development.

**Parkin coregulated gene protein (PACRG)** is a gene located close to parkin and thought to be co-transcribed with parkin. The PACRG protein is also a component of Lewy bodies in PD patients.

**DJ-1/PARK7** participates in protection of neuronal cells from oxidative stress and mutation may lead to loss of this protection causing neuronal degradation. The roles of oxidative stress and mitochondrial dysfunction are under investigation as contributing factors to onset of PD.



*Fig. 3: Human breast tissue (FFPE) stained with DJ-1/PARK7 antibody Cat.-No. AP15523PU-N*

**PTEN-induced putative kinase 1 (PINK1)** is a mitochondrial serine/threonine-protein kinase thought to protect cells from stress-induced mitochondrial dysfunction. Mutations in this gene may lead to early-onset PD.

**Nuclear receptor-related factor 1 (NR4A2/NURR1)** is a transcription factor expressed in the embryonic ventral midbrain. In developing and adult dopamine neurons, NR4A2 is required for the expression of several genes

important for dopamine synthesis and function. Mutations are suggested to lead to dopaminergic dysfunction.

**Synphilin 1 (SNCAIP)**, a substrate of parkin, interacts with alpha-synuclein and is observable in Lewy bodies. Mutation of the SNCAIP may lead to enhanced apoptosis. The function of synphilin 1 in PD susceptibility remains to be confirmed.

**Alpha-crystallin B chain** is a member of the small heat shock protein family and acts as a molecular chaperone preventing aggregation of denatured proteins and prevents apoptosis by inhibiting caspases. Enhanced expression of alpha-crystallin B chain is observed in numerous neurodegenerative diseases such as Alzheimer's disease, multiple sclerosis and PD.

#### Key References

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#### Please refer also to other FocusOns about Neurosciences

- FocusOn 130: Antibodies for Alzheimer's Disease  
 FocusOn 132: Antibodies for Huntington's Disease  
 FocusOn 133: Antibodies for Amyotrophic Lateral Sclerosis

Name	Property	Host	Clone	Reactivity	Application	Catalog-No.
Alpha-crystallin B chain		Mouse	2E8	Hu, Ms	E, WB	SM6011S
Alpha-crystallin B chain		Rabbit		Bov, Chk, Hu, Ms, Rt	C, IF, WB	AP03027SU-N
Alpha-crystallin B chain		Mouse	1A7.D5	Bov, Hu	E, WB	AM12029PU-N
Alpha-synuclein / SNCA		Rabbit		Hu	E, P, WB	AP13472PU-N
Alpha-synuclein / SNCA	also beta	Mouse	3B6	Hu, Ms, Rt	E, WB	AM09033PU-S
Alpha-synuclein / SNCA		Rabbit		Hu, Rt	P, WB	AP07351PU-N
Alpha-synuclein / SNCA	pSer129	Rabbit		Bov, Can, Hu, Ms, Rt	WB	AP08611PU-N
Alpha-synuclein / SNCA		Rabbit		Hu, Rt	P	AP15807PU-S
DJ-1 / PARK7		Rabbit		Hu	E, WB	AP13481PU-N
DJ-1 / PARK7		Rabbit		Can, Chk, Fish, Hu, Ms, Rt	E, P, WB	AP07401PU-N
DJ-1 / PARK7		Rabbit		Hu, Ms	P, WB	AP15523PU-S
DJ-1 / PARK7		Goat		Hu, Ms, Rt	WB	AP16115PU-N
DJ-1 / PARK7		Mouse	1B11	Hu	E, WB	SM6031S
Dopamin		Mouse	DA.2B11	-	E, IF	BM778
NR4A2		Rabbit		Hu	E, P, WB	AP13493PU-N
PARK8 / LRRK2	C-term	Mouse	133AT720	Hu, Ms	E, WB	AM11057PU-N
PARK8 / LRRK2		Rabbit		Hu	E, P, WB	AP13697PU-N
PARK8 / LRRK2		Rabbit		Hu	E, IF, WB	AP13698PU-N
PARK8 / LRRK2		Rabbit		Hu, Ms, Rt	IP, P, WB	AP08192PU-N
Parkin (PARK2)		Rabbit		Hu	E, P, WB	AP13474PU-N
Parkin (PARK2)		Rabbit		Hu, Ms, Rt	P	AP15714PU-S
Parkin (PARK2)		Rabbit		Hu, Rt	C, WB	SP5267P
Parkin (PARK2)		Goat		Can, Hu, Ms, Rt	WB	AP16546PU-N
Parkin (PARK2)	pSer101	Rabbit		Bov, Hu	WB	AP08720PU-N
Parkin (PARK2)	pSer378	Rabbit		Hu	WB	AP08721PU-N
PACRG		Rabbit		Hu, Rt, Zebrafish	E, IF, P, WB	AP07237PU-N
PACRG	204-215	Rabbit		Chk, Hu, Ms	E, WB	AP09233PU-N
PINK1(PARK6)		Rabbit		Hu	E, P, WB	AP13478PU-N
PINK1(PARK6)		Mouse	38CT18.7	Hu, Ms	P, WB	AM11054SU-N
PINK1(PARK6)		Rabbit		Hu, Ms, Hst	P, WB	AP08220PU-N
STUB1 / CHIP		Rabbit		Hu	E, P, WB	AP13495PU-N
STUB1 / CHIP		Goat		Bov, Can, Hu, Ms, Rt	WB	AP15976PU-N
STUB1 / CHIP		Goat		Hu, Ms	WB	SP7285P
Synphilin 1		Goat		Hu	P, WB	AP00828SU-N
Synphilin 1		Rabbit		Hu, Ms	E, WB	AP13492PU-N
UCHL1 / PGP9.5		Rabbit		Hu	P	AP15750PU-S
UCHL1 / PGP9.5		Mouse	BH7	Bov, Can, Hu, Mam, Ms, Rt	C, IF, WB	AM08273SU-N
UCHL1 / PGP9.5		Rabbit		Hu, Ms, Rt	E, P, WB	AP06285PU-N
UCHL1 / PGP9.5		Mouse	3D9	Hu, Ms	E, P, WB	AM09027PU-S

Bov: Bovine, Can: Canine, Chk: Chicken, Hst: Hamster, Hu: Human, Mam: Mammalia, Ms: Mouse, Rt: Rat

C: Immunohistochemistry on frozen sections, E: ELISA, IF: Immunofluorescence, IP: Immunoprecipitation, P: Immunohistochemistry on formalin-fixed, paraffin-embedded tissue sections, WB: Western blot