**Product name**
Anti-LRRK2 antibody [MJFF2 (c41-2)]

**Description**
Rabbit monoclonal [MJFF2 (c41-2)] to LRRK2

**Host species**
Rabbit

**Tested applications**
Suitable for: ICC/IF, IHC-P, WB, IP, IHC-FrFl

**Species reactivity**
Reacts with: Mouse, Rat, Human

**Immunogen**
Recombinant fragment within Human LRRK2 aa 950 to the C-terminus. The exact sequence is proprietary.

Database link: Q5S007

**Positive control**
WB: A549 and MEF cell lysates; HEK293 cells transfected with LRRK2 cell lysate. ICC/IF: Neuro-2a cells. IHC-P: SNc of 1 y-old Rgs6-/- mice; Mouse brain tissue IP: Mouse cerebral cortex

**General notes**
Well-characterized antibodies to efficiently detect and purify LRRK2 protein are a critical need in the Parkinson's Disease (PD) research community. To help accelerate LRRK2 research, The Michael J. Fox Foundation (MJFF), working with Abcam, has generated unique and high quality LRRK2 rabbit monoclonal antibodies to be widely available for PD research community.

LRRK2 (Leucine-rich repeat kinase 2, dardarin) is a protein kinase belonging to the ROCO family, which is defined by the presence of a ROC (Ras/GTPase of complex proteins) domain and COR (C-terminal of Roc) region. LRRK2 exhibits kinase activity whereby it can undergo autophosphorylation and can phosphorylate generic substrates. In addition, the GTPase domain of LRRK2 can mediate GDP (guanosine-5'-diphosphate)/GTP (guanosine-5'-triphosphate) binding as well as GTP hydrolysis.

LRRK2 is mutated in a significant number of Parkinson's disease (PD) patients. Mutations in this gene account for 4% of PD, and are observed in 1% of sporadic PD patients. Clinical symptoms of patients carrying PD-associated mutations of LRRK2 are indistinguishable from typical sporadic PD. The spectra of neuropathological features of PARK8 (type 8), the type corresponding to LRRK2, is broad and appears to encompass those associated with other familial PD cases such as PARK1 (alpha-synuclein) and PARK2 (Parkin). Patients with this gene mutation have typical relatively late onset Parkinsonism with features comparable with idiopathic PD; symptoms include asymmetric rest tremor, bradykinesia, rigidity, and a good response to 3,4-dihydroxy-L-phenylalanine (l-DOPA). The pathology of cases with LRRK2 mutations is pleomorphic.

Abcam recommended secondaries - Goat Anti-Rabbit HRP (ab205718) and Goat Anti-Rabbit Alexa Fluor® 488 (ab150077).

See other anti-rabbit secondary antibodies that can be used with this antibody.

Our RabMAb® technology is a patented hybridoma-based technology for making rabbit monoclonal antibodies. For details on our patents, please refer to RabMAb® patents.

We are constantly working hard to ensure we provide our customers with best in class antibodies. As a result of this work we are pleased to now offer this antibody in purified format. We are in the process of updating our datasheets. The purified format is designated 'PUR' on our product labels. If you have any questions regarding this update, please contact our Scientific Support team.

This product is a recombinant rabbit monoclonal antibody.

### Properties

<table>
<thead>
<tr>
<th>Form</th>
<th>Liquid</th>
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<tbody>
<tr>
<td>Storage instructions</td>
<td>Shipped at 4°C. Store at +4°C short term (1-2 weeks). Upon delivery aliquot. Store at -20°C or -80°C. Avoid freeze / thaw cycle.</td>
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<tr>
<td>Storage buffer</td>
<td>Preservative: 0.01% Sodium azide</td>
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<td>Constituents: 59% PBS, 40% Glycerol, 0.5% BSA</td>
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<tr>
<td>Purity</td>
<td>Protein A purified</td>
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<tr>
<td>Clonality</td>
<td>Monoclonal</td>
</tr>
<tr>
<td>Clone number</td>
<td>MJFF2 (c41-2)</td>
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<tr>
<td>Isotype</td>
<td>IgG</td>
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### Applications

Our Abpromise guarantee covers the use of ab133474 in the following tested applications.

The application notes include recommended starting dilutions; optimal dilutions/concentrations should be determined by the end user.

<table>
<thead>
<tr>
<th>Application</th>
<th>Abreviews</th>
<th>Notes</th>
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<tbody>
<tr>
<td>ICC/IF</td>
<td>1/50</td>
<td></td>
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<tr>
<td>Application</td>
<td>Abreviews</td>
<td>Notes</td>
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<tr>
<td>IHC-P</td>
<td>1/200 - 1/500. Perform heat mediated antigen retrieval with citrate buffer pH 6 before commencing with IHC staining protocol.</td>
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<tr>
<td>IP</td>
<td>Use at an assay dependent concentration. (2-5 µg)</td>
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<tr>
<td>IHC-FrFrI</td>
<td>Use at an assay dependent concentration. PubMed: 23560750</td>
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**Function**
Positively regulates autophagy through a calcium-dependent activation of the CaMKK/AMPK signaling pathway. The process involves activation of nicotinic acid adenine dinucleotide phosphate (NAADP) receptors, increase in lysosomal pH, and calcium release from lysosomes. Together with RAB29, plays a role in the retrograde trafficking pathway for recycling proteins, such as mannose 6 phosphate receptor (M6PR), between lysosomes and the Golgi apparatus in a retromer-dependent manner. Regulates neuronal process morphology in the intact central nervous system (CNS). Plays a role in synaptic vesicle trafficking. Phosphorylates PRDX3. Has GTPase activity. May play a role in the phosphorylation of proteins central to Parkinson disease.

**Tissue specificity**
Expressed in the brain. Expressed in pyramidal neurons in all cortical laminae of the visual cortex, in neurons of the substantia nigra pars compacta and caudate putamen (at protein level). Expressed throughout the adult brain, but at a lower level than in heart and liver. Also expressed in placenta, lung, skeletal muscle, kidney and pancreas. In the brain, expressed in the cerebellum, cerebral cortex, medulla, spinal cord occipital pole, frontal lobe, temporal lobe and putamen. Expression is particularly high in brain dopaminergic areas.

**Involvement in disease**
Parkinson disease 8

**Sequence similarities**
Belongs to the protein kinase superfamily. TKL Ser/Thr protein kinase family. Contains 12 LRR (leucine-rich) repeats. Contains 1 protein kinase domain. Contains 1 Roc domain. Contains 7 WD repeats.

**Domain**
The seven-bladed WD repeat region is critical for synaptic vesicle trafficking and mediates interaction with multiple vesicle-associated presynaptic proteins. The Roc domain mediates homodimerization and regulates kinase activity.

**Post-translational modifications**
Autophosphorylated.

**Cellular localization**
Expression of familial PD genes is altered in degenerating neurons of vSNc.

Double immunofluorescence staining against TH (green) and Lrrk2 (red) in SNc of control and 1 y-old Rgs6-/- mice that display dysmorphic THlow mDA neurons. Arrowheads indicate unaffected neurons while arrows point to THlow cells. Scale bar 20 µm.

Evaluation of DRD1 intracellular and extracellular level by BPA upon dopamine treatment in SH-SY5Y-DRD1 cells untransduced or transduced by WT or G2019S LRRK2

(C and D) DRD1 localization at basal conditions (C) and upon 15 minutes (D) of dopamine treatment of SH-SY5Y-DRD1 cells transduced or not by alpha-synuclein WT or A53T. After agonist treatment the cells were fixed and incubated with the different primary antibodies (anti-FLAG for DRD1 and ab133474) and with Alexa647-conjugated secondary antibody (red) or Alexa488-conjugated secondary antibody (green) for DRD1 or LRRK2 respectively. Scale bars = 10 µm.
Lane 1: Wild type A549 whole cell lysate (20 µg)
Lane 2: Wild type MEF whole cell lysate (20 µg)
Lane 3: LRRK2 knockout A549 whole cell lysate (20 µg)
Lane 4: LRRK2 knockout MEF whole cell lysate (20 µg)

Lanes 1 - 4: Merged signal (red and green). Green - ab133474 observed at 286 kDa. Red - loading control, ab18058, observed at 130 kDa.

ab133474 was shown to recognize LRRK2 in wild type A549 and MEF cells along with additional cross reactive bands. Whilst signal was not seen in LRRK2 knockout cells. Wild-type and LRRK2 knockout samples were subjected to SDS-PAGE. Ab133474 and ab18058 (Mouse anti Vinculin loading control) were incubated overnight at 4°C at 10000 dilution and 1/10000 dilution respectively. Blots were developed with Goat anti-Rabbit IgG H&L (IRDye® 800CW) preabsorbed ab216773 and Goat anti-Mouse IgG H&L (IRDye® 680RD) preabsorbed ab216776 secondary antibodies at 1/10000 dilution for 1 hour at room temperature before imaging.

Wild-type and LRRK2 knockout MEF and A549 cells were provide as a generous gift from Professor Dario Alessi, MRC Protein Phosphorylation and Ubiquitination Unit (University of Dundee).

ab133474 staining LRRK2 in Neuro-2a (mouse neuroblastoma cell line) cell line by ICC/IF (Immunocytochemistry/immunofluorescence). Cells were fixed with 4% paraformaldehyde, permeabilized with 0.1% Triton X-100. Samples were incubated with primary antibody (1/500). ab150077 was used as the secondary antibody (1/1000). Tubulin stained using ab7291 (1/1000) and ab150120 (1/1000) as the secondary. Nuclear counter stained with DAPI.
Immunoprecipitation to verify the interaction of LRRK2 and ArfGAP1 in vivo. LRRK2 interacts with ArfGAP1 in brain extracts derived from wild-type mice following immunoprecipitation with ab133474, a LRRK2-specific monoclonal antibody (MJFF-2/c41-2), whereas ArfGAP1 is not immunoprecipitated in extracts derived from LRRK2 knockout mice.

Protein extracts were prepared from the cerebral cortex of adult wild-type and LRRK2 knockout mice (with targeted deletion of exon 41 of the LRRK2 gene) by homogenization in TNE buffer (10 mM Tris-HCL pH 7.4, 150 mM NaCl, 5 mM EDTA, 0.5% NP-40, 1× phosphatase inhibitor cocktail 1 and 2, 1× Complete Mini protease inhibitor cocktail). Protein concentration was determined by BCA assay. Brain extracts (10 mg protein) were combined with 50 µl Protein G-Dynabeads pre-incubated with rabbit anti-LRRK2 (5 µg; MJFF2/c41-2; Abcam, Inc.), rabbit anti-ArfGAP1 (3 µg) or rabbit IgG (3 µg) antibodies followed by overnight incubation at 4°C. Dynabead complexes were sequentially washed twice with TNE buffer and twice with TBS buffer (10 mM Tris-HCL pH 7.4, 150 mM NaCl). Immunoprecipitates were eluted by heating at 70°C for 10 min, resolved by SDS-PAGE and subjected to Western blot analysis.

Immunohistochemical analysis of mouse brain tissue, staining LRRK2 with ab133474.

Antigen retrieval was performed by heat mediation and tissue was blocked with 2% goat serum. Sections were incubated with primary antibody (1/200) overnight at 4°C. An AlexaFluor®488-conjugated goat anti-rabbit IgG was used as the secondary antibody.
All lanes: Anti-LRRK2 antibody [MJFF2 (c41-2)] (ab133474) at 1/10000 dilution

Lane 1: HEK293 cell lysate transfected with 3*Flag vector
Lane 2: HEK293 cell lysate transfected with 3*Flag full length wild type LRRK2

Lysates/proteins at 10 µg per lane.

Secondary
All lanes: HRP labelled goat anti-rabbit at 1/2000 dilution

Predicted band size: 286 kDa

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