

## Datasheet: MCA341R

**BATCH NUMBER 148924C**

<b>Description:</b>	MOUSE ANTI RAT CD68
<b>Specificity:</b>	CD68
<b>Other names:</b>	ED1
<b>Format:</b>	Purified
<b>Product Type:</b>	Monoclonal Antibody
<b>Clone:</b>	ED1
<b>Isotype:</b>	IgG1
<b>Quantity:</b>	0.25 mg

## Product Details

### Applications

This product has been reported to work in the following applications. This information is derived from testing within our laboratories, peer-reviewed publications or personal communications from the originators. Please refer to references indicated for further information. For general protocol recommendations, please visit [www.bio-rad-antibodies.com/protocols](http://www.bio-rad-antibodies.com/protocols).

	Yes	No	Not Determined	Suggested Dilution
Flow Cytometry (1)	▪			1/50 - 1/100
Immunohistology - Frozen	▪			
Immunohistology - Paraffin (2)	▪			1/100
ELISA			▪	
Immunoprecipitation	▪			
Western Blotting	▪			
Immunofluorescence	▪			
Radioimmunoassays	▪			

Where this product has not been tested for use in a particular technique this does not necessarily exclude its use in such procedures. Suggested working dilutions are given as a guide only. It is recommended that the user titrates the product for use in their own system using appropriate negative/positive controls.

(1) **Membrane permeabilisation is required for this application. Bio-Rad recommends the use of Leucoperm™ (Product Code [BUF09](#)) for this purpose.**

(2) **This product requires protein digestion pre-treatment of paraffin sections e.g. trypsin or pronase**

### Target Species

Rat

### Species Cross Reactivity

Reacts with: Bovine

Does not react with: Horse

**N.B.** Antibody reactivity and working conditions may vary between species. Cross reactivity is derived from testing within our laboratories, peer-reviewed publications or personal communications from the originators. Please refer to references indicated for further information.

<b>Product Form</b>	Purified IgG - liquid
<b>Preparation</b>	Purified IgG prepared by affinity chromatography on Protein A from tissue culture supernatant.
<b>Buffer Solution</b>	Phosphate buffered saline.
<b>Preservative Stabilisers</b>	0.09% sodium azide.
<b>Carrier Free</b>	Yes
<b>Approx. Protein Concentrations</b>	IgG concentration 1.0 mg/ml
<b>Immunogen</b>	Rat spleen cells
<b>External Database Links</b>	<b>UniProt:</b> <a href="#">Q4FZY1</a> <a href="#">Related reagents</a>
<b>RRID</b>	AB_2291300
<b>Fusion Partners</b>	Spleen cells from immunised BALB/c mice were fused with cells of the SP2/0-Ag14 mouse myeloma cell line.
<b>Specificity</b>	<p><b>Mouse anti rat CD68, clone ED1</b> recognizes the rat ED1 antigen, a heavily glycosylated protein of ~90 -110 KDa, also known as rat CD68 (<a href="#">Dijkstra et al. 1985</a>).</p> <p>The ED1 antigen is expressed on most macrophages populations, as well as on monocytes and is considered as a pan-macrophage marker in the rat (<a href="#">Damoiseaux et al. 1994</a>). ED1 is expressed predominantly on the lysosomal membrane and lightly on the cell surface (<a href="#">Dijkstra et al. 1985</a>).</p> <p>The expression of ED1 antigen being predominantly cytoplasmic (<a href="#">Dijkstra et al. 1985</a>), flow cytometry results are improved by the use of a membrane permeabilization procedure, such as <a href="#">Leucoperm</a>, prior to staining.</p>
<b>Flow Cytometry</b>	Use 10ul of the suggested working dilution to label $1 \times 10^6$ cells in 100ul.
<b>References</b>	<ol style="list-style-type: none"><li>Damoiseaux, J.G. <i>et al.</i> (1994) Rat macrophage lysosomal membrane antigen recognized by monoclonal antibody ED1. <a href="#">Immunology. 83 (1): 140-7.</a></li><li>Bauer, J. <i>et al.</i> (1994) Phagocytic activity of macrophages and microglial cells during the course of acute and chronic relapsing experimental autoimmune encephalomyelitis. <a href="#">J</a></li></ol>

[Neurosci Res. 38 \(4\): 365-75.](#)

3. Wu, L. *et al.* (2004) Dietary approach to attenuate oxidative stress, hypertension, and inflammation in the cardiovascular system. [Proc Natl Acad Sci U S A. 101 \(18\): 7094-9.](#)
4. Bao, F. *et al.* (2004) Early anti-inflammatory treatment reduces lipid peroxidation and protein nitration after spinal cord injury in rats. [J Neurochem. 88 \(6\): 1335-44.](#)
5. Zilka, N. *et al.* (2009) Human misfolded truncated tau protein promotes activation of microglia and leukocyte infiltration in the transgenic rat model of tauopathy. [J. Neuroimmunol. 209: 16-25.](#)
6. Fujita, E. *et al.* (2010) Statin attenuates experimental anti-glomerular basement membrane glomerulonephritis together with the augmentation of alternatively activated macrophages. [Am J Pathol. 177 \(3\): 1143-54.](#)
7. Salegio, E.A. *et al.* (2011) Macrophage presence is essential for the regeneration of ascending afferent fibres following a conditioning sciatic nerve lesion in adult rats. [BMC Neurosci. 12: 11.](#)
8. Wei, X. *et al.* (2014) Dural fibroblasts play a potential role in headache pathophysiology. [Pain. 155: 1238-44.](#)
9. Naito, Y. *et al.* (2011) Dietary iron restriction prevents hypertensive cardiovascular remodeling in dahl salt-sensitive rats. [Hypertension. 57: 497-504.](#)
10. Baker, S.C. *et al.* (2011) Cellular integration and vascularisation promoted by a resorbable, particulate-leached, cross-linked poly( $\epsilon$ -caprolactone) scaffold. [Macromol Biosci. 11 \(5\): 618-27.](#)
11. Bedi, A. *et al.* (2010) Effect of early and delayed mechanical loading on tendon-to-bone healing after anterior cruciate ligament reconstruction. [J Bone Joint Surg Am. 92: 2387-401.](#)
12. Liew, H.K. *et al.* (2012) Systemic administration of urocortin after intracerebral hemorrhage reduces neurological deficits and neuroinflammation in rats. [J Neuroinflammation. 9: 13.](#)
13. Chiu, T.L. *et al.* (2012) The treatment of glioblastoma multiforme through activation of microglia and TRAIL induced by rAAV2-mediated IL-12 in a syngeneic rat model. [J Biomed Sci. 19: 45.](#)
14. Glorie, L.L. *et al.* (2012) DPP4 inhibition improves functional outcome after renal ischemia-reperfusion injury. [Am J Physiol Renal Physiol. 303: F681-8.](#)
15. Quan, L.D. *et al.* (2010) Development of a macromolecular prodrug for the treatment of inflammatory arthritis: mechanisms involved in arthrotropism and sustained therapeutic efficacy. [Arthritis Res Ther. 12: R170.](#)
16. Peng, J.H. *et al.* (2012) Effects of Puerariae Radix Extract on Endotoxin Receptors and TNF- $\alpha$  Expression Induced by Gut-Derived Endotoxin in Chronic Alcoholic Liver Injury. [Evid Based Complement Alternat Med. 2012: 234987.](#)
17. Matsuda, K. *et al.* (2010) Hemophagocytic histiocytic sarcoma in a Japanese black cow. [Vet Pathol. 47: 339-42.](#)
18. Tian, Y.F. *et al.* (2013) Lipoic acid suppresses portal endotoxemia-induced steatohepatitis and pancreatic inflammation in rats. [World J Gastroenterol. 19 \(18\): 2761-71.](#)
19. Xiang, Y. *et al.* (2013) L-carnitine protects against cyclosporine-induced pancreatic and renal injury in rats. [Transplant Proc. 45 \(8\): 3127-34.](#)
20. Wang-Rosenke, Y. *et al.* (2013) Tyrosine kinases inhibition by Imatinib slows progression in chronic anti-thy1 glomerulosclerosis of the rat. [BMC Nephrol. 14: 223.](#)

21. Dort, J. *et al.* (2013) Beneficial Effects of Cod Protein on Inflammatory Cell Accumulation in Rat Skeletal Muscle after Injury Are Driven by Its High Levels of Arginine, Glycine, Taurine and Lysine. [PLoS One. 8: e77274.](#)
22. Chang, C.Y. *et al.* (2013) Docosahexaenoic acid reduces cellular inflammatory response following permanent focal cerebral ischemia in rats. [J Nutr Biochem. 24 \(12\): 2127-37.](#)
23. Machelska, H. *et al.* (2004) Selectins and integrins but not platelet-endothelial cell adhesion molecule-1 regulate opioid inhibition of inflammatory pain. [Br J Pharmacol. 142 \(4\): 772-80.](#)
24. Sakuraya, K. *et al.* (2014) The synergistic effect of mizoribine and a direct renin inhibitor, aliskiren, on unilateral ureteral obstruction induced renal fibrosis in rats. [J Urol. 191 \(4\): 1139-46.](#)
25. Xu, X. *et al.* (2014) Aging aggravates long-term renal ischemia-reperfusion injury in a rat model. [J Surg Res. 187 \(1\): 289-96.](#)
26. Kim, Y.H. *et al.* (2014) Enhancement of bone regeneration by dual release of a macrophage recruitment agent and platelet-rich plasma from gelatin hydrogels. [Biomaterials. 35 \(1\): 214-24.](#)
27. Lin, Y.C. *et al.* (2015) Time-course effect of electrical stimulation on nerve regeneration of diabetic rats. [PLoS One. 10: e0116711.](#)
28. Matsuda, K. *et al.* (2009) Two cases of bovine sarcoma in clinically long-standing lesions. [J Vet Med Sci. 71 \(2\): 221-4.](#)
29. Thieme, K. & Oliveira-Souza, M. (2015) Renal Hemodynamic and Morphological Changes after 7 and 28 Days of Leptin Treatment: The Participation of Angiotensin II via the AT1 Receptor. [PLoS One. 10 \(3\): e0122265.](#)
30. Ayoub, M.A. *et al.* (2015) Functional Interaction between Angiotensin II Receptor Type 1 and Chemokine (C-C Motif) Receptor 2 with Implications for Chronic Kidney Disease. [PLoS One. 10 \(3\): e0119803.](#)
31. Bijarnia, R.K. *et al.* (2015) Sodium thiosulfate ameliorates oxidative stress and preserves renal function in hyperoxaluric rats. [PLoS One. 10 \(4\): e0124881.](#)
32. Oboshi, M. *et al.* (2015) Temporary dietary iron restriction affects the process of thrombus resolution in a rat model of deep vein thrombosis. [PLoS One. 10 \(5\): e0126611.](#)
33. Nagai, H. *et al.* (2015) Pulmonary Macrophages Attenuate Hypoxic Pulmonary Vasoconstriction via  $\beta$ 3AR/iNOS Pathway in Rats Exposed to Chronic Intermittent Hypoxia. [PLoS One. 10 \(7\): e0131923.](#)
34. Adamo, H.H. *et al.* (2015) Adaptive (TINT) Changes in the Tumor Bearing Organ Are Related to Prostate Tumor Size and Aggressiveness. [PLoS One. 10 \(11\): e0141601.](#)
35. Paulsen, I.M.S. *et al.* (2015) A single simple procedure for dewaxing, hydration and heat-induced epitope retrieval (HIER) for immunohistochemistry in formalin fixed paraffin-embedded tissue. [European Journal of Histochemistry. 59 \(4\): 2532-9.](#)
36. Ibarra, V. *et al.* (2016) This paper is a winner in the Undergraduate category for the SFB awards: Evaluation of the tissue response to alginate encapsulated islets in an omentum pouch model. [J Biomed Mater Res A. 104 \(7\): 1581-90.](#)
37. Zeka, B. *et al.* (2016) Aquaporin 4-specific T cells and NMO-IgG cause primary retinal damage in experimental NMO/SD. [Acta Neuropathol Commun. 4 \(1\): 82.](#)
38. Xu K *et al.* (2016) Expression of aryl hydrocarbon receptor in rat brain lesions following traumatic brain injury. [Diagn Pathol. 11 \(1\): 72.](#)
39. Gällentoft, L. *et al.* (2016) Impact of degradable nanowires on long-term brain tissue

- responses. [J Nanobiotechnology. 14 \(1\): 64.](#)
40. C6ndor JM *et al.* (2016) Treatment With Human Wharton's Jelly-Derived Mesenchymal Stem Cells Attenuates Sepsis-Induced Kidney Injury, Liver Injury, and Endothelial Dysfunction. [Stem Cells Transl Med. 5 \(8\): 1048-57.](#)
41. Herold, S. *et al.* (2016) CatWalk gait analysis in a rat model of multiple sclerosis. [BMC Neurosci. 17 \(1\): 78.](#)
42. Szmydynger-Chodobska, J. *et al.* (2016) The Involvement of Pial Microvessels in Leukocyte Invasion after Mild Traumatic Brain Injury. [PLoS One. 11 \(12\): e0167677.](#)
43. Hashmat, S. *et al.* (2016) Interleukin-6 inhibition attenuates hypertension and associated renal damage in Dahl salt-sensitive rats. [Am J Physiol Renal Physiol. 311 \(3\): F555-61.](#)
44. Cha, S.J. *et al.* (2016) Identification of GAPDH on the surface of *Plasmodium* sporozoites as a new candidate for targeting malaria liver invasion. [J Exp Med. 213 \(10\): 2099-112.](#)
45. Murata, M. *et al.* (2016) Surfactant protein D is a useful biomarker for monitoring acute lung injury in rats. [Exp Lung Res. 42 \(6\): 314-21.](#)
46. Faleiros, C.M. *et al.* (2017) Effects of previous physical training on adriamycin nephropathy and its relationship with endothelial lesions and angiogenesis in the renal cortex. [Life Sci. 169: 43-51.](#)
47. Haba, D. *et al.* (2017) Morphological study on the pressure ulcer-like dermal lesions formed in the rat heel skin after transection of the sciatic nerves. [Acta Histochem. 119 \(1\): 39-47.](#)
48. Landeck, N. *et al.* (2017) Toxic effects of human and rodent variants of alpha-synuclein *in vivo*. [Eur J Neurosci. 45 \(4\): 536-47.](#)
49. Carrillo-de Sauvage, M.A. *et al.* (2015) The neuroprotective agent CNTF decreases neuronal metabolites in the rat striatum: an *in vivo* multimodal magnetic resonance imaging study. [J Cereb Blood Flow Metab. 35 \(6\): 917-21.](#)
50. Chang, C.Y. *et al.* (2015) Tetramethylpyrazine inhibits neutrophil activation following permanent cerebral ischemia in rats. [Biochem Biophys Res Commun. 463 \(3\): 421-7.](#)
51. Londono, R. *et al.* (2017) The effect of cell debris within biologic scaffolds upon the macrophage response. [J Biomed Mater Res A. 105 \(8\): 2109-18.](#)
52. Xue, Y. *et al.* (2017) Hydroxyapatite nanoparticle-induced mitochondrial energy metabolism impairment in liver cells: *in vitro* and *in vivo* studies. [J Appl Toxicol. 37 \(8\): 1004-1016.](#)
53. Wang, M. *et al.* (2017) Characterization of the Micro-Environment of the Testis that Shapes the Phenotype and Function of Testicular Macrophages. [J Immunol. 198 \(11\): 4327-40.](#)
54. Menzies, R.I. *et al.* (2015) Inhibition of the purinergic P2X7 receptor improves renal perfusion in angiotensin-II-infused rats. [Kidney Int. 88 \(5\): 1079-87.](#)
55. Aarts, S.A.B.M. *et al.* (2017) Inhibition of CD40-TRAF6 interactions by the small molecule inhibitor 6877002 reduces neuroinflammation. [J Neuroinflammation. 14 \(1\): 105.](#)
56. Han, T.T. *et al.* (2015) Adipose-derived stromal cells mediate *in vivo* adipogenesis, angiogenesis and inflammation in decellularized adipose tissue bioscaffolds. [Biomaterials. 72: 125-37.](#)
57. Kanamori, H. *et al.* (2017) Influence of nicotine on choline-deficient, L-amino acid-defined diet-induced non-alcoholic steatohepatitis in rats. [PLoS One. 12 \(6\): e0180475.](#)

58. Kühne, L. *et al.* (2017) Renal allograft rejection, lymphocyte infiltration, and *de novo* donor-specific antibodies in a novel model of non-adherence to immunosuppressive therapy. [BMC Immunol. 18 \(1\): 52.](#)
59. Jaworska, J. *et al.* (2019) Effect of the HDAC Inhibitor, Sodium Butyrate, on Neurogenesis in a Rat Model of Neonatal Hypoxia-Ischemia: Potential Mechanism of Action. [Mol Neurobiol. 56 \(9\): 6341-70.](#)
60. Fontana, J. *et al.* (2017) Impact of Steroids on the Inflammatory Response after Ischemic Acute Kidney Injury in Rats. [Indian J Nephrol. 27 \(5\): 365-71.](#)
61. Tourki, B. *et al.* (2019) Lebetin 2, a Snake Venom-Derived B-Type Natriuretic Peptide, Provides Immediate and Prolonged Protection against Myocardial Ischemia-Reperfusion Injury via Modulation of Post-Ischemic Inflammatory Response. [Toxins \(Basel\). 11 \(9\)Sep 10 \[Epub ahead of print\].](#)
62. Silva, F.M.O. *et al.* (2019) Tamoxifen and bone morphogenic protein-7 modulate fibrosis and inflammation in the peritoneal fibrosis model developed in uremic rats. [Mol Med. 25 \(1\): 41.](#)
63. Nozomu, A. *et al.* (2019) Delayed Rectifier K<sup>+</sup>-Channel Is a Novel Therapeutic Target for Interstitial Renal Fibrosis in Rats with Unilateral Ureteral Obstruction [BioMed Res Intl. 2019: 1-11.](#)
64. Muri, L. *et al.* (2020) Repetitive transcranial magnetic stimulation activates glial cells and inhibits neurogenesis after pneumococcal meningitis. [PLoS ONE 15\(9\): e0232863.](#)
65. Jahandideh, A. *et al.* (2020) Folate Receptor  $\beta$  Targeted PET Imaging of Macrophages in Autoimmune Myocarditis. [J Nucl Med. Apr 13 \[Epub ahead of print\].](#)
66. Zhang, Z. *et al.* (2020) Mesenchymal Stem Cells Promote the Resolution of Cardiac Inflammation After Ischemia Reperfusion Via Enhancing Efferocytosis of Neutrophils. [J Am Heart Assoc. 9 \(5\): e014397.](#)
67. Zhang, L.Y. *et al.* (2020) Microglia exacerbate white matter injury via complement C3/C3aR pathway after hypoperfusion. [Theranostics. 10 \(1\): 74-90.](#)
68. Rodionova, K. *et al.* (2020) Neurogenic tachykinin mechanisms in experimental nephritis of rats. [Pflugers Arch. Oct 17 \[Epub ahead of print\].](#)
69. Leisengang, S. *et al.* (2020) Primary culture of the rat spinal dorsal horn: a tool to investigate the effects of inflammatory stimulation on the afferent somatosensory system. [Pflugers Arch. Oct 24 \[Epub ahead of print\].](#)
70. Jahandideh, A. *et al.* (2020) Folate Receptor  $\beta$  Targeted PET Imaging of Macrophages in Autoimmune Myocarditis. [J Nucl Med. Apr 13 \[Epub ahead of print\].](#)
71. Rivera, J. *et al.* (2019) Infusion of HIV-1 Nef-expressing astrocytes into the rat hippocampus induces enteropathy and interstitial pneumonitis and increases blood-brain-barrier permeability. [PLoS One. 14 \(11\): e0225760.](#)
72. Luo, K. *et al.* (2019) Cilastatin protects against tacrolimus-induced nephrotoxicity via anti-oxidative and anti-apoptotic properties. [BMC Nephrol. 20 \(1\): 221.](#)
73. Amaral, J. *et al.* (2013) 7-Ketocholesterol induces inflammation and angiogenesis *in vivo*: a novel rat model. [PLoS One. 8 \(2\): e56099.](#)
74. Sogi, Y. *et al.* (2020) Joint hemorrhage accelerates cartilage degeneration in a rat immobilized knee model. [BMC Musculoskelet Disord. 21 \(1\): 761.](#)
75. Li, L. *et al.* (2021) Ascorbic acid accelerates Wallerian degeneration after peripheral nerve injury [Neural Regeneration Research. 16:6. 1078-85.](#)
76. Solár, P. *et al.* (2020) Subarachnoid Hemorrhage Increases Level of Heme Oxygenase-1 and Biliverdin Reductase in the Choroid Plexus [Frontiers in Cellular](#)

[Neuroscience. 14 \[Epub ahead of print\].](#)

77. Wang, Q. *et al.* (2020) Urinary phosphate-containing nanoparticle contributes to inflammation and kidney injury in a salt-sensitive hypertension rat model. [Commun Biol. 3 \(1\): 575.](#)

78. Hoff, U. *et al.* (2019) A synthetic epoxyeicosatrienoic acid analogue prevents the initiation of ischemic acute kidney injury. [Acta Physiol \(Oxf\). 227 \(2\): e13297.](#)

79. Noh, J.E. *et al.* (2020) Intracerebral Transplants of GMP-Grade Human Umbilical Cord-Derived Mesenchymal Stromal Cells Effectively Treat Subacute-Phase Ischemic Stroke in a Rodent Model. [Front Cell Neurosci. 14: 546659.](#)

80. Ismail, S.F. *et al.* (2020) Ammonia Induced Microglial Activation Modulates Connexin 43 and Aquaporin 4 Expression in Astrocyte-microglia Co-culture Model [BMC Neurosci. Preprint Sep 22 \[Epub ahead of print\].](#)

81. Zhao, H.Y. *et al.* (2020) L-carnitine treatment attenuates renal tubulointerstitial fibrosis induced by unilateral ureteral obstruction. [Korean J Intern Med. Sep 18 \[Epub ahead of print\].](#)

82. Bennett, M. *et al.* (2020) Proteoglycan 4 Reduces Neuroinflammation and Protects the Blood-Brain Barrier after Traumatic Brain Injury. [J Neurotrauma. Oct 19 \[Epub ahead of print\].](#)

---

**Storage**

Store at +4°C or at -20°C if preferred.

This product should be stored undiluted.

Storage in frost free freezers is not recommended. Avoid repeated freezing and thawing as this may denature the antibody. Should this product contain a precipitate we recommend microcentrifugation before use.

---

**Guarantee**

12 months from date of despatch

---

**Health And Safety Information**

Material Safety Datasheet documentation #10040 available at: <https://www.bio-rad-antibodies.com/SDS/MCA341R10040>

---

**Regulatory**

For research purposes only

---

## Related Products

### Recommended Secondary Antibodies

Rabbit Anti Mouse IgG (STAR12...)	<a href="#">RPE</a>
Goat Anti Mouse IgG IgA IgM (STAR87...)	<a href="#">HRP</a>
Goat Anti Mouse IgG (STAR76...)	<a href="#">RPE</a>
Goat Anti Mouse IgG (STAR70...)	<a href="#">FITC</a>
Goat Anti Mouse IgG (H/L) (STAR117...)	<a href="#">Alk. Phos.</a> , <a href="#">DyLight@488</a> , <a href="#">DyLight@550</a> , <a href="#">DyLight@650</a> , <a href="#">DyLight@680</a> , <a href="#">DyLight@800</a> , <a href="#">FITC</a> , <a href="#">HRP</a>
Rabbit Anti Mouse IgG (STAR9...)	<a href="#">FITC</a>
Goat Anti Mouse IgG (STAR77...)	<a href="#">HRP</a>

Goat Anti Mouse IgG (Fc) (STAR120...) [FITC](#), [HRP](#)

Rabbit Anti Mouse IgG (STAR13...) [HRP](#)

## Recommended Negative Controls

[MOUSE IgG1 NEGATIVE CONTROL \(MCA1209\)](#)

**North & South** Tel: +1 800 265 7376

**America** Fax: +1 919 878 3751

Email: [antibody\\_sales\\_us@bio-rad.com](mailto:antibody_sales_us@bio-rad.com)

**Worldwide**

Tel: +44 (0)1865 852 700

Fax: +44 (0)1865 852 739

Email: [antibody\\_sales\\_uk@bio-rad.com](mailto:antibody_sales_uk@bio-rad.com)

**Europe**

Tel: +49 (0) 89 8090 95 21

Fax: +49 (0) 89 8090 95 50

Email: [antibody\\_sales\\_de@bio-rad.com](mailto:antibody_sales_de@bio-rad.com)

To find a batch/lot specific datasheet for this product, please use our online search tool at: [bio-rad-antibodies.com/datasheets](https://bio-rad-antibodies.com/datasheets)  
'M367610:200529'

Printed on 21 Feb 2024

---

© 2024 Bio-Rad Laboratories Inc | [Legal](#) | [Imprint](#)