

# Anti-HA-Biotin

Biotin-conjugated mouse monoclonal antibody (clone 12CA5) to a peptide epitope derived from the hemagglutinin protein of human influenza virus

Cat. No. 11 666 851 001

100 µg (500 µl)

 Version 08

Content version: March 2016

Store at –15 to –25°C

## 1. What this Product Does


### Contents


500 µl frozen liquid (0.2 mg/ml)

### Storage and Stability

If stored at –15 to –25°C, the antibody preparation is stable until the expiration date printed on the label.


For storage, prepare convenient aliquots and freeze them at –15 to –25°C.

 Avoid repeated freezing and thawing.

 Anti-HA-Biotin antibody is shipped at ambient temperature.

### Application

Anti-HA-Biotin is used for the immunochemical detection of native influenza hemagglutinin protein and recombinant “epitope tagged” proteins containing the HA epitope in western and dot blots in conjunction with secondary antibody-enzyme or streptavidin-enzyme reporter systems. The anti-HA-Biotin conjugate can also be used to localize recombinant “epitope-tagged” proteins by standard immunofluorescence methods in conjunction with secondary antibody-fluorescent or streptavidin-fluorescent reporter systems.


 For experiments in which sensitivity is not critical, use anti-HA-Biotin (12CA5). For higher sensitivity detection in western blotting at 10-fold lower concentration use anti-HA-Biotin, High Affinity (3F10)\*.

### Additional Equipment and Reagents Required

Additional equipment and reagents required to perform western blot analyses using anti-HA-Biotin include:

- Western blotting apparatus
- Western Transfer Buffer: 10% methanol, 24 mM Tris-base, 194 mM glycine
- PVDF Western Blotting Membrane\*
- Washing Buffer (PBST): PBS, 0.05–2% Tween 20\*, pH 7.5
- Blocking Solution (1:10 dilution of Western Blocking Reagent\* in 1× PBST)
- Anti-Biotin-POD, Fab fragments\* or Streptavidin-POD\*
- Lumi-Light Western Blotting Substrate\* or Lumi-Light<sup>PLUS</sup> Western Blotting Substrate\*
- Lumi-Film Chemiluminescent Detection Film\*

## Product Characteristics

<b>Specificity</b>	Anti-HA-Biotin recognizes the HA nonapeptide sequence YPYDVPDYA derived from the human influenza virus hemagglutinin protein (amino acids 98-106) (1). The antibody recognizes its antigenic determinant even when the HA peptide epitope is introduced into unrelated recombinant proteins by a technique known as “epitope tagging.”
<b>Clone</b>	12CA5 (2)
<b>Subtype</b>	Mouse IgG <sub>2b</sub> κ
<b>Purity</b>	The anti-HA-Biotin monoclonal antibody is ≥ 90% pure as determined by HPLC.  The antibody preparation does not contain preservatives or stabilizers.
<b>Affinity</b>	$K_a = 1 \times 10^8/M$
<b>Isoelectric Point</b>	6.4

## 2. How to Use this Product

### 2.1 Before You Begin

#### Epitope Tagging


Before using anti-HA-Biotin to analyze the product of your target gene, incorporate the 27-base DNA sequence, which encodes the HA epitope, into the target gene sequence using one of the following methods:

- Clone your gene of interest into a suitable bacterial or mammalian expression vector.
- Prepare oligonucleotide linkers that can encode the HA epitope, and clone the linkers into the target gene at the desired N-terminal, C-terminal, or internal site (3).
- Insert the HA-peptide coding sequence into the target gene by oligonucleotide-mediated site-directed mutagenesis (4, 5).

#### Preparation of Working Solutions

The anti-HA-Biotin preparation is ready to use as supplied.

For western blot analysis using a 10 × 10 cm membrane, dilute 50 – 500 µl of undiluted anti-HA-Biotin in 10 ml of a 1:20 dilution of Western Blocking Reagent in PBST immediately prior to use.

 Do not add sodium azide to any reagent used in the procedure. Azide inhibits the enzymatic activity of POD.

## 2.2 Procedure

### Western Blot Analysis

To perform western blot analysis using anti-HA-Biotin, follow the protocol below:

Step	Action
1	<p>Perform electrophoresis according to standard protocols (6).</p> <ul style="list-style-type: none"> <li>Pre-wet a PVDF membrane* (0.45-<math>\mu</math>m pore size) in 100% methanol, and subsequently equilibrate the PVDF membrane for at least 5 minutes in Western Transfer Buffer</li> <li>Perform western blot transfer to the PVDF membrane using Western Transfer Buffer.</li> </ul> <p>⚠ The buffer must be at +2 to +8°C for electrophoretic transfer.</p>
2	<p>Transfer the membrane (protein side up) to a container large enough to hold it.</p> <p>⚠ Be sure the side of the membrane that contains protein faces up so the detection reagents will have maximum access to the antigens.</p> <p>🕒 A disposable, square petri dish (100 × 15 mm) makes a convenient container for a 10 × 10 cm blot.</p>
3	<ul style="list-style-type: none"> <li>After transfer, block the membrane for 1 hour at +15 to +25°C with 10 ml<sup>#)</sup> of Blocking Solution.</li> <li>Place container on a rotating platform and rotate gently for 1 hour at +15 to +25°C.</li> </ul> <p>⚠ Make sure the reagent completely and constantly covers the membrane during this incubation and all incubation steps below.</p> <p>🕒 This incubation step may also be performed at +2 to +8°C overnight.</p>
4	<p>Drain the Blocking Solution from the container and wash the blocked membrane once with PBST.</p>
5	<ul style="list-style-type: none"> <li>Thaw the undiluted anti-HA-Biotin and store on ice prior to use.</li> <li>Dilute 50 - 500 <math>\mu</math>l of undiluted anti-HA-Biotin in 10 ml of a 1:20 dilution of Western Blocking Reagent in PBST immediately prior to use.</li> <li>Incubate blocked membrane with diluted anti-HA-Biotin for 2 hours at +15 to +25°C (or overnight at +2 to +8°C) with gentle rotation.</li> </ul>
6	<ul style="list-style-type: none"> <li>Drain the antibody solution from the container and rinse the membrane with approximately 20 ml<sup>#)</sup> of Wash Buffer.</li> <li>Wash the membrane four times, 10 min per wash, with 20 ml<sup>#)</sup> PBST.</li> </ul>
7	<p>Dilute either Anti-Biotin-POD, Fab fragments* 1:150 - 1:300 or Streptavidin-POD* 1:2000 - 1:5000 in diluent (as in step 5 above), and incubate the membrane for 1 hour at +15 to +25°C with gentle rotation.</p>
8	<p>Wash the membrane four times, 10 min per wash, with PBST. Prepare Lumi-Light Western Blotting Substrate* according to package insert instructions.</p>
9	<ul style="list-style-type: none"> <li>Drain the antibody solution from the container and rinse the membrane with approximately 20 ml<sup>#)</sup> of Wash Buffer.</li> <li>Wash the membrane four times, 10 min per wash, with 20 ml<sup>#)</sup> PBST.</li> </ul>
10	<ul style="list-style-type: none"> <li>Prepare a Detection Solution according to the protocol described in the Lumi-Light reagent package insert.</li> <li>Add the Lumi-Light reagent to the membrane.</li> </ul>
11	<ul style="list-style-type: none"> <li>Drain excess Detection Solution from the membrane, and wrap the blot in plastic wrap.</li> <li>Expose the membrane to X-ray film (e.g., Lumi-Film*) in a film cassette. For a 1 min substrate development, perform a 1-5 min exposure initially.</li> </ul> <p>🕒 Conditions for substrate development and X-ray film exposure needed to achieve optimum signal may vary with each experiment.</p>

<sup>#)</sup> volume required per 100 cm<sup>2</sup> (10 × 10 cm) membrane

## 3. Troubleshooting

Problem	Possible Cause	Recommendation
<b>Chemiluminescent or chromogenic signal weak or not visible</b>	Poor isolation of tagged protein	Use a different cell lysis procedure.
	Antibody too dilute	Double the concentration of the anti-HA-Biotin (and/or anti-Biotin-POD, Fab fragments* / Streptavidin-POD*).
	Too little protein on the gel	Add more protein to gel.
	Poor transfer of proteins from gel to membrane	<ul style="list-style-type: none"> <li>Verify efficiency of protein transfer from gel to membrane by silver staining the remaining gel.</li> <li>To improve transfer efficiency increase the electrical current and/or the transfer time for the blot.</li> <li>Be sure there are no air bubbles between the membrane and gel during transfer.</li> </ul>
	Wrong type of membrane	For maximum signal, use PVDF membranes for transfer.
	Antibody incubation too short	Incubate anti-HA-Biotin with the membrane blot for a longer time.
Signal development time too short	Double the development time.	
Wash time too long or too stringent	<ul style="list-style-type: none"> <li>Shorten the washing time.</li> <li>Omit Tween 20 from the Wash Buffer.</li> </ul>	
Enzyme on antibody conjugate inactivated by preservative	Do not use sodium azide in any western blot reagents if you use POD-conjugated antibodies or streptavidin.	
Substrate inactive	Make fresh dilution of substrate or start with a different stock of substrate.	
<b>High background, additional bands on blot</b>	Epitope tag sequence is not detectable due to: <ul style="list-style-type: none"> <li>Proteolytic cleavage</li> <li>Low level of expression</li> <li>Premature translation termination resulting in loss of C-terminal tag sequence</li> </ul>	<ul style="list-style-type: none"> <li>Include protease inhibitors in lysis buffer.</li> <li>Use alternative expression system or optimize your expression system.</li> <li>Insert multiple tag sequences into target protein to increase avidity of antibody reaction.</li> <li>Use alternative insertion site within the target gene for the epitope tag sequence.</li> </ul>
	Antibody too concentrated	Decrease concentration of Anti-HA-Biotin (and/or Anti-Biotin-POD, Fab fragments* / Streptavidin-POD*) by half.
	Wash time too short	Wash time too short
Incubation of membrane with substrate too long	Leave blot membrane in substrate for a shorter time.	
Wrong type membrane	For minimum background, use PVDF membranes for transfer.	
Blocking Reagent too dilute	<p>Use nonfat dry milk (5% w/v) dissolved in PBST as Blocking Solution and antibody diluent.</p> <p>⚠ High concentrations of nonfat dry milk may reduce specific signal as well as background.)</p>	
Contaminated reagents or equipment	<ul style="list-style-type: none"> <li>Use clean equipment, freshly prepared buffers, and new membranes.</li> <li>Always avoid touching membranes with bare hands; use gloves and forceps.</li> </ul>	
Signal development time too long	Reduce development time by half.	

Problem	Possible Cause	Recommendation
Additional bands	Crossreacting bands have been reported in certain western blot experiments performed with anti-HA (2). In order to determine the specificity of the anti-HA-Biotin, include a negative-control cell extract prepared from the host organism and lacking the HA-tagged protein being analyzed. As an additional specificity control, add the HA Peptide* (1 mg/ml final concentration) to the diluted anti-HA antibody (step 4 above). In this way, the HA Peptide will compete with membrane-bound antigen for specific anti-HA binding.	

#### 4. Additional Information on this Product

##### Background Information

The anti-HA antibody was originally used (1) to study how the immune system recognizes the influenza hemagglutinin protein, a surface glycoprotein required for infectivity of the human virus. However, the principal use of the anti-HA antibody is the detection and purification of proteins whose encoding DNA sequences have been fused to the HA-epitope sequence by recombinant DNA techniques (2, 3). The ability to prepare such epitope-tagged proteins and locate them with the anti-HA antibody in subsequent experiments (1, 2, 7–21) has enabled researchers to determine:

- The size, cellular localization, and abundance of proteins produced by newly discovered genes
- Post-translational modifications of proteins
- The movement of proteins within cell membranes
- The identity of proteins within functional protein complexes
- The function of proteins that are unstable, difficult to purify, or share epitopes with a number of other proteins.

##### Preparation

Clone 12CA5 is a subclone of H26D08. This parent clone was obtained by immunizing 129 GIX<sup>+</sup> mice with a synthetic peptide (residues 76–111 of X47 hemagglutinin I) coupled to keyhole limpet hemocyanin. Spleen cells were then fused with SP2/0 myeloma cells in polyethylene glycol to create the H26D08 hybridoma clone (22). Anti-HA antibody was purified from mouse ascites fluid dialyzed against 10 mM potassium phosphate, 70 mM NaCl (pH 7.4).

##### Quality Control

Each lot of anti-HA-Biotin is tested for functionality and purity relative to a reference standard to confirm the quality of each new reagent preparation: HA peptide is coated onto a microplate. Anti-HA-Biotin is bound by the immobilized HA peptide and, in turn, captures anti-biotin-POD. This complex is then detected using ABTS, allowing both biotin binding and immunoreactivity of the anti-HA-Biotin conjugate to be tested relative to a reference standard.

##### References

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##### Product Citations

- Canton, D.A. et al. (2005). The Pleckstrin Homology Domain-Containing Protein CKIP-1 Is Involved in Regulation of Cell Morphology and the Actin Cytoskeleton and Interaction with Actin Capping Protein. *Mol. Cell. Biol.*, **25**: 3519–3534
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#### 5. Supplementary Information

##### 5.1 Conventions

###### Text Conventions

To make information consistent and easy-to-read, the following text conventions are used in this Instruction Manual:

Text Convention	Usage
Numbered instructions labeled ❶, ❷, etc.	Steps in a procedure that must be performed in the order listed
Asterisk *	Denotes a product available from Roche Diagnostics

###### Symbols

In this Instruction Manual, the following symbols are used to highlight important information:

Symbol	Description
ⓘ	Information Note: Additional information about the current topic or procedure.
⚠	Important Note: Information critical to the success of the procedure or use of the product.

###### Abbreviations

In this Instruction Manual the following abbreviations are used:

Abbreviation	Meaning
HA	hemagglutinin
PBS	phosphate-buffered saline
POD	peroxidase
PVDF	polyvinyl-difluoride
Y; P; D; V; A	Tyrosine; Proline; Aspartic acid; Valine; Alanine

##### 5.2 Changes to Previous Version

- Editorial Changes

### 5.3 Ordering Information

Product	Pack Size	Cat No.
Anti-HA (12CA5)	200 µg 5 mg (1ml)	11 583 816 001 11 666 606 001
Anti-HA-Biotin	100 µg (500 µl)	11 666 851 001
Anti-HA-Fluorescein	100 µg (500 µl)	11 666 878 001
Anti-HA-Rhodamine	100 µg (500 µl)	11 666 959 001
Anti-HA High Affinity (3F10)	50 µg 500 µg	11 867 423 001 11 867 431 001
Anti-HA-Biotin, High Affinity (3F10)	50 µg	12 158 167 001
Anti-HA-Fluorescein, High Affinity (3F10)	25 µg	11 988 506 001
Anti-HA-Peroxidase, High Affinity (3F10)	25 µg	12 013 819 001
Anti-HA Affinity Matrix	1 ml	11 815 016 001
HA Peptide	5 mg	11 666 975 001
Protease/Phosphatase Inhibitor Tablets and Lysis Reagents		
c●mplete	20 tablets in glass vials	11 697 498 001
	3 × 20 tablets in glass vials	11 836 145 001
	20 tablets in <i>EASYpacks</i>	04 693 116 001
c●mplete, Mini	25 tablets in a glass vial	11 836 153 001
	30 tablets in <i>EASYpacks</i>	04 693 124 001
c●mplete, EDTA-free	20 tablets in a glass vial	11 873 580 001
	3 × 20 tablets in glass vials	05 056 489 001
	20 tablets in <i>EASYpacks</i>	04 693 132 001
c●mplete, Mini, EDTA-free	25 tablets in a glass vial	11 836 170 001
	30 tablets in <i>EASYpacks</i>	04 693 159 001
c●mplete Lysis-B (2×) (for bacterial cell lysis)	1 kit (100 ml lysis reagent and 20 c●mplete Protease Inhibitor Cocktail Tablets)	04 719 930 001
c●mplete Lysis-B (2×), EDTA-free (for bacterial cell lysis)	1 kit (100 ml lysis reagent and 20 c●mplete, EDTA-free Protease Inhibitor Cocktail Tablets)	04 719 948 001
c●mplete Lysis-M (for mammalian cell lysis)	1 kit (200 ml lysis reagent and 20 c●mplete Protease Inhibitor Cocktail Tablets)	04 719 956 001
c●mplete Lysis-M, EDTA-free (for mammalian cell lysis)	1 kit (200 ml lysis reagent and 20 c●mplete, EDTA-free Protease Inhibitor Cocktail Tablets)	04 719 964 001
PhosSTOP	20 tablets in <i>EASYpacks</i>	04 906 837 001
	10 tablets in <i>EASYpacks</i>	04 906 845 001
Western Blotting Reagents		
Lumi-Light <sup>PLUS</sup> Western Blotting Kit (Mouse/Rabbit)	1 kit (1,000 cm <sup>2</sup> membrane)	12 015 218 001
Lumi-Light Western Blotting Substrate	400 ml, (4000 cm <sup>2</sup> membrane)	12 015 200 001
Lumi-Light <sup>PLUS</sup> Western Blotting Substrate	100 ml, (1,000 cm <sup>2</sup> membrane)	12 015 196 001
Lumi-Film Chemiluminescent Detection Film	100 films (8 × 10 inches 20.3 × 25.4 cm)	11 666 657 001
PVDF Western Blotting Membranes	1 roll (30 cm × 3.00 m)	03 010 040 001
Western Blocking Reagent, Solution	100 ml (10 blots, 100 cm <sup>2</sup> )	11 921 673 001
	6 × 100 ml (60 blots, 100 cm <sup>2</sup> )	11 921 681 001

Product	Pack Size	Cat No.
Bovine Serum Albumin, Fraction V	50 g	10 735 078 001
	100 g	10 735 086 001
	500 g	10 735 094 001
	1 kg	10 735 108 001
Detergents		
Triton X 100	5 × 10 ml	11 332 481 001
Tween 20	5 × 10 ml	11 332 465 001
Nonidet P40	5 × 10 ml	11 332 473 001
Buffers in a Box, Premixed PBS Buffer, 10×	4 l	11 666 789 001

#### Trademarks

All brands or product names are trademark of their respective holders.

#### Regulatory Disclaimer

For life science research only. Not for use in diagnostic procedures.

#### Disclaimer of License

For patent license limitations for individual products please refer to: [List of biochemical reagent products](#)

#### Contact and Support

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