CD33

Concentrated and Prediluted Mouse Monoclonal Antibody
901-3116-020426

Available Product Formats				
Format	**Catalog Number**	**Description**	**Dilution**	**Diluent**
NeoPATH PRO	NPAI 3116 T40	40 tests	Ready-to-use	N/A

Intended Use:
For *in vitro* Diagnostic Use
The Biocare CD33 [PWS44] mouse monoclonal antibody is intended for laboratory professional use, in the qualitative identification of CD33 protein in sections of formalin-fixed, paraffin-embedded (FFPE) human tissue by an immunohistochemistry (IHC) procedure performed manually or on an automated slide stainer and visualized by light microscopy. The clinical interpretation of any staining or its absence should be complemented by morphological studies and proper controls and should be evaluated within the context of the patient's clinical history and other diagnostic tests by a qualified pathologist.

Summary and Explanation:
The Biocare CD33 antibody detects CD33 (Siglec-3), a 67 kDa glycosylated transmembrane receptor expressed on myeloid-specific cells. [15, 16] Historically, CD33 was primarily used for flow cytometry; more recently, a paraffin embedded tissue–compatible CD33 antibody has been developed.

CD33 is useful for phenotyping acute myelogenous leukemias, with immunohistochemical (IHC) analysis providing results equivalent to flow cytometry. [15, 16] It is also valuable in the evaluation of myeloid sarcomas. [15, 17] In normal bone marrow trephine biopsies, clone PWS44 stains myeloid and myelomonocytic lineages, as well as mature macrophages, while erythroid and megakaryocyte series are negative for CD33. [15]

Principle of Procedure:
This antibody product may be used as the primary antibody in immunohistochemistry testing of formalin-fixed, paraffin-embedded tissue sections. In general, immunohistochemical (IHC) staining techniques allow for the visualization of antigens via the sequential application of a specific antibody to the antigen (primary antibody), a secondary antibody to the primary antibody (optional link antibody/probe), an enzyme complex and a chromogenic substrate with interposed washing steps. The enzymatic activation of the chromogen results in a visible reaction product at the antigen site. The specimen may then be counterstained, and cover slipped. Results are interpreted using a light microscope and aid in the differential diagnosis of pathophysiological processes, which may or may not be associated with a particular antigen.

Materials and Methods:

Reagents Provided:
Host Source: Mouse monoclonal
Species Reactivity: Human; other species not tested.
Clone: PWS44
Isotype: IgG2b
Protein Concentration: Contact Biocare's Technical Support for specific Ig concentration
Specificity: Prokaryotic recombinant protein corresponding to a region of the C2 domain on human CD33
Cellular Localization: Cell membrane / cytoplasm
Method: Affinity purified mouse monoclonal antibody.

Reconstitution, Mixing, Dilution, Titration:
Prediluted antibody reagent is optimally diluted for use with the below mentioned staining system. Further dilution may result in loss of antigen staining. The user must validate any such change. Differences in tissue processing and technical procedures in the user's laboratory may produce significant variability in results necessitating regular performance of in-house controls (see Quality Control section).

Known Applications:
Immunohistochemistry (formalin-fixed paraffin-embedded tissues)

Supplied As:
Ready-to-use:
Buffered saline solution, pH 6.1-6.3, contains a protein carrier and less than 0.1% sodium azide preservative. See Safety Data Sheet for additional details.

Materials and Reagents Needed but Not Provided:
Microscope slides positively charged.
Positive and negative tissue controls
Desert Chamber (or similar Drying oven)
Xylene or xylene substitute
Ethanol or reagent alcohol
Decloaking Chamber (Pressure cooker)
Deionized or distilled water
Wash buffer
Pretreatment reagents
Peroxidase block
Protein block (optional)
Detection probe and polymer
Negative control reagents
Chromogens
Hematoxylin (counterstain)
Bluing reagent
Mounting medium
Coverglass
Light Microscope (40-400X magnification)
Automated Slide Staining Platform

Configurations of the antibody product are available for use on the instruments indicated in the table above.

Storage and Stability:
Store at 2ºC to 8ºC. The product is stable to the expiration date printed on the vial label, when stored under these conditions. Do not use after expiration date. Storage under any condition other than those specified must be verified. Diluted reagents should be used promptly; store any remaining reagent at 2ºC to 8ºC. The stability of user diluted reagents have not been established by Biocare.

Positive and negative controls should be run simultaneously with all patient specimens. If unexpected staining is observed, which cannot be explained by variations in laboratory procedures and a problem with the antibody is suspected, contact Biocare's Technical Support at 1-800-542-2002 or via the technical support information provided on biocare.net.

Specimen Preparation:
Tissues fixed in formalin are suitable for use prior to paraffin embedding. Osseous tissues should be decalcified prior to tissue processing to facilitate tissue cutting and prevent damage to microtome blades.[1,2]

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Properly fixed and embedded tissues expressing the specified antigen target should be stored in a cool place. The Clinical Laboratory Improvement Act (CLIA) of 1988 requires in 42 CFR §493.1259(b) that "The laboratory must retain stained slides at least ten years from the date of examination and retain specimen blocks at least two years from the date of examination."[3]

Treatment of Tissues Prior to Staining:
Perform Heat Induced Epitope Retrieval (HIER) per recommended protocol below. The routine use of HIER prior to IHC has been shown to minimize inconsistency and standardize staining.[4,5]

Warning and Precautions:
1. This antibody contains less than 0.1% sodium azide. Concentrations less than 0.1% are not reportable hazardous materials according to U.S. 29 CFR 1910.1200, OSHA Hazard communication and EC Directive 91/155/EC. Sodium azide (NaN_3) used as a preservative is toxic if ingested. Sodium azide may react with lead and copper plumbing to form highly explosive metal azides. Upon disposal, flush with large volumes of water to prevent azide build-up in plumbing. (Center for Disease Control, 1976, National Institute of Occupational Safety and Health, 1976)[6]
2. Specimens, before and after fixation, and all materials exposed to them should be handled as if capable of transmitting infection and disposed of with proper precautions. Never pipette reagents by mouth and avoid contacting the skin and mucous membranes with reagents and specimens. If reagents or specimens come into contact with sensitive areas, wash with copious amounts of water.[7]
3. This product contains materials of animal origin. As with any product derived from biological sources, proper handling procedures should be used in accordance with local requirements.
4. Microbial contamination of reagents may result in an increase in nonspecific staining.
5. Incubation times or temperatures other than those specified may give erroneous results. The user must validate any such change.
6. Do not use reagent after the expiration date printed on the vial.
7. Prediluted antibody reagent is optimally diluted for use. Further dilution may result in loss of antigen staining.
8. To prevent evaporation and ensure maximum test capacity, promptly cap and remove reagents from automated instruments after each run. Leaving reagents exposed can reduce their effectiveness and the number of tests they can provide. Always store reagents as directed to maintain their integrity.
9. Dispose of all used reagents and any other contaminated disposable materials following procedures for infectious or potentially infectious waste. It is the responsibility of each laboratory to handle solid and liquid waste according to their nature and degree of hazardousness and to treat and dispose of it (or have them treated and disposed of) in accordance with any applicable regulations.
10. Follow local disposal regulations for your location along with recommendations in the Safety Data Sheet to determine the safe disposal of this product
11. The SDS is available upon request and is located at http://biocare.net.
12. To report suspected serious incidents related to this device, contact the local Biocare representative and the competent authority of the Member State or Country in which the user is established.

Instructions for Use:
Recommended Staining Protocols for CD33 [PWS44]:

NeoPATH PRO:

NPAI3170 is intended for use with the NeoPATH PRO. Refer to the User Manual for specific instructions for use. Recommended protocol parameters are as follows:	
Chromogen Staining Option	**DAB**
Antibody Protocol:	CD33-BC, 20 min at RT
Template:	HRP_HIGH_105C_20MINAB+BLOCK
Dewax:	Dewax STD; 20 min at 75°C
Antigen Retrieval (HIER Option):	HIGH_105C_30MIN
Enzyme:	N/A
Block Option:	NeoPATH Pro Background Punisher, 10 min at RT
Detection:	HRP_20AB+BLOCK (Amplifier; 10 min at RT, Polymer; 25 min at RT)
Chromogen:	7 min DAB + 2 min DAB Enhancer at RT.
Hematoxylin:	7 min at RT

Quality Control:
Refer to CLSI Quality Standards for Design and Implementation of Immunohistochemistry Assays; Approved Guideline-Second edition (I/LA28-A2) CLSI Wayne, PA USA (www.clsi.org). 2011[8]

Positive Tissue Control: Myeloid leukemia
External Positive control materials should be fresh specimens fixed, processed, and embedded as soon as possible in the same manner as the patient sample(s). Positive tissue controls are indicative of correctly prepared tissues and proper staining techniques. One positive external tissue control for each set of test conditions should be included in each staining run.

The tissues used for the external positive control materials should be selected from patient specimens with well-characterized low levels of the positive target activity that gives weak positive staining. The low level of positivity for external positive controls is designed to ensure detection of subtle changes in the primary antibody sensitivity from instability or problems with the IHC methodology. Commercially available tissue control slides or specimens processed differently from the patient sample(s) validate reagent performance only and do not verify tissue preparation.

Known positive tissue controls should only be utilized for monitoring the correct performance of processed tissues and test reagents, rather than as an aid in formulating a specific diagnosis of patient samples. If the positive tissue controls fail to demonstrate positive staining, results with the test specimens should be considered invalid.

Negative Tissue Control:
Use a negative tissue control (known to *be CD33* negative) fixed, processed, and embedded in a manner identical to the patient sample(s) with each staining run to verify the specificity of the IHC primary antibody for demonstration of the target antigen, and to provide an indication of specific background staining (false positive staining). Also, the variety of different cell types present in most tissue sections can be used by the laboratorian as internal negative control sites to verify the IHC's performance specifications. The types and sources of specimens that may be used for negative tissue controls are listed in the Performance Characteristics section.

If specific staining (false positive staining) occurs in the negative tissue control, results with the patient specimens should be considered invalid.

Nonspecific Negative Reagent Control:

In addition to staining with *CD33* antibody, a second slide should be stained with the appropriate negative control reagent.

Assay Verification:
Prior to initial use of an antibody or staining system in a diagnostic procedure, the user should verify the antibody's specificity by testing it on a series of in-house tissues with known immunohistochemical performance characteristics representing known positive and negative tissues. Refer to the quality control procedures previously outlined in this section of the product insert and to the quality control recommendations of the CAP Certification Program[9] for Immunohistochemistry and/or the NCCLS IHC guideline[10]). These quality control procedures should be repeated for each new antibody lot, or whenever there is a change in assay parameters.

Troubleshooting:
Follow the antibody specific protocol recommendations according to the data sheet provided. If atypical results occur, contact Biocare's Technical Support at 1-800-542-2002.

Interpretation of Staining:

Positive Tissue Control:
The positive tissue control stained with indicated antibody should be examined first to ascertain that all reagents are functioning properly. The appropriate staining of target cells (as indicated above) is indicative of positive reactivity. If the positive tissue controls fail to demonstrate positive staining, any results with the test specimens should be considered invalid.

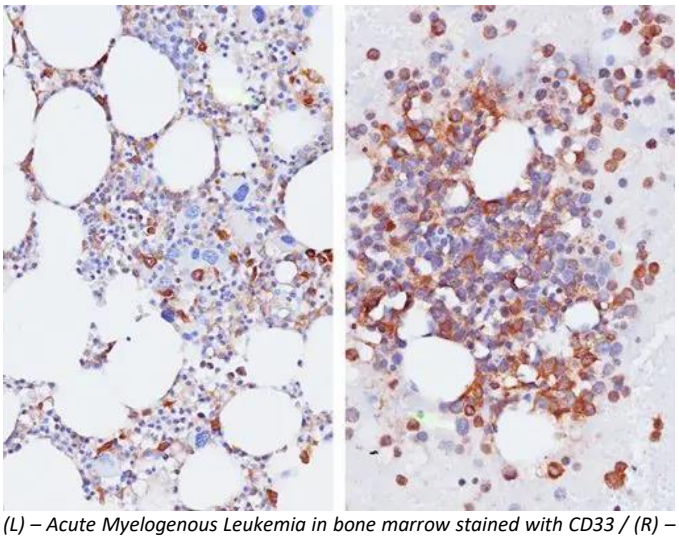
The color of the reaction product may vary depending on substrate chromogens used. Refer to substrate package inserts for expected color reactions. Further, metachromasia may be observed in variations of the method of staining.[11]

When a counterstain is used, depending on the incubation length and potency of the counterstain used, counterstaining will result in a coloration of the cell nuclei. Excessive or incomplete counterstaining may compromise proper interpretation of results. Refer to protocol(s) for recommended counterstain.

Negative Tissue Control:
The negative tissue control should be examined after the positive tissue control to verify the specificity of the labeling of the target antigen by the primary antibody. The absence of specific staining in the negative tissue control confirms the lack of antibody cross reactivity to cells/cellular components. If specific staining (false positive staining) occurs in the negative external tissue control, results with the patient specimen should be considered invalid.

Nonspecific staining, if present, usually has a diffuse appearance. Sporadic staining of connective tissue may also be observed in sections from excessively formalin-fixed tissues. Use intact cells for interpretation of staining results. Necrotic or degenerated cells often stain nonspecifically.

Patient Tissue:
Examine patient specimens stained with indicated antibody last. Positive staining intensity should be assessed within the context of any nonspecific background staining of the negative reagent control. As with any immunohistochemical test, a negative result means that the antigen was not detected, not that the antigen was absent in the cells/tissue assayed. If necessary, use a panel of antibodies to identify false-negative reactions.



(L) – Acute Myelogenous Leukemia in bone marrow stained with CD33 / (R) – Myelodysplastic Syndrome in bone marrow aspirate stained with CD33

Refer to Summary and Explanation and Limitations for specific information regarding indicated antibody immunoreactivity.

Limitations:

General Limitations:
1. For *in vitro* diagnostic Use
2. This product is for professional use.
3. For prescription use only (Rx Only).
4. Tissue staining is dependent on the handling and processing of the tissue prior to staining. Improper fixation, freezing, thawing, washing, drying, heating, sectioning or contamination with other tissues or fluids may produce artifacts, antibody trapping, or false negative results. Inconsistent results may be due to variations in fixation and embedding methods, or to inherent irregularities within the tissue.[12]
5. Excessive or incomplete counterstaining may compromise proper interpretation of results.
6. The clinical interpretation of any positive or negative staining should be evaluated within the context of clinical presentation, morphology, and other histopathological criteria. The clinical interpretation of any positive or negative staining should be complemented by morphological studies using proper positive and negative internal and external controls as well as other diagnostic tests. It is the responsibility of a qualified pathologist who is familiar with the proper use of IHC antibodies, reagents, and methods to interpret all the steps used to prepare and interpret the final IHC preparation.
7. The optimum antibody dilution and protocols for a specific application can vary. These include, but are not limited to fixation, heat-retrieval method, incubation times, tissue section thickness and detection kit used. Due to the superior sensitivity of these unique reagents, the recommended incubation times and titers listed are not applicable to other detection systems, as results may vary. The data sheet recommendations and protocols are based on exclusive use of Biocare products. Ultimately, it is the responsibility of the investigator to determine optimal conditions.
8. This product is not intended for use in flow cytometry. Performance characteristics have not been determined for flow cytometry.
9. Tissues from persons infected with hepatitis B virus and containing hepatitis B surface antigen (HBsAg) may exhibit nonspecific staining with horseradish peroxidase.[13]

10. Reagents may demonstrate unexpected reactions in previously untested tissues. The possibility of unexpected reactions even in tested tissue groups cannot be completely eliminated due to biological variability of antigen expression in neoplasms, or other pathological tissues.[14] Contact Biocare's Technical Support at 1-800-542-2002, or via the technical support information provided on biocare.net, with documented unexpected reaction(s).
11. Normal/nonimmune sera from the same animal source as secondary antisera used in blocking steps may cause false-negative or false-positive results due to autoantibodies or natural antibodies.
12. False-positive results may be seen due to non-immunological binding of proteins or substrate reaction products. They may also be caused by pseudo peroxidase activity (erythrocytes), endogenous peroxidase activity (cytochrome C), or endogenous biotin (e.g., liver, breast, brain, kidney) depending on the type of immunostain used.[12]

Product Specific Limitations:
No additional product specific limitations noted.

Troubleshooting:
1. No staining of any slides – Check to determine appropriate positive control tissue, antibody, and detection products have been used, check instrument calibration and maintenance. Ensure tissue samples are appropriately placed per instrument guidelines (refer to relevant instrument manuals).
2. Weak staining of all slides – Check to determine appropriate positive control tissue, antibody, and detection products have been used, check instrument calibration and maintenance. Ensure tissue samples are appropriately placed per instrument guidelines (refer to relevant instrument manuals).
3. Excessive background of all slides – There may be high levels of endogenous biotin (if using biotin-based detection products), endogenous HRP activity converting chromogen to colored end product (use peroxidase block), or excess non-specific protein interaction (use a protein block, such as serum- or casein-based blocking solution). Check instrument calibration and maintenance.
4. Tissue sections wash off slides during incubation – Check slides to ensure they are positively charged. Specific staining too dark – Check protocol to determine of proper antibody titer was applied to slide, as well as proper incubation times for all reagents. Additionally, ensure the protocol has enough washing steps to remove excess reagents after incubation steps are completed. Check instrument calibration and maintenance.
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References:
1. Kiernan JA. Histological and Histochemical Methods: Theory and Practice. New York: Pergamon Press 1981.
2. Sheehan DC and Hrapchak BB. Theory and Practice of Histotechnology. St. Louis: C.V. Mosby Co. 1980.
3. Clinical Laboratory Improvement Amendments of 1988: Final Rule, 57 FR 7163, February 28, 1992.
4. Shi S-R, Cote RJ, Taylor CR. J Histotechnol. 1999 Sep;22(3):177-92.
5. Taylor CR, et al. Biotech Histochem. 1996 Jan;71(5):263-70.
6. Center for Disease Control Manual. Guide: Safety Management, NO. CDC-22, Atlanta, GA. April 30, 1976 "Decontamination of Laboratory Sink Drains to Remove Azide Salts."
7. Clinical and Laboratory Standards Institute (CLSI). Protection of Laboratory Workers from Occupationally Acquired Infections; Approved Guideline-Fourth Edition CLSI document M29-A4 Wayne, PA 2014.
8. CLSI Quality Standards for Design and Implementation of Immunohistochemistry Assays; Approved Guideline-Second edition (I/LA28-A2) CLSI Wayne, PA USA (www.clsi.org). 2011
9. College of American Pathologists (CAP) Certification Program for Immunohistochemistry. Northfield IL. Http://www.cap.org (800) 323-4040.
10. O'Leary TJ, Edmonds P, Floyd AD, Mesa-Tejada R, Robinowitz M, Takes PA, Taylor CR. Quality assurance for immunocytochemistry; Proposed guideline. MM4-P. National Committee for Clinical Laboratory Standards (NCCLS). Wayne, PA. 1997;1-46.
11. Koretzik K, Lemain ET, Brandt I, and Moller P. Metachromasia of 3-amino-9-ethylcarbazole (AEC) and its prevention in Immunoperoxidase techniques. Histochemistry 1987; 86:471-478.
12. Nadji M, Morales AR. Immunoperoxidase, part I: the techniques and its pitfalls. Lab Med 1983; 14:767.
13. Omata M, Liew CT, Ashcavai M, Peters RL. Nonimmunologic binding of horseradish peroxidase to hepatitis B surface antigen: a possible source of error in immunohistochemistry. AmJ Clin Path 1980; 73:626.
14. Herman GE and Elfont EA. The taming of immunohistochemistry: the new era of quality control. Biotech & Histochem 1991; 66:194.
15. Hoyer JD, et al. CD33 detection by immunohistochemistry in paraffin-embedded tissues: a new antibody shows excellent specificity and sensitivity for cells of myelomonocytic lineage. Am J Clin Pathol. 2008 Feb; 129(2):316-23.
16. Rollins-Raval MA, Roth CG. The value of immunohistochemistry for CD14, CD123, CD33, myeloperoxidase and CD68R in the diagnosis of acute and chronic myelomonocytic leukaemias. Histopathology. 2012 May; 60(6):933-42.
17. Amador-Ortiz C, et al. Use of classic and novel immunohistochemical markers in the diagnosis of cutaneous myeloid sarcoma. J Cutan Pathol. 2011 Dec; 38(12):945-53.

Symbols:
Biocare uses the following symbols and signs in addition to those listed in the ISO 15223-1 standard (for USA: https://biocare.net/wp-content/uploads/Symbol-Sheet.pdf for more information).

Revision History:

Rev	Updates
1	Initial version of this document.

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