

**DIRECTIONS FOR USE**

**Anti-D Clone 1 and Clone 2 Monoclonal:**

For Tube, Bio-Rad-ID, Ortho BioVue, Microplate and Slide Techniques.

**SUMMARY**

The Rh blood group system was discovered in 1940. The D antigen is the most clinically significant non-ABO red blood cell antigen and has been implicated in causing Haemolytic Transfusion Reactions and Haemolytic Disease of the Newborn.

Anti-D	Phenotype	Caucasians %	Afro-Americans %
+	Rh D +ve	85	72
0	Rh D -ve	15	28

**INTENDED PURPOSE**

The Anti-D reagents are blood grouping reagents intended to be used to qualitatively determine the presence or absence of the Rh D antigen on the red cells of blood donors or patients requiring a blood transfusion when tested in accordance with the recommended techniques stated in this IFU.

**PRINCIPLE**

The reagents will cause direct agglutination (clumping) of test red cells that carry the D antigen. No agglutination generally indicates the absence of the D antigen (see Limitations).

**REAGENT**

Lorne Monoclonal IgM Anti-D Clone 1 and Clone 2 blood grouping reagents are low protein reagents containing a human monoclonal IgM antibody diluted with sodium chloride (0.9 g%), bovine albumin (2.0 g%) and macromolecular potentiators (1.5 g%). When typing patient samples, each reagent will directly agglutinate Rh D positive cells, including majority of variants (but not D<sup>u</sup>) and a high proportion of weak D (D<sup>w</sup>) phenotypes when using the recommended techniques. The reagents do not contain or consist of CMR substances, or endocrine disrupting substances or that could result in sensitisation or an allergic reaction by the user. Each reagent is supplied at optimal dilution for use on patient samples with all recommended techniques stated below without need for further dilution or addition. For lot reference number and expiry date see Vial Label.

Product	Cell Line / Clone
Anti-D Clone 1	RUM-1
Anti-D Clone 2	MS-201

**WEAKENED EXPRESSION OF THE RhD ANTIGEN**

The collective term D<sup>w</sup> is widely used to describe red cells which have a weaker expression of the D antigen than normal. The term weak D denotes individuals with a reduced number of complete D antigen sites per red cell. The term partial D denotes individuals with missing D antigen epitopes. D<sup>w</sup> cells is a partial D category which misses most D epitopes. Both Clone 1 and Clone 2 reagents will detect most examples of partial and weak D red cells by direct agglutination, but will not detect D<sup>w</sup> cells.

**STORAGE**

Reagent vials should be stored at 2 - 8°C on receipt. Prolonged storage at temperatures outside this range may result in accelerated loss of reagent reactivity. This reagent has undergone transportation stability studies at 37°C and -25°C as described in document BS EN ISO 23640:2015.

**SAMPLE COLLECTION AND PREPARATION**

Blood samples can be collected into EDTA, citrate, CPDA anticoagulants or as a clotted sample. The samples should be tested as soon as possible following collection. If a delay in testing should occur, store the samples at 2-8°C. Samples displaying gross haemolysis or microbial contamination should not be used for testing. Blood samples showing evidence of lysis may give unreliable results. It is preferable (but not essential) to wash all blood samples with PBS or Isotonic saline before being tested.

**PRECAUTIONS**

- The reagents are intended for in vitro diagnostic use only.
- If a reagent vial is cracked or leaking, discard the contents immediately.
- Do not use the reagents past the expiration date (see Vial Label).
- Do not use the reagents if a precipitate is present.
- Protective clothing should be worn when handling the reagents, such as disposable gloves and a laboratory coat.
- The reagents have been filtered through a 0.2 µm capsule to reduce the bio-burden, but are not supplied sterile. Once a vial has been opened the contents should remain viable up until the expiry date as long as there is no marked turbidity, which can indicate reagent deterioration or contamination.
- The reagents contain < 0.1% sodium azide. Sodium azide may be toxic if ingested and may react with lead and copper plumbing to form explosive metal azides. On disposal flush away with large volumes of water.
- Materials used to produce the products were tested at source and found to be negative for HIV 1+2 and HCV antibodies and HBsAg using approved microbiological tests.
- No known tests can guarantee that products derived from human or animal

sources are free from infectious agents. Care must be taken in the use and disposal of each vial and its contents.

**DISPOSAL OF REAGENT AND DEALING WITH SPILLAGES**

For information on disposal of the reagent and decontamination of a spillage site see Material Safety Data Sheets, available on request.

**CONTROLS AND ADVICE**

- It is recommended a positive control (ideally R,r cells), and a negative control (ideally rr cells) be tested in parallel with each batch of tests. Tests must be considered invalid if controls do not show expected results.
- When typing red cells from a patient who is diagnosed with a disease that causes the red cells to become coated with antibody or other proteins (such as HDN, AIHA), it is important to test the patient's red cells using Lorne's Monoclonal D Negative Control (catalogue # 650010). Tests must be considered invalid if red cells are agglutinated using Lorne's Monoclonal D Negative Control (catalogue # 650010).
- Weak and partial D antigen variants are poorly detected by the gel card, microtitre plate and slide technique. It is recommended that weak and partial D variants are tested using the tube test technique.
- Before use, let the reagent warm up to room temperature. As soon as the reagent has been used, put the reagent back in storage at 2-8°C.
- In the Recommended Techniques one volume is approximately 50µl when using the vial dropper provided.
- The use of the reagents and the interpretation of results must be carried out by properly trained and qualified personnel in accordance with the requirements of the country where the reagents are in use.
- The user must determine suitability of the reagents for use in other techniques.

**REAGENTS AND MATERIALS REQUIRED**

- Applicator sticks.
- Automatic plate reader.
- Bio-Rad ID-Cards (NaCl, enzyme test and cold agglutinins).
- Bio-Rad ID-Centrifuge.
- Bio-Rad ID-CellStab or ID-Diluent 2.
- Glass microscope slides or white card tiles.
- Glass test tubes (10 x 75 mm or 12 x 75 mm).
- Microplate centrifuge.
- Ortho BioVue System Cassettes (Neutral).
- Ortho BioVue System Centrifuge.
- Ortho 0.8% Red Cell Diluent.
- Plate shaker.
- PBS solution (pH 6.8-7.2) or Isotonic saline solution (pH 6.5-7.5).
- Positive (ideally R,r) and negative (rr) control red cells.
- Test tube centrifuge.
- Validated "U" well microplates.
- Volumetric pipettes.

**RECOMMENDED TECHNIQUES**

**A. Tube Technique**

- Prepare a 2-3% suspension of red cells in PBS or Isotonic saline.
- Place in a labelled test tube: 1 volume of Lorne Anti-D reagent and 1 volume of red cell suspension.
- Mix thoroughly and centrifuge all tubes for 20 seconds at 1000 rcf or for a suitable alternative time and force.
- Gently resuspend red cell button and read macroscopically for agglutination
- Any tubes, which show negative or questionable result (as can happen with weak D samples), should be incubated for 15 minutes at room temperature.
- Following incubation, repeat steps 3 and 4.

**B. Bio-Rad-ID Technique (NaCl, enzyme test and cold agglutinins cards)**

- Prepare a 0.8% suspension of red cells in ID-CellStab or ID-Diluent 2.
- Remove aluminium foil from as many microtubes as needed.
- Place in appropriate microtube: 50µl of red cell suspension and 25µl of Lorne Anti-D reagent.
- Centrifuge ID-Card(s) in a Bio-Rad gel card centrifuge.
- Read macroscopically for agglutination.

**C. Ortho BioVue Technique (Neutral cards)**

- Prepare a 0.8% suspension of red cells in 0.8% Ortho Red Cell Diluent.
- Remove aluminium foil from as many reaction chambers as needed.
- Place in appropriate reaction chamber: 50µl of red cell suspension and 40µl of Lorne Anti-D reagent.
- Centrifuge cassette(s) in an Ortho BioVue System Centrifuge.
- Read macroscopically for agglutination.

**D. Microplate Technique, using "U" wells**

- Prepare a 2-3% suspension of red cells in PBS or Isotonic saline.
- Place in the appropriate well: 1 volume Lorne Anti-D reagent and 1 volume red cell suspension.

- Mix thoroughly, preferably using a microplate shaker, taking care to avoid cross-well contamination.
- Incubate at room temperature for 15 minutes (time dependant on user).
- Centrifuge the microplate for 1 minute at 140 rcf or for a suitable alternative time and force.
- Resuspend the cell buttons using carefully controlled agitation on a microplate shaker
- Read macroscopically or with a validated automatic reader.
- Any weak reactions should be repeated by the tube technique.

#### E. Slide Technique

- Prepare a 35-45% suspension of red cells in serum, plasma or PBS or Isotonic saline or use anti-coagulated whole blood (in its own plasma).
- Place on a labelled glass slide or card tile: 1 volume of Lorne Anti-D reagent and 1 volume of red cell suspension.
- Using a clean applicator stick, mix reagent and cells over an area of about 20 x 40 mm.
- Slowly tilt the slide back and forth for 30 seconds, with occasional further mixing during the 1-minute period, maintaining slide at room temperature.
- Read macroscopically after 1 minute over a diffuse light and do not mistake fibrin strands as agglutination.
- Any weak reactions should be repeated by the tube technique.

#### INTERPRETATION OF TEST RESULTS

- Positive: Agglutination of the red cells constitutes a positive test result and within accepted limitations of test procedure, indicates the presence of the D antigen on the red cells.
- Negative: No agglutination of the red cells constitutes a negative result and within the accepted limitations of the test procedure, indicates the absence of the D antigen on the red cells.
- Test results of cells that are agglutinated using the reagent negative control shall be excluded, as the agglutination is most probably caused by the effect of the macromolecular potentiators in the reagent on sensitised cells.

#### STABILITY OF THE REACTIONS

- Read all tube and microplate tests immediately after centrifugation.
- Slide tests should be interpreted after a maximum of one minute to ensure specificity and to avoid the possibility a negative result may be incorrectly interpreted as positive due to drying of the reagent.
- Caution should be exercised in the interpretation of results of tests performed at temperatures other than those recommended.

#### LIMITATIONS

- Lorne Anti-D is not suitable for use with enzyme treated cells, cells suspended in LISS or for use in indirect antiglobulin (IAT) techniques.
- Stored blood may give weaker reactions than fresh blood.
- False positive agglutination may be seen due to the presence of macromolecular potentiators in the reagent when testing IgG sensitised cells, e.g. AIHA, HDN.
- False positive or false negative results may also occur due to:
  - Contamination of test materials
  - Improper storage, cell concentration, incubation time or temperature
  - Improper or excessive centrifugation
  - Deviation from the recommended techniques

#### SPECIFIC PERFORMANCE CHARACTERISTICS

- Prior to release, each lot of Lorne Anti-D monoclonal reagent was tested using the recommended test methods listed in this IFU. The tests complied with the test requirements as stated in the current version/issue of the 'Guidelines for the Blood Transfusion Services in the United Kingdom' and the 'Common Technical Specifications'.
- Anti-D grouping reagents for D grouping of patients should not react with D<sup>0</sup> cells using the method(s) recommended for use.
- Specificity of source monoclonal antibodies is demonstrated using a panel of antigen-negative cells.
- The potency of the reagents has been tested against the following minimum potency reference standard obtained from National Institute of Biological Standards and Controls (NIBSC):
  - Anti-D reference 99/836.
- The Quality Control of the reagents was performed using red cells with phenotypes that were verified by a UK blood transfusion centre and had been washed with PBS or Isotonic saline prior to use.

#### DISCLAIMER

- The user is responsible for the performance of the reagents by any method other than those mentioned in the Recommended Techniques.
- Any deviations from the Recommended Techniques should be validated prior to use<sup>9</sup>.

#### BIBLIOGRAPHY

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#### AVAILABLE REAGENT SIZES

	Vial Size	Catalogue Number
Anti-D Clone 1 Monoclonal	10 ml	730010
	1000 ml	730000*
	5000 ml	730000X5*
Anti-D Clone 2 Monoclonal	10 ml	710010
	1000 ml	710000*
	5000 ml	710000X5*

\*This size is For Further Manufacturing Use (FFMU) only and is therefore not CE marked.



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