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Frequency of Mi^a antigen: A pilot study among blood donors

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The Miltenberger (Mi) classes represent a group of phenotypes for red cells that carry low frequency antigens associated with the MNSs blood group system. This pilot study was aimed at determining the Mi^a antigen positivity in the blood donor population in a tertiary care hospital in New Delhi, India. The study was performed between June to August 2014 on eligible blood donors willing to participate. Antigen typing was performed using monoclonal anti-Mi^a antiserum by tube technique. Only one of the 1000 blood donors (0.1%) tested was found to be Mi^a antigen positive. The Mi^a antigen can, therefore, be considered as being rare in the Indian blood donor population.

Key words Miltenberger - Mi^a antigen - MNSs blood group

The Miltenberger (Mi) classes represent a group of phenotypes for red cells that carry low frequency antigens associated with the MNSs blood group system. The Mi^a antigen is expressed on several glycophorin variants that are hybrids between the usual forms of glycophorin A and B[1]. Anti-Mi^a was first described in 1951 by Levine and co-workers[2] in the serum of Mrs. Miltenberger, who developed this antibody in response to immunization from her antigen positive foetus. The corresponding antigen was named after her[2]. The incidence of the blood group antigen Mi^a among most populations is low[3-5]. Higher frequencies of occurrence are, however, noted in the Chinese and South East Asians[6-8]. Anti-Mi^a is also frequently reported among the South East Asians especially the Chinese[9-12].

The antigen frequencies in Indian population have not been documented. This pilot study was aimed at determining the Mi^a antigen positivity in blood donor population attending a tertiary care hospital in north India.

This study was carried out in the department of Transfusion Medicine, Indraprastha Apollo Hospitals, New Delhi, India, between June and August 2014, on apparently healthy blood donors, after being approved by the institutional Ethical Committee. All donors coming to the department for blood donation during the study period were assessed as per the screening criteria laid down by the Drug and Cosmetics Act, 1940[13]. Donors found fit to donate blood after initial screening were informed about the Mi^a antigen testing. The first 1000 donors giving written informed consent to participate in the study were included.

Blood donation was taken as per the departmental protocols. Blood samples (4 ml) collected in tubes containing EDTA (ethylene diamine tetra acetic acid)

were subjected to Mi^a antigen testing using monoclonal anti Mi^a-antiserum (Immucor Inc. Norcross, GA, USA). The tests were performed using "tube technology" by adding two drops of anti-Mi^a antiserum to one drop of 2-4 per cent red cell suspension. The tubes were incubated for 15 min at room temperature and centrifuged. The haemagglutination reaction was read thereafter. Positive and negative controls using known Mi^a antigen positive and negative cells were run along with each batch of tests.

Of the 1000 donors tested, only one was found to be Mi^a antigen positive. The Mi^a positive donor was a 42 yr old Hindu male. The overall frequency of Mi^a antigen in this pilot study was 0.1 per cent.

The Miltenberger is a series of relatively rare phenotypes associated with the MNSs system, related to each other through the overlapping specificities of a number of low frequency alloantigens[1]. As the series became more complex with the incorporation of several new variants, a terminology based on glycophorins (Glycophorin. Vw, Glycophorin. Hop, *etc*.) was suggested by Tippett and co-workers in 1992[3]. This new terminology has been widely accepted and has replaced the original concept of 'Miltenberger subclasses'.

Since, the Mi^a antigen is present on red cells of many Miltenberger phenotypes, the existence of Mi^a antigen as an independent entity was questioned until Chen *et al* in 2001[14] reported the first monoclonal anti-Mi^a, thereby confirming the existence of the Mi^a antigen.

The frequency of Mi^a has been reported to be less than one per 1000 among Caucasians, Negro and Japanese people[3-5], but in South-East Asia, the frequency in Chinese blood donors in Hong Kong was 6.28 per cent[15], 88 per cent in the Ami, mountain people of Taiwan[7] and 9.6 per cent in Malaysian blood donors[16].

Anti-Mi^a is regarded as clinically significant and has been reported in high frequency in the South East Asians[9-12]. It has been reported as the most frequently detected alloantibody in immunized patients in Malaysia[17] as well as in Taiwan[9]. The frequency of Mi^a antigen observed in this pilot study in the Indian population was comparable to that reported in literature for Caucasians and other populations[3-5], however, it was much lower than reported in the Chinese and other South-East Asian populations[7,15,16]. At a frequency of 0.1 per cent, Mi^a can be considered a low frequency antigen and incorporation of regular screening for corresponding antibodies during the pre-transfusion testing may not be necessary. However, considering the expansion in medical tourism in India and an influx of patients from various Asian and African countries, the need for screening for anti-Mi^a needs to be further evaluated. Besides, this being a pilot study of only 1000 subjects, a larger study is required to accurately determine the frequency of Mi^a antigen in the Indian population.

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