

# Uncommon CD markers in acute myeloid leukemia

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## Article Info

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## Abstract

This study was done to assess the unusual CD expression in 100 cases of acute myeloid leukemia from October 2016 to April 2018. The age limit was from 3 to 50 years. Four color flow cytometry was used to diagnose the fresh aspirated bone marrow or peripheral blood sample of acute leukemia. The unusual lymphoid CD expression on myeloblasts was analyzed. Among the cases, 44% were acute myeloid leukemia, 52% of patients were of acute lymphoblastic leukemia and mixed phenotype acute leukemia was 4%. Aberrant CD expression was observed in 58% acute myeloid leukemia patients. Both aberrant CD5 and CD7 lymphoid markers expressed in acute myeloid leukemia patients were 4.2%. Aberrant CD7, CD5, cCD79a and cCD3 were in 45.8%, 33.3%, 8.3%, 8.3% of acute myeloid leukemia patients respectively. In acute myeloid leukemia, the frequency of aberrant CD expression was compared with recent international data.

## Introduction

Blood cancer is 6.5% of all cancer worldwide,<sup>1</sup> but higher in the Western countries than in Asia and African. WHO predicts that the hematological cancer patients would rise about 48% in underdeveloped countries by 2030.<sup>2,4</sup> Acute myeloid and lymphoblastic leukemia are 42.4% of hematological cancer and the frequency of acute myeloid leukemia was 28.3% in Bangladesh.<sup>5</sup> Acute myeloid leukemia is a hematological malignancy with morphologic, immunologic, and molecular features with different surface and cytoplasmic CD antigens expression. The CD markers on white blood cells can be determined by flow cytometry. Flow cytometry improves both closeness and reproducibility of acute leukemia classification.<sup>6</sup> Flow cytometry of acute myeloid leukemia has shown variable antigens expressed on stem cells with infrequent co-expression of lymphoid antigens. Acute myeloid leukemia generally exhibits aberrant antigen expression or co-expression in relation to normal myeloid cells. Detection of aberrant phenotypes by flow cytometry has been applied toward monitoring of residual disease.<sup>7</sup>

Acute leukemia diagnosis depends on the morphology, cytochemistry and immunophenotyping. The study of aberrant CD expression in acute myeloid leukemia was observed in different parts of the world.

## Materials and Methods

### Sample collection

Consecutive 100 acute leukemia patients aged 3 to 50 years were studied. Three milliliter peripheral blood or 5 mL of bone marrow aspirated samples were taken in vials containing ethylenediamine tetraacetate (EDTA).

### Sample processing

Using Sysmex XE-2100, the complete blood count was done and blood film was stained by Leishman's stain to find out the presence of blast cells.<sup>8</sup> After the evaluation of peripheral and bone marrow smear of blast cells, cell lysing and fixing method for immunofluorescence staining, the whole blood or aspirate marrow samples were prepared with different CD markers which were conjugated with fluorochromes (i.e., FITC, PE, ECD and PC5) and with phosphate buffer saline (NaH<sub>2</sub>PO<sub>4</sub>·2H<sub>2</sub>O, Na<sub>2</sub>HPO<sub>4</sub> and NaCl) cell washing was done. The monoclonal antibody was added to the whole blood or aspirated marrow sample, the fluorochrome-labeled antibodies bind specifically to leucocyte surface antigens and/or cytoplasmic antigens. The stained samples were treated with optilyse C lysine solution which lysed the erythrocytes under hypotonic conditions.

The solution containing 15% formaldehyde and 50% diethylene glycol used for cytoplasmic



Table I

## Distribution of acute leukemia

Cases	Number of patients
Age distribution (Years)	
≤ 20	52
>20	48
Acute myeloid leukemia	44
Acute myeloid leukemia with conventional CD expression	20
Acute myeloid leukemia with aberrant CD expression of lymphoid markers	24
cCD79a	2
CD5	8
cCD3	2
CD7	11
CD5 and CD7	1
Acute lymphoblastic leukemia	52
Mixed phenotype acute leukemia	4
Total number of acute leukemia	100

staining of antigens such as MPO, CD79a, CD3, TdT and cCD22. Sodium azide was used in immunofluorescent as a biotinylated primary labeling reagents. Cell fix was used for the fixation of peripheral blood cell suspension after immunofluorescence staining with monoclonal antibodies. Before flow cytometric analysis, a buffered solution containing less than 10% formaldehyde and 1% sodium azide was used. These samples were acquired in the flow cytometry instrument using CXP software.<sup>9</sup>

#### Data analysis

Data were analyzed using software CXP. The fluorescence intensities of the blasts were compared with the negative cell population for different CD marker expressions. The blasts were identified by low side scatter (SSC) and weak CD45 intensity.<sup>10</sup>

### Results

Among this study population, acute myeloid leukemia was 44%, acute lymphoblastic leukemia was 52% and mixed phenotype acute leukemia 4% (Table I). Among the acute leukemia patients, 24% cases show aberrant expressions of CD antigens and which was 54.5% of the total acute myeloid leukemia patients.

Among the 44 acute myeloid leukemia patients, 20 case having conventional CD antigen expressions of lineage-specific markers and it was 20% of the total acute leukemia patients and 45.5% of acute myeloid

leukemia which were not lineage specific markers.

cCD79a showed aberrancy in 2 out of 24 aberrant acute myeloid leukemia patients which were 8.3% of total aberrant acute myeloid leukemia. CD5 showed aberrancy in 8 acute myeloid leukemia which was 33.3% of the total aberrant acute myeloid leukemia. cCD3 showed aberrancy on 2 acute myeloid leukemia which was 8.3% of the total aberrant acute myeloid leukemia.

CD7 showed aberrancy in 11 acute myeloid leukemia which were 45.8% of the total aberrant. Aberrancy CD5 and CD7 showed 4.2% of total aberrant acute myeloid leukemia.

### Discussion

The uncommon lymphoid antigens expression in acute myeloid leukemia were analyzed. In this study, acute myeloid leukemia aberrant cases were more than conventional ones. The mean age was higher in non-lineage specific cases than that of the conventional one.

Acute lymphoblastic leukemia cases were slightly higher than acute myeloid leukemia probably majority patients were younger than 20 years. Among aberrant cases CD7 and CD5 were predominant.

In this study, lymphoid antigens expression in acute myeloid leukemia was 54.5%. Venditti et al. (1998) reported the frequency of lymphoid markers in acute myeloid leukemia were 41% which was lower than this study.<sup>8</sup> Weir and Borowitz (2001) observed the frequency of aberrant lymphoid CD expression in acute myeloid leukemia was 13 to 60% which is close to this study.<sup>9</sup> Sarma et al. (2015) also stated that aberrant lymphoid CD expression found in 58.3% of cases of acute myeloid leukemia.<sup>10</sup> Reading et al. (1993)<sup>11</sup> and Abdulateef et al. (2014)<sup>12</sup> reported that a higher incidence of lymphoid markers expression in acute myeloid leukemia was 54.0% and 67.5%, respectively, which was similar to this study.

The aberrant lymphoid CD7 is the most frequently expressed in acute myeloid leukemia was 45.8% in our study. Macedo et al. (1995)<sup>13</sup> reported CD7 expression on acute myeloid leukemia was 37.5%; Juluis et al. (2005)<sup>14</sup> reported 32.6% and Orgata et al. (2001)<sup>15</sup> stated 30.9% CD7 expression on acute myeloid leukemia. Weir and Borowitz (2001)<sup>9</sup> and Auewarakul et al. (2003)<sup>16</sup> stated that the T-cell associated antigen CD7 was seen in 27%.

In this study, T cell-associated aberrant CD5 expression in acute myeloid leukemia was 33.3%.

Khurram et al. (2010)<sup>17</sup> stated the frequency of aberrant expression of CD5 on acute myeloid leukemia in between 20% to 40% of cases of acute

myeloid leukemia, which is similar to this study. Launder et al. (1996)<sup>18</sup> reported the expression of aberrant CD5 on acute myeloid leukemia was 25%, which was lower than this study.

Variation in study result may be due to different sample size, single or multicenter, different genetic and environmental factors.

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## Conclusion

Aberrant CD is present in the majority of acute myeloid leukemia patients admitted into the Bangabandhu Sheikh Mujib Medical University Hospital.

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