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CYTOGENETIC FEATURES AND PROGNOSIS OF IAMP21 ACUTE LYMPHOBLASTIC LEUKEMIA

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INTRODUCTION

Patients with intrachromosomal amplification of chromosome 21 (iAMP21) are a cytogenetic subgroup of childhood B-cell acute lymphoblastic leukemia (B-ALL).

AIM

To investigate the cytogenetic features and prognosis of children with iAMP21 B-ALL.

METHOD

- Retrospective analysis of data from 12 children diagnosed with B-ALL and iAMP21.
- Screened patients ranged in age from 1 month to 18 years.
- All patients were diagnosed with B-ALL using standard morphological and immunophenotypic criteria.
- Patients in this study were classified as iAMP21 using the criteria of 5 or more *RUNX1* signals per cell and by a ratio of *RUNX1* to tel 21q signals exceeding 1.

RESULTS

In this study, 12 patients demonstrated 5 or more *RUNX1* signals per interphase nucleus. Compared to *RUNX1*, all cases showed fewer subtelomeric signals in interphase cells, ranging from 1 to 5. The accurate interphase distinction of iAMP21 was made by calculating the ratio of *RUNX1* to subtelomeric signals; the minimum and maximum values were 1.67 and more than 10, respectively. Metaphase FISH data were recorded if available. Of the cases, 4 of 12 demonstrated 3 or more extra copies of *RUNX1* on a single abnormal chromosome 21 with the morphology of mar,r(21)c and add(21)c. Using MLPA, 3 of 12 cases showed gene deletion, including IKZF1, *CDKN2A/B*, *ETV6*, *BTG1*, and *RB1*. All cases received chemotherapy according to CCCG-ALL-2020; 10 achieved remission, and MRD remained negative; 2 did not achieve remission, and MRD was >0.01%.

Table 1. Summary of Cases of B-ALL With iAMP21

Case No.	Age, y/ Sex	WBC Count, $\times 10^9$/L	*RUNX1 copies*/ cell	tel 21q copies/ cell	*RUNX1*/tel 21q ratio	*RUNX1 copies*/ iAMP21 chromosome	MLPA	Remission
1	8/F	1.3	>10	1	>10	>10/mar3	N	Yes
2	8/M	2	5	1	5	NP	N	Yes
3	7.4/M	5	8	4	2	NP	N	Yes
4	8.6/M	5.2	5～12	3～5	2.04	>5/r	N	Yes
5	7/M	12	5～8	1	6.5	NP	N	Yes
6	5.7/F	10	6～8	2	3.5	NP	*IKZF1* detetion	Yes
7	10.5/F	300	7～10	3～5	2.17	4～5/add(21)(q22)	N	Yes
8	4/M	60	5	1	5	NP	N	Yes
9	7/F	1.2	5	3	1.67	NP	*CDKN2A/B, ETV6, BTG1, RB1* detetion	Yes
10	6/M	12	5	3	1.67	4/add(21)(q22)	N	Yes
11	11/F	3	5～7	3～4	1.71	NP	*RB1, ERG* detetion	No
12	8/F	4.6	>10	5	>2.4	NP	N	No

N, normal; NP, not performed.

CONCLUSIONS

iAMP21 is a primary cytogenetic abnormality located in the same region of amplification as the *RUNX1* gene and a common region of deletion at the telomere. Some patients display other genetic abnormalities in addition to iAMP21. iAMP21 is associated with inferior outcomes, and patients with this abnormality require more intensive therapy.

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