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Production and Characterization of Monoclonal Antibodies Against the Human Leukemic Cell Line K562 *

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A. Introduction

The cell line K562 was originally established from a patient with chronic myeloid leukemia (CML) in terminal blast crisis [1]. The cells have the potential of self-renewal and pluripotency to differentiate into progenitors of different blood cells [2]. The aim of the present paper was to produce monoclonal antibodies which might be useful as indicators for the earliest differentiation stages of hematopoiesis and for leukemias transformed at this stage.

B. Reactivity of Monoclonal Anti-K562 Antibodies with Different Cell Lines and Normal Blood Cells

Monoclonal antibodies were produced according to the method of Köhler and Milstein [3] by immunization of BALB/c mice with K562 cells and fusing the spleen cells with X63-Ag.8.653 myeloma line. The first screening by radioimmunobinding assay resulted in 24/90 hybridomas positive for K562 cells. Three antibodies were selected which showed a restricted reactivity pattern when tested against different cell lines and normal blood cells (Table 1).

Antibody Y which was specific for K562 cells reacted with 30%–50%, antibody H with 40%–45%, and antibody C with 60% –64% of the K562 cells. Cloning experiments with K562 cells showed that stable cell clones can be established which express low or high concentrations of the antigen detected by antibody Y.

C. Reactivity of Monoclonal Anti-K562 Antibodies with Human Leukemic Cells of Different Origin

The antibodies Y, H, and C were also tested for reactivity with different human leukemic cells (Table 2). According to the tests summarized in Table 2, antibody Y showed a selective reactivity to myeloid leukemias. This reactivity was especially pronounced in myeloid blast crisis of CML, but not in the chronic phase or lymphoid blast crisis.

D. Future Directions

Further experiments are necessary to clarify whether the antigen detected by antibody Y is a leukemia-associated antigen or a differentiation antigen present on a low percentage of bone marrow stem cells. A comparison with anti-K562 monoclonal antibodies produced by other groups [4, 5] must also be performed to show which antibodies detect identical molecular entities. The practical relevance of the antibodies needs to be proven.

E. Summary

Of the anti-K562 monoclonal antibodies produced in our group:

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Table 1. Reactivity of three monoclonal anti-K562 antibodies against several cell lines and normal cells of human origin by radioimmunoassay or fixed-cell immunofluorescence

Cells	ZIK-C1-A/D9 (Y)	ZIK-Cl-A/H5 (H)	ZIK-C1-A/C5 (C)
K562	+	+	+ + +
HMy2, NC 37	–	–	+ +, + + +
Reh, SKW-3	–	+, (+)	+ +, + + +
HL-60, Molt-4	–	–, (+)	–, (+)
Mononuclear blood and bone marrow cells	–	+	+ +
Granulocytes	–	+ +	(+)
Erythrocytes	–	–	–

Table 2. Reactivity of three monoclonal anti-K562 antibodies against human leukemic cells

Diagnosis	ZIK-C1-A/D9 (Y)	ZIK-C1-A/H5 (H)	ZIK-C1-A/C5 (C)
T-ALL, T-CLL	0/12[a]	(4)/7	10/11
AUL	(1)/18	(10)/15	(7)/15
0-ALL	0/3	0/1	0/1
B-ALL, B-CLL	0/5	(4)/5	(2)/5
ANLL (mainly AML)	8+(4)/15	7+ (3)/11	7+(1)/9
CML	6+(5)/20	6+(11)/19	3+(4)/15

[a] Number of positive cases divided by total cases tested, weakly positive cases in parentheses

ZIK-C1-A/D9 (Y) reacted exclusively with K562 cells and most AML and CML cells in myeloid blast crisis.
ZIK-C1-B/H5 (H) reacted with K562, AML, and CML cells, and with normal granulocytes and some mononuclear cells.
ZIK-C1-A/F5 (C) reacted with K562 cells and cells of the lymphatic lineage.

References

1. Lozzio CB, Lozzio BB (1975) Blood 45:321
2. Lozzio BB, Lozzio CB, Ichiki AT, Kalmaz GD, Bamberger EG. In: Killmann S-A, Cronkite EP, Müller-Berat CN (eds) Haemopoietic stem cells. Munksgaard, Copenhagen, p 323
3. Köhler G, Milstein C (1975) Nature 256:495
4. Schienle HW, Müller-Ruchholtz W (1981) J Cancer Res Clin Oncol 101:109
5. Young NS, Hwang-Chen SP (1981) Proc Natl Acad Sci USA 78:7073