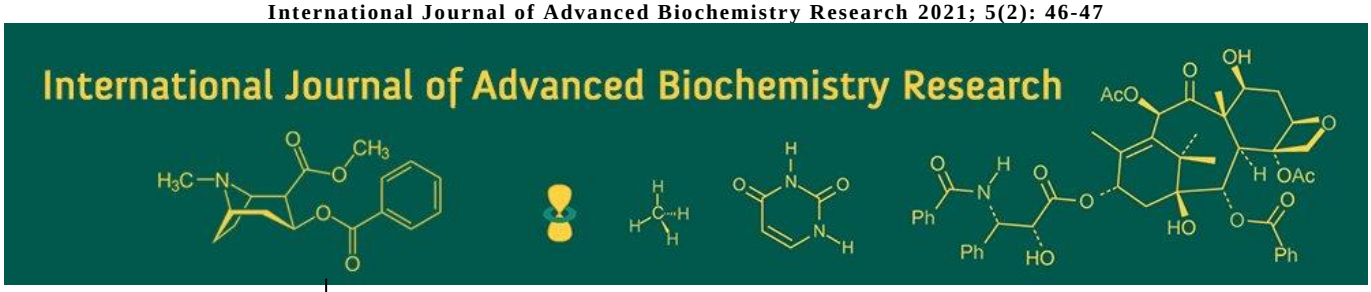

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Biomarkers in leukemia

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Abstract
Cancer, particularly leukemia is one of the major causes of death amongst cancer patients. So, solving the mystery behind underlying causes and abnormalities that lead to the leukemia has become a challenge for the researchers. Again in each type of the leukemia, which kind of the biological marker is associated is a puzzle. Biological markers and tumour markers are measurable biochemicals that are associated with a malignancy. A wide range of these biological markers known as cluster differentiation (CD markers) markers have been found to be associated with leukemia. These include the Cd2, CD5, Cd7, CD10, CD20, CD33, CD34, etc. The expression of all these CDs has been associated in different types of leukemia. So, studying the level of expression of these different CDs can be a major breakthrough in the treatment strategies of leukemia.

Keywords: Leukemia, cancer patients, puzzle

Introduction
Leukemia is a heterogeneous disease, characterized by the deregulated proliferation of blood precursor cells of myeloid or lymphoid origin. Cancer involving the blood forming cells acute leukemia is the most common malignancy in children. It is due to a clonal proliferation of hematopoietic cells (usually white blood cells). In leukemia, abnormal immature white cells increase greatly and invade other tissues and organs. These white cells are not able to function at their normal task of fighting disease which makes the leukemic child vulnerable to infection or haemorrhage (Mohr A *et al*. 2004) [1].

A safety biomarker is a treatment-emergent finding that substitutes for or translates into a clinically relevant adverse outcome. Environmental studies and toxicology defined a biomarker as any cellular or molecular indicator of toxic exposure, adverse health outcome or susceptibility. That definition paved the way for a further delineation of biomarkers into three categories-biomarkers of exposure, effect and susceptibility; these categories are often cited for their potential utility in environmental, occupational or other related toxicological applications.

Currently, the most important application of biomarkers is in drug discovery and development. The role of biomarkers in various therapeutic areas particularly cancer, cardiovascular disease and disorders of the central nervous system, is described. Biomarkers are useful not only for diagnosis of some of these diseases but also for understanding the pathomechanism as well as a basis for the development of therapeutics.

Mature functional B- and T- lymphocytes express a number of characteristics cell surface proteins including receptors for antigens. Thus, they can be distinguished on the basis of these surface proteins, which are often referred to as CD for cluster of differentiation, followed by unique identifying numbers, A specific antibody can be raised against each of these CD cell-surface markers; therefore they are called CD antigens (Anne L *et al*. 2003) [2].

This system of nomenclature was originally developed for membrane proteins or protein complexes that could be identified by their physical properties, such as molecular weight, or their interaction with specific antibodies. Glycosylated CD molecules act as binding sites for lectins, histamine, and receptors for insulin and growth hormones.

An individual CD usually consists of a single or dimeric polypeptide chain and may be glycosylated; accordingly, the molecular weight of different CDs varies for example, 24 kDa for CD9 and kDa for CD22 [3].

Myeloid markers: CD 13, CD 14, CD 15, CD 33,

Lymphoid markers: CD 2, CD 3, CD 4, CD 5, CD 7, CD 8, CD 10, CD 19, CD 20, CD 22, CD 23, Cd 79a
Non lineage markers: CD34, CD45

Flow cytometry
Flow cytometry can rapidly and quantitatively analyze the characteristics and responses of individual cells and is easily automatable. Therefore, as a well-established and routine method, it is suited for the analysis of individual patient material in order to arrive at optimized personalized antitumor drug therapies in the clinical setting or to aid the identification of novel compounds and combination treatment by high-throughput screening methods Howard (Fingert *et al*. 2006) [5].

Confocal reflectance microscopy
Confocal reflectance microscopy is a new technology that can provide detailed images of tissue architecture and cellular morphology of living tissue in near real time. In concept, *in vivo* confocal imaging resembles histological tissue evaluation, except that three-dimensional subcellular resolution is achieved noninvasively and without stains. In epithelial structure, resolution of 1 µm has been achieved with a 200-400-µm filed of view and a penetration depth of up to 500 µm recently, flexible reflectance confocal micro endoscopes have been described that can obtain high-resolution confocal images of tissue *in vivo* in near real time. Use of this instrument provides the potential to image oral epithelial tissues with subcellular resolution in a clinical setting (Martyn TS *et al*. 2005) [5].

Types of Leukemia

1. **Acute Myelogenous (granulocytic) Leukemia (AML):** Acute myelogenous leukemia (AML) - also known as acute Nonlymphocytic leukemia (ANLL) - is the most common form of adult leukemia. Most patients are of retirement age (average age at diagnosis = 65 years), and more men are affected than women.

Expression of CDs: CD13, CD14, CD15

2. **Chronic Myelogenous (granulocytic) Leukemia (CML):** Chronic Myelogenous Leukemia (CML) is known as a myeloproliferative disorder- that is, it is a disease in which bone marrow cells proliferate (multiply) outside of the bone marrow tissue.

Expression of CDs; CD 33

3. **Acute Lymphocytic (Lymphoblastic) Leukemia ALL:** Acute Lymphocytic Leukemia (ALL)-also known as acute lymphoblastic leukemia–is a malignant disease caused by the abnormal growth and development of early nongranular white blood cells, or lymphocytes. The leukemia originates in the blast cells of the bone marrow (B-cells), thymus (T-cells), and lymph nodes.

Expression of CDs: CD2, CD3, CD4, CD7, CD8, CD10, CD22, CD23, Cd79a

4. **Chronic Lymphocytic Leukemia (CLL):** Chronic Lymphocytic Leukemia is the most common leukemia in North America and in Europe. It is disease of older adults and is very rare among people who are younger than 50 years of age. Men with CLL outnumber women by a 2-to-1 average.

Expression of CDs: CD5, CD19, CD20

This is very much an evolving field. Isolation of CD markers is continuing and new once are being found monthly. As a result, marker panels will change, and more specific information will be available. As a general rule, it can be said that Cells that are positive for CD2, 3, 4, 5, 8, 45RA and/or 45RO are T lymphocytes.
Cells that are positive for CD10, 19, 20, 21, 23, 35, 40, and sometimes 77 are B lymphocytes (CD5 can also be found on specific subset of B lymphocytes).
CD 28 can be positive with T or B cells and NK (natural killer) cells, which are another lymphocyte subset.
CD 34 is one of the most important markers for it is seen in the hematopoietic pluripotential stem cell (PSC) which is the cell that is "wanted" in bone marrow or peripheral blood stem cell transplants.
CD 38 is a receptor that is found in plasma cell, some thymocytes (early lymphocytes still in the thymus), NK cells, and in very early B cells. Increased presence of CD 38 has been found in cells in multiple myeloma, and certain acute lymphoblastic and Myeloblastic leukemia. CD38 is also thought to be of predictive value in determining the clinical course that will CLL will take (David M. Thomas, 2004) [4].

Conclusion
As leukemia is one of the most death causing disease amongst all types of cancer. A number of diagnostic methods are available to diagnose different types and severity of cancer. Biomarkers are the most acceptable diagnostic aid used in cancer. There are different CD markers are identified for different condition in cancer. It is very difficult to identify particular CDs that are used for particular type of Leukemia. The above study shows some CDs are used in a different type of Leukemia.

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