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CASE REPORT

The Importance of Flow Cytometry in Medical Diagnosis

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SUMMARY

Background: **Flow cytometry is a new technology with a wide range of application in modern medical examination. It mainly counts and sorts the tiny particles suspended in the fluid, so as to quickly analyze the results quantitatively and qualitatively. This is not only of great significance for scientific research, but also has a great impact on clinical examination.**
Methods: **The importance of flow cytometry detection is analyzed through two typical cases, providing important diagnostic basis for clinicians.**
Results: **Flow cytometry was used to screen out the typical characteristic images and data of the above two cases, and the data and results supported the clinician to diagnose the cause of the disease.**
Conclusions: **Two cases proved the importance of flow cytometry in modern clinical examination. Flow cytometry can be applied in clinical examination. Its development and application provide important diagnostic reference evidence for clinical medicine and have gradually become one of the emerging technologies to promote the rapid development of medicine.**
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flow cytometry, HIV/AIDS, ankylosing spondylitis

INTRODUCTION

Flow cytometry is a new technology emerging in clinical medicine in recent years, which combines multiple disciplines and is a comprehensive technology, including cell biology, physics technology, laser technology, etc. Especially with the rapid development of medical technology, the frequency and scope of its use have been improved. Flow cytometry is mainly a technology that allows cells to flow rapidly. In this case, cells or biological particles in cells are analyzed and sorted [1-3]. At present, it has been applied in genetics, oncology, and biological cytology, especially in medical examination. Here are two examples to illustrate the importance of flow cytometry in medical diagnosis.

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Table 1. Patient clinical test results.

Project	Results	Normal Result Range
Leukocytes (x 10^9/L)	6.60	3.50 - 9.50
Red blood cells (x 10^{12}/L)	5.80	4.30 - 5.80
Hemoglobin (g/L)	163.00	130.00 - 175.00
Platelet (x 10^9/L)	211.00	125.00 - 350.00
Total T lymphocytes (%)	90.08↑	58.40 - 81.56
CD4 lymphocyte (%)	6.97↓	24.93 - 45.57
CD8 lymphocyte (%)	82.15↑	16.40 - 33.76
HIV antibody test	doubt?	negative

Doubt? - means not confirmed by local CDC.

CASE PRESENTATION

Case 1

The main report of a 38-year-old female: chest and back pain for more than half a year, obvious in the morning, improved after exercise, no pain at night, healthy in the past, no chronic history, no drug allergy history. The attending doctor then conducted a routine blood test on the patient. The results showed that the patient's dynamic erythrocyte precipitation rate (ESR) and antinuclear antibody (ANA) were normal, while human leukocyte antigen B27 (HLA-B27) was positive (Flow cytometry analysis of HLA-B27 is shown in Figure 1A). The clinician then performed imaging examinations, and MRI revealed inflammatory changes and a little fluid accumulation on both sides of the sacroiliac joint, which was considered to be ankylosing spondylitis.

Case 2

A 43-year-old male patient developed fever 14 days ago due to a cold. His body temperature was 39℃ with chills. He had no malignant vomiting, dizziness, headache, frequent urination, urgent urination, and pain. The attending doctor then completed the relevant examination, as shown in Table 1 below. Flow cytometry showed that the ratio of CD4 lymphocytes to CD8 lymphocytes in the patient's lymphocyte subsets was inverted, and at the same time, the patient's clinical test results were suspected to be positive for HIV antibody tests, but it had not been confirmed by the local Centers for Disease Control and Prevention. The flow diagram of lymphocyte subsets is shown in Figure 1B.

DISCUSSION

In clinical practice, the essence of flow cytometry is to provide a convenient method for the detection of cell subsets for clinical medical examination [4]. The main operation process is to use fluorescent antigen and antibody detection technology on the surface of the lymphocyte membrane to detect and analyze the antigen and each subgroup and calculate the percentage of each subgroup of lymphocytes, so as to evaluate the immune situation of human cells. From the above two cases, we can see that we have assisted in the diagnosis of HIV and coercive spondylitis by flow cytometry. The fluorescence intensity of antigen and antibody can be more directly seen through a flow analysis diagram, and the image interpretation and analysis of diseases can be more directly provided. Since the association of human leukocyte antigen B27 (HLA-B27) with spondyloarthropathy is well known, and the strong association between HLA-B27 and ankylosing spondylitis (AS) in HLA-related diseases is used to diagnose this disease, AS can be identified by using flow cytometry to determine the intensity of HLA-B27 antigen expression. The important step of this technique is to perform double immunostaining against HLA-B27 in whole blood samples and analysis by flow cytometry, which is a rapid method to detect HLA-B27 antigen. Similarly, the epidemic cell analyzer performs an immunological assessment of HIV patients by monitoring the ratio of leukocyte antigens CD4 and CD8 to confirm the immune cell status of the body [5] and can also provide valuable information about the response to antiviral therapy and disease progression for subsequent treatment.

At the same time, flow cytometry has been applied more and more widely in the immune typing of leukemia. Most normal blood cells have cell membranes or cytonuclear antigens in the process of differentiation, development, and maturation of functional cells from stem cells. The changes are mainly closely related to the various stages of differentiation and development of blood cells, and there is a significant correlation specificity with the degree of differentiation of cell series [3]. It is for this reason that the identification and classification of these blood cells is mainly based on the expression of antigens. Secondly, flow cytometry is used to detect specific antigen molecules on the cells, which is called phenotypic analysis of flow cell immunity. Flow immunophenotyping is a fast and simple method for cell type analysis.

All in all, the antigen of single cells can be identified by immunofluorescence staining or polychromatic immunofluorescence cell staining. The identification time of cells is relatively short, and it has gradually become a relatively advanced cytological examination technology used in medical examination with a wide range of applications.

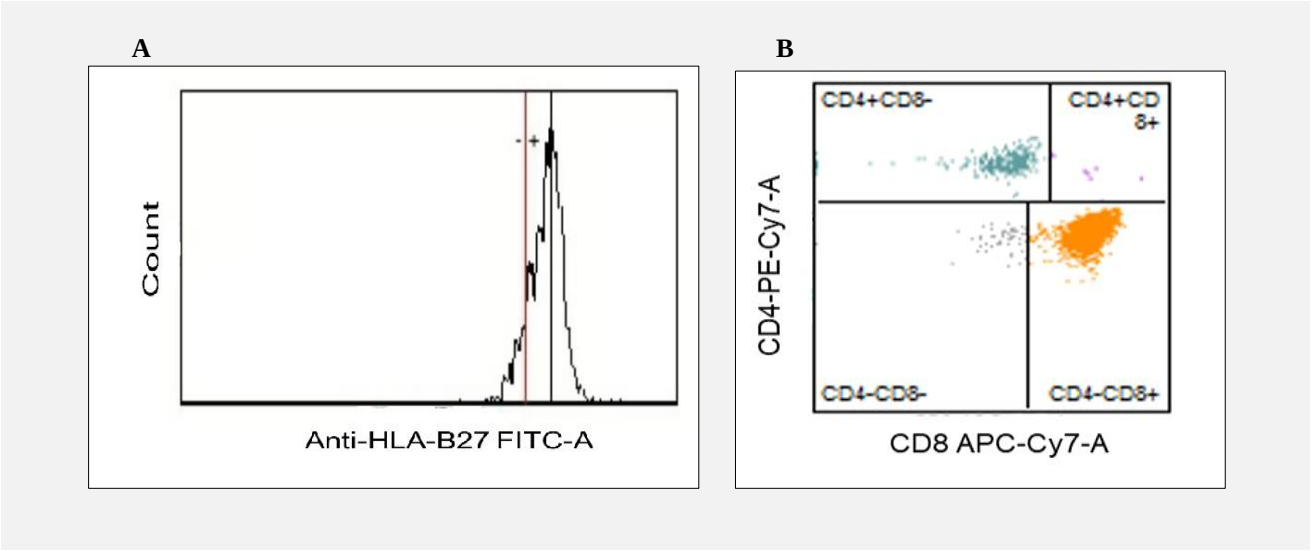

Figure 1. Flow cytometry analysis chart.

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Declaration of Interest:
All authors declare that they have no competing interests.

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