



Immunological System Cellular: CD8 Lymphocytes in Children and Adolescents with Cancer in Cochabamba, Bolivia

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Submission: ☒ July 05, 2017; Published: ☒ August 11, 2017

Summary

Introduction: The immune system, a good part of the body's defense against cancer is driven directly by the cells and between these the CD8 lymphocytes.

Objective: The objective of this study was to determine the CD8 lymphocytes (cellular immunity) in children and adolescents with cancer who regularly attend to the Manuel Ascencio Villarroel Children's Hospital in Cochabamba region (Bolivia) and to relate the results with the type of cancer and the treatment to which they are being subjected.

Patients and methods: A cross-sectional study was carried out in January and February 2016 in children and adolescents who regularly attended to the Manuel Ascencio Villarroel Children's Hospital, in a focal sample between 2 and 16 years of age (n=23) of Cochabamba region, Bolivia. The parents and/or guardians of the participants were surveyed and a blood sample was taken to determine CD8 lymphocytes by the immune fluorescence method. A descriptive analysis was performed.

Result: In types of cancers that affect these children and adolescents, 78.26 have lymphoblastic leukemia (acute B cells), 8.69% have histiocytosis, 4.34 have uterine adenocarcinoma, 4.34% myeloid leukemia, 4.34% rhabdomyosarcoma. The patients that are undergoing chemotherapy; 65.21% maintenance, 21.74% consolidation, 8.69% are in surveillance, 4.34% do not respond to treatment.

Cellular immunity, with the determination of CD8 lymphocytes per ml resulted: Patient 1=42, patient 2=33, patient 3=0, patient 4=10, patient 5=25, patient 6=7, patient 7=16, patient 8=28, patient 9=63, patient 10=69, patient 11=66, patient 12=16, patient 13=108, patient 14=14, patient 15=18, patient 16=126, patient 17=17, patient 18=163, patient 19=47, patient 20=0, patient 21=7, patient 22=123, patient 23=279. Concerning to the type of cancer and its treatment with chemotherapy, there is no appreciable difference in the proportion of the decreased of CD8 lymphocytes.

Conclusion: Considering that normal values of CD8 cells are between 600 and 800 cells/ml of blood, this study found: that in all children or adolescents with cancer who are or were receiving chemotherapy, the cellular immune system is weakened. That in children or adolescents who are under monitoring, values tend to increase slightly, but without reaching normal values. That in some children and adolescents with cancer who are in consolidation therapy, CD8 lymphocytes are absent.

Keywords: Children; Adolescents; Bolivia; Cancer; CD8 lymphocytes; Chemotherapy

Abbreviations: LL: Lymphoblastic Leukemia; ML: Myeloid Leukemia; IS: Immunological Surveillance

Introduction

A considerable advance has been made in knowledge of cancer and some of the etiological factors that predispose it and that cause alterations inside the cells, which frequently lead to abnormal cell proliferation [1]. To eliminate these aberrations, the immune system has several mechanisms which allow him to recognize and eliminate transformed cells [2]. The role of the immune system in tumor control was first proposed by Thomas and Burnet in 1957, with the theory of "immunological surveillance", this theory postulates that, within an organism, malignant cells are continuously being generated, but these are identified fast and destroyed by the immune system. Immunological surveillance has been proven in

several experimental models, exemplified by successful growth of xenotransplants (including human tumors) in nude mice (nu/nu) and by the increase in the appearance of tumors in thymectomized animals and in humans presenting immune suppression [3]. A good part of the body's defense against cancer is carried out directly by the cells, rather than by the antibodies circulating in the blood. For example, the presence of tumor antigens on cancer cells can activate certain white blood cells (lymphocytes and in a lesser degree, monocytes), which carry out immunological surveillance by looking for cancerous cells and destroying them [4]. And especially CD8 T lymphocytes, which act as cytotoxic cells, which directly kill

malignant tumor cells [5]. Those in humans are in normal values between 600 and 800 cells (CD8)/ml of blood [6].

Currently children and adolescents with cancer in many countries are being treated with chemotherapy, it being a treatment with cancer drugs (cytotoxic) that works by killing cancer cells, stopping their spread or slowing their growth. However, it can also damage healthy cells, which causes side effects [7]. According to Martinez-Cayuelas E et al. [8], cytostatics, including methotrexate, cytarabine, asparagines and vincristine, were used to treat cancer in children with leukemia, cause adverse effects such as neuropathy, altered level of consciousness, headache-myopathy, seizures, depressive disorder-ataxia, altered perception of distance from objects, pain, weakness of lower limbs and mandibular pain. According to M Rodriguez et al. [9], cytostatics such as vincristine, Cyclophosphamide, Doxorubicin, Daunorubicin, Asparaginase, Cytarabine, Purinetol (Mercaptopurine), Methotrexate and Thioguanine cause adverse reactions, between the most common candidiasis, mucositis, herpetic lesions and hemorrhagic syndrome. And also, Tania Vilá Gómez [10], in her research called Adverse Reactions (RA) of the main cytostatics used in the treatment of leukemia (All) in children, for which she reviewed several articles, concluding that the cytostatics used are very broad; that the most involved were mainly asparagines, vincristine and methotrexate; that the system most affected independently of the active principle was the gastrointestinal system followed by the immune and neurological system; that the RA of these main cytostats with more incidence were mucositis, nausea and vomiting; finally, that the adverse reactions cause both physical and psychic abnormalities in the child with All when treated with cytostatics.

In the Plurinational State of Bolivia, according to data from the National Cancer Registry of the Ministry of Health, in 2011 there were 192 cases of children with cancer, in 2012 an increase was observed in 223 cases and by 2013 is perceived a slight increase to 327 infants under treatment, which represents a 12 percent annual growth [11]. Also, this entity mentions that the most common cases of childhood cancer are: Leukemia in 46%, lymphomas 11%, retinoblastoma 10%, Rhabdomyosarcoma 6%, cancer of the central nervous system 8.4% and other varieties 15%. According to the statistics department of the Manuel AscencioVillarroel children's Hospital of Cochabamba (Bolivia), in 2015, 1014 children and adolescents (2 months to 15 years of age) with different kind of cancers, of which they had: 785 acute lymphoblastic leukemia, 41 unspecified Hodgkin's disease, 27 malignant neoplasm of kidney (except renal pelvis) and 161 other cancers. According to these data, cancer in children and adolescents increased very considerably in Cochabamba city.

In Cochabamba the sample of children and adolescents with cancer (study sample), are also undergoing to chemotherapy and considering that the cellular immune system of these may be affected. The objective of this study was to determine cellular immunity, specifically CD8 lymphocytes in Children and adolescents with cancer who regularly attend to the Manuel AscencioVillarroel Children's Hospital in the Cochabamba region (Bolivia) and relate

the results to the type of cancer and the treatment to which they are being treated.

Therefore, in order to achieve this objective, a background questionnaire was carried out, to the parents or guardians, and blood was extracted from the focal sample of children and adolescents with cancer who usually attend the consultation of the Manuel Ascencio Villarroel Children's Hospital.

Patients and Methods

A cross-sectional study was carried out in January and February 2016 in Cochabamba, Bolivia, focused on a questionnaire that assessed the antecedents of the types of cancer, the type of treatment to which they are being submitted and also extracted 3ml of blood, in which CD8 lymphocytes were determined by immunofluorescence method of 23 children and adolescents with cancer (focal sample) with 2 months to 16 years of age who regularly attend to the Manuel AscencioVillarroel Children's Hospital.

The study was carried out in accordance with the guidelines established by the Helsinki Declaration, the participation was voluntary without economic incentives and informed consent was subrogated and answered by parents or legal guardians, the procedures were approved by the Bioethics Committee of Medicine Faculty of Mayor de San Simón University. The variables collected were recorded confidentially, and a descriptive, analytical and comparative statistical study.

Result

In the types of cancer that affect these children and adolescents, 78.26 have lymphoblastic leukemia, acute B cells, 8.69% have histiocytosis, 4.34 have uterine adenocarcinoma, 4.34% myeloid leukemia, 4.34% rhabdomyosarcoma. Patients undergoing chemotherapy, 65.21% maintenance, 21.74% consolidation 8.69% are under surveillance, 4.34% do not respond to treatment.

Cellular immunity, with the determination of CD8 lymphocytes per ml, resulted

patient 1=42, patients 2=33, patient 3=0, patient 4=10, patient 5=25, patient 6=7, patient 7=16, patient 8 =28, patient 9=63, patient 10=69, patient 11=66, patient 12=16, patient 13=108, patient 14=14, patient 15=18, patient 16=126, patient 17=17, patient 18=163, patient 19=47, patient 20=0, patient 21=7, patient 22=123, patient 23=279.

Regarding the type of cancer and its treatment with chemotherapy, there is no appreciable difference in the proportion of the decrease in CD8 lymphocytes.

Discussion

Although in the Manuel Ascencio Villarroel Children's Hospital in 2015, 1014 children and adolescents with different types of cancer were treated, approximately only 50 patients usually attend their treatments and controls, of which in this cross-sectional study was able to obtain blood sample only of 23 children and adolescents. It would be interesting and more complete to perform another

study with more of these patients in question and also make the determination of killer T cells that also eliminate malignant cells.

Conclusion

Considering that normal values of CD8 cells are between 600 and 800 cells/ml of blood, this study found: that in all children or adolescents with cancer who are or were receiving chemotherapy, the cellular immune system is weakened. That in children or adolescents who are under surveillance, values tend to increase slightly, but without reaching normal values. Those in some children and adolescents with cancer who are in consolidation therapy, CD8 lymphocytes are absent.

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