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Antigen-Specific Lymphocyte Proliferation Assay and Virus Neutralization Test for Measurement of Measles-Specific Immunity in 15-19 Years Old High School Students in Tehran, Iran

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Abstract: Limited information is available concerning the role of measles-specific cell mediated immunity as a correlate of long-term protection from measles infection. Although serological responses are determined in epidemiological studies and high antibody titer is a good indicator of protection, the role of Cell-Mediated Immunity (CMI) has to be defined more clearly. In this study, Lymphocyte Proliferation (LP) and Viral Neutralization Test (VNT) were used in order to measure measles-specific cellular and humoral immune responses of 100 high school students in Tehran. From total number of subjects studied, 33 were girls and 67 were boys and all were in good health. Of these, 77 had protective neutralizing measles antibody titers and 23 did not have such titer. The results of LP showed that 89 subjects had protective cellular immune responses and 11 did not. A quantitative relationship between humoral and cellular immune responses was not observed. These findings suggest that measles-specific protective CMI is measurable for longer time in comparison to humoral immunity. These data suggest that LP responses may be better sustained than antibody titers in some children.

Key words: Measles, lymphocyte proliferation, viral neutralization, high school students

INTRODUCTION

Measles is a highly contagious viral disease that remains the leading vaccine-preventable cause of child mortality worldwide (Moss *et al*., 2004) and is considered as a major health problem world wide with nearly 45 million new cases and one million deaths occurring each year (Nossal, 2000). Frequent incidence of measles disease in Europe, North America and some other countries including Iran has been reported (Khodabandeh Loo, 2003; Ohsaki *et al*., 2000; Papania *et al*., 2000). In the context of increased efforts by World Health Organization (WHO, 2005) and other agencies to achieve a reduction in mortality due to measles there is an on-going need for reliable laboratory assays to assess measles immunity (Cohen *et al*., 2006). In addition, to design better vaccination strategies, it is essential to define the critical immunological mechanisms necessary for effective immunity to measles vaccines (Dhiman *et al*., 2005). The immunological determinants, which lead to permanent immunity against measles virus, have been recently evaluated. Previous studies have shown that acute measles infection leads to a life-long immunity in the host. In contrast, it is now clear that the immunization with attenuated measles vaccine does not induce life-long immunity in every individual (Klinge *et al*., 2000; Tischer and Gerike, 2000). Previous data demonstrated that cellular immunity is necessary for recovering from measles and might be sufficient for long-term immunity, although neutralizing anti-measles antibodies can be protective in high titers (Ohsaki *et al*., 2000).

In this study, however, Lymphocyte Proliferation (LP) and Virus Neutralization Test (VNT) have been used to evaluate the specific immune responses of the subjects to measles virus. The results can be used to evaluate the correlates of long-term immunity against measles virus and to provide a background for extensive epidemiological studies to survey the performance of the measles eradication programs.

MATERIALS AND METHODS

Subjects: One hundred young adults (33 girls and 67 boys) ages 15-19 high school students from Tehran were randomly enrolled in this study. This research was performed with the permission of the Education Department of Tehran and informed consent was obtained at the time of blood collection.

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