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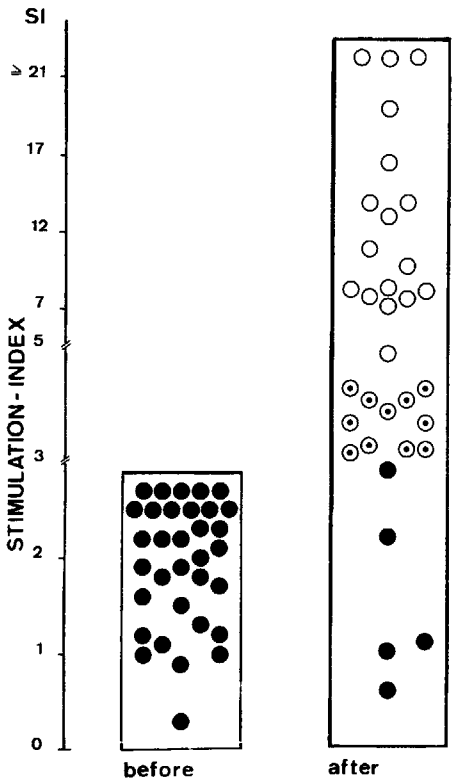
Enhancement of Varicella-Zoster-Specific Immune Responses in the Elderly by Boosting with Varicella Vaccine



Legend. Varicella-zoster virus (VZV)-specific cell-mediated immunity in 33 adult volunteers (age range, 55–65 years) before and two months after inoculation with live VZV vaccine. The subjects, who had previously been screened for a negative proliferative immune response to VZV antigen in an in vitro serum assay, were vaccinated with OKA-strain VZV vaccine (2,700 pfu; SmithKline-RIT, Rixensart, Belgium). Blood sampling was done on the day of vaccination and two months later. Lymphocytes were isolated by Ficoll-Hypaque separation. Cells (5×10^5) were cultivated in the presence of VZV antigen (sonicated VZV-infected MA 184 human foreskin fibroblasts) or control antigen (sonicated uninfected fibroblasts) after five and six days. ^{125}I-iododeoxiuridine (1.25 μCi) and fluorodeoxiuridine ($10^{-6}M$) were added. After 18 hr the cells were harvested on paper disks, and the tracer incorporation was counted in a gamma counter. The geometric mean of three determinations was used for the calculation of the specific increase (cpm of VZV − cpm of control) and the stimulation index (SI; cpm of VZV/cmp of control). Cell-mediated immune responses with a specific increase of 2,500 cpm and an SI of <3 were considered negative (●), those with a specific increase of 2,500–6,000 and an SI of 3–5 were considered weakly positive (⊙), and those with a specific increase >6,000 and an SI of >5 were considered positive (○). Humoral antibodies to VZV were determined by ELISA (Varicella Enzygnost®, Behring, Marburg, West Germany).

Summary

During the evaluation of specific immune responses to VZV in healthy elderly people, we observed an impairment of the lymphocyte transformation by VZV antigen in vitro despite normal values for the cell-mediated immune response to mitogens [1]. Our results were confirmed by Burke et al [2], who also reported reduced skin-test reactivity to VZV antigen in older age groups. Approximately 20% of 55- to 65-year-old healthy people with a confirmed history of chickenpox and humoral antibodies to VZV show a negative lymphoproliferative immune response to VZV antigen. The possibility of a correlation between this observation and the fact that shortly after the appearance of clinical symptoms in herpes-zoster infections the cell-mediated immune response to VZV virus is also negative [3] remains to be established; nevertheless, with a view to the possible prevention of herpes-zoster, we vaccinated 33 volunteers having a reduced lymphoproliferative immune response to VZV with live OKA-strain VZV vaccine. In 28 (85%) of the volunteers the vaccination induced a change from a negative to a positive cell-mediated immune response to VZV antigen in vitro; we do not yet know why no stimulation was observed in the other five (15%), but we hope to be able to present some explanations by testing the function of the suppressor/helper cells and the plasma factors. In all subjects humoral antibodies to VZV were present prior to administration of the booster vaccination. An increase in antibody titer was observed in >50% of our vaccinees, suggesting at least some VZV replication, despite preexisting humoral antibodies. Retesting of a few of our volunteers one year after vaccination showed that the boosting effect remained. The most important question remaining to be answered—whether such an improvement in the lymphoproliferative immune response to VZV does in fact give protection against herpes-zoster infection—can only be answered by the clinical evaluation of a large number of vaccinees over a period of several years.

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References

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