

EM · X GOLD promotes the expression of heat-shock protein 70 (HSP70) in a mammalian cell line, Vero

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Background and Aims: EM · X GOLD is a soft drink produced by Effective Microorganisms (EM) and has, over the years, proved effective as a health supplement. Its physiological functions, however, have little been understood. Recently, in our laboratory EM · X GOLD was shown to give heat resistance to lactic acid bacteria, *Lactobacillus casei*, and also to enterobacteria, *Escherichia coli*. The possible involvement of heat-shock proteins (HSPs) in this phenomenon is being currently pursued. In order to reproduce and extend this observation in mammalian system, we asked whether EM · X GOLD induces HSP70, one of the major HSPs, in a mammalian epithelial cell line, Vero. **Methods:** Vero cells cultured with or without 5% EM · X GOLD were heat-shocked at 45 °C for 17 min. Controls were those cells cultured in the same way but without heat-shock. After 24 hrs, cellular proteins were analyzed by immunoblotting with anti-HSP70 antibody. **Results:** 1) Proteins from Vero cells without heat-shock revealed only a faint band of HSP70. Upon heat-shock, this band showed a marked increase in intensity, a sign of heat-shock response. 2) Cellular HSP70 expression was not affected by EM · X GOLD without heat-shock. When heat-shocked, however, HSP70 expression was significantly increased in cells with EM · X GOLD. **Conclusions:** EM · X GOLD was shown to promote HSP70 production upon heat-shock in mammalian cells. By this means, EM · X GOLD may compensate the heat-shock damage to cells. EM · X GOLD by itself, however, was not able to induce HSP70 under the present experimental condition. The heat resistance observed in bacteria cultured with EM · X GOLD could also be mediated by the enhanced production of heat-shock proteins. Taken together, it is highly probable that EM · X GOLD induces the production of HSP70 and other heat-shock proteins, which may serve to protect cells from a variety of external stresses, leading to the maintenance of healthy states of the organism.