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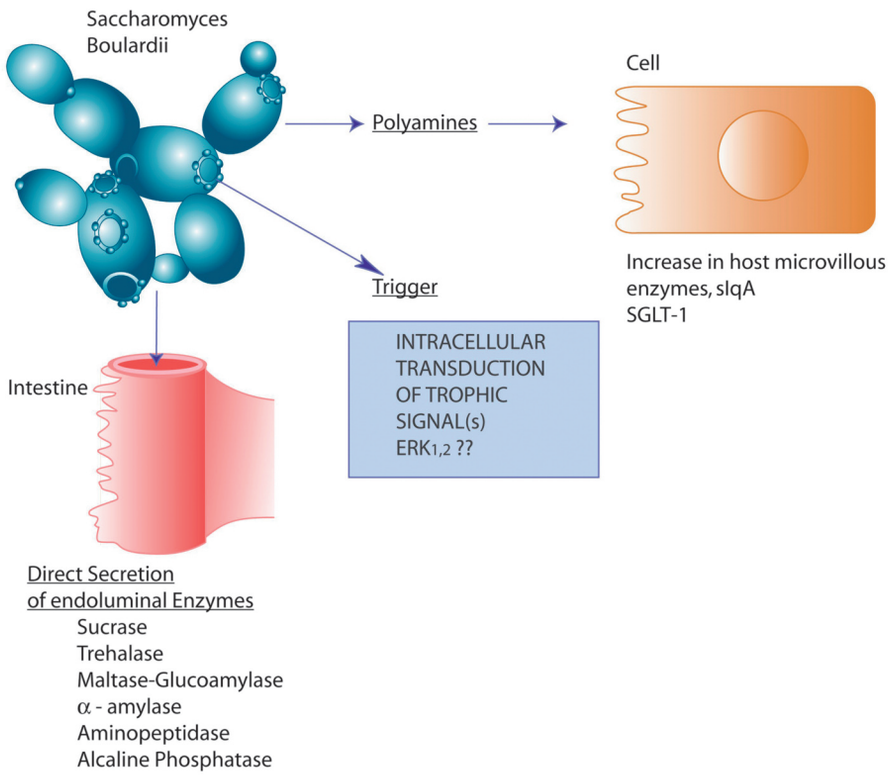

Fig. 1. — The Figure represents the three mechanisms of action of the probiotic *Saccharomyces boulardii*

(+ 24%). In response to 1000 nanomoles of spermine, enzyme stimulation was proportionally greater with increases in sucrase (× 4,6) and maltase (+ 70%) activities. Similarly, weaned rats treated with either *S. boulardii* or equivalent quantities of spermine (500 nanomoles) presented parallel, significant increases in specific sucrase (157%) and maltase (+ 47,5%) activities. Therefore, oral administration of 100 mg lyophilised *S. boulardii* containing 679 nanomoles of polyamines to breast fed sucklings reproduced similar changes in microvillous enzymes than the administration of 500 nanomoles of spermine. Regarding the stimulation of microvillous enzymes, the oral administration of spermine is a dose – dependent phenomenon. It is more sensitive for sucrase than for other microvillous enzymes (lactase, aminopeptidase, maltase-glucoamylase) and becomes detectable at doses of spermine as low as 250 nanomoles/day. After absorption, polyamines act at the level of DNA synthesis, mRNA expression and protein production. Lastly, recent experiments indicate that *S. boulardii* inhibits the signal transduction triggered by *E. coli* on in vitro intestinal cell lines, essentially interleukin 8 ad NF-kB (13).

Up to now, the precise mechanism by which yeast cells triggers signals transduced in epithelial cells remains unknown. However, the ERK_{-1} and ERK_{-2} MAP kinases could be involved because these messengers are activated at the epithelial cell membrane by trophic signals and transduce them into the cell to the nucleus (14, 15). Furthermore, the disacharidase activities are inhibited by specific ERK inhibitors (14). Further studies are warranted to determine the nature of the signal(s) transduced into epithelial cells.

In conclusion : oral administration of lyophilised *S. boulardii* upgrades intestinal functions meanly by three mechanisms : 1) the endoluminal secretion of enzyme proteins by the yeast itself ; 2) the endoluminal secretion of polyamines (spermine and spermidine) that after absorption enhances the synthesis of BBM proteins, enzymes and carriers ; and 3) the possible intracellular activation of messengers which transduce trophic signals from the apical membrane to the nucleus.

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