

Temperature dependency of bidirectional flux in the rat intestine subjected to graded ischemia

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This study examined the effect of temperature and ischemia on permeation of fluorescently-labeled dextran (M.W. = 4 kDa; FD4) across rat intestinal mucosa. Permeability was evaluated ex vivo using an everted gut sac technique in both the mucosal-to-serosal (M→S) and serosal-to-mucosal (S→M) directions. At baseline (B), 30-min of ischemia (I-30) and 60-min of ischemia (I-60), intestinal segments were prepared and incubated at 37°C, 15°C and 4°C (n = 4-7/group) for 30 min. Clearance (nl/min/cm²) was calculated based on the accumulated amount of FD4 at 30 min. Both M→S and S→M fluxes increased with increasing temperature at B,

I-30 and I-60. Ischemic gut (I-30 and I-60) had about a three-fold higher (M→S)/(S→M) flux ratio than that of normal gut (p<0.001). At 4°C, neither M→S nor S→M flux was different between B and I-30, but both M→S and S→M fluxes significantly increased at I-60, suggesting an increase in permeation via a passive mechanism. Increased bidirectional fluxes at 37°C were obtained in the I-30 and I-60 gut sacs when compared to B. We conclude that FD4 is actively transported across the intestinal mucosa in the S→M direction and that ischemic injury increases passive diffusion of the probe across the gut wall.

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