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Letter to the Editor

Survival of Immunoglobulins from Different Species through the Gastrointestinal Tract in Healthy Adult Volunteers: Implications for Human Therapy

Oral administration of immunoglobulin antibodies from different species has proven to be successful for treatment of a variety of gastrointestinal infections (for reviews, see reference 2). To be effective, the antibodies must survive the gastrointestinal environment and reach their target areas with their biological properties intact. Survival of 10 to 20% has been reported previously in trials in which bovine or human antibodies were used to treat newborn infants or patients with diarrhea (1, 3, 5, 6, 8). Both groups, however, have a gastrointestinal passage time much shorter than that in healthy adult individuals, which allows the antibodies to pass through the gastrointestinal tract with less degradation. Neither survival data from studies of healthy adults nor studies assessing different ways of protecting the immunoglobulins from digestion has been published. We therefore studied the survival of bovine immunoglobulin (IgG) and chicken IgY (yolk IgG) in the gastrointestinal tract of four healthy volunteers by using different protocols aimed at prolonging survival.

In separate trials, 0.5, 2.5, or 10 g of bovine IgG (kindly provided by L. Björck, Department of Food Science, Swedish University of Agricultural Science, Uppsala, Sweden) or chicken IgY (kindly provided by H. Hatta, Taiyo Kagaku Co., Yokkaichi, Japan) was given either unprotected or protected by antacid (10 ml of Novaluzid containing MgOH and AlOH; Astra-Hässle, Mölndal, Sweden), omeprazole (Losec, 20 mg, Astra-Hässle), or enterocapsulation (Center for Chemical Reference Substances, The National Cooperation of Swedish Pharmacies) to the volunteers. Stools from each individual were collected each day and were weighed and homogenized thoroughly. The immunoglobulins were extracted from the stool samples as described previously (4), and the concentrations of bovine IgG and chicken IgY were measured by sandwich enzyme-linked immunosorbent assay using either unconjugated and alkaline-phosphatase-labelled sheep anti-bovine IgG (The Binding Site Ltd., Birmingham, England) (diluted 1/500) or rabbit anti-chicken IgG (IMS, Uppsala, Sweden) (diluted 1/500), respectively. As standards, purified bovine IgG or chicken IgY (Jackson ImmunoResearch Laboratories, Inc., West Grove, Pa.) was used.

Contrary to previous results obtained with infants or patients with diarrhea, we detected only minute amounts (<0.01% of the ingested antibodies) of bovine or chicken egg yolk immunoglobulins in the stool samples of healthy adults. A recent study (7) showed that 19% of orally ingested bovine IgG was recovered in the ilea of healthy adult volunteers. Since proteins are absorbed in the small intestine, this might be the last location where immunoglobulins are active in therapeutically relevant concentrations. However, in cases in which the passage time is much shorter than normal, such as with patients with diarrhea, oral immunoglobulins may still be effective in the lower gastrointestinal tract (for references, see reference 2). Finding an efficient way to protect the immunoglobulins from degradation in the gastrointestinal tract would be useful for economic reasons, as it would allow the dose to be lowered, and for cases in which the infection does not affect the passage time of the patient, and it remains a subject that needs further attention.

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