Short Report

Ex Vivo Intra-Arterial Infusion of Microencapsulated Mitomycin C into Dog Kidney

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KATO, T., NEMOTO, R. and NISHIMOTO, T. Ex Vivo Intra-Arterial Infusion of Microencapsulated Mitomycin C into Dog Kidney. Tohoku J. exp. Med., 1979, 127 (1), 99-100 — Microencapsulated Mitomycin C with ethylcellulose was infused into isolated dog kidneys through the renal artery. The capsules were lodged mainly at cortico-medullary junction, where the drug was released from the capsules. Vascularity of kidney was reduced moderately. ——— microencapsulated Mitomycin C; renal artery; isolated dog kidney; vascularity

Encasement of anticancer drugs in a microscopic size capsule, namely a microcapsule, may provide a prolonged release of the internal drugs (Luzzi 1970). Furthermore, if microencapsulated anticancer drugs were infused into supplying arteries of cancerous lesions, an intensive topical chemotherapy would be facilitated. Herein is reported an ex vivo intra-arterial infusion of microencapsulated Mitomycin C (MMC-m.c.) into dog kidney.

MATERIALS AND METHODS

Details of preparation and in vitro properties of MMC-m.c. will be reported elsewhere (Kato et al. 1978); in brief, Mitomycin C (80%, W/W) was microencapsulated with ethylcellulose (20%, W/W) based on the principles of coacervation (Kondo 1970) with certain modification. Particle size of MMC-m.c. used in this experiment was $429.3 \pm 81.9$ (mean $\pm$ S.D.) $\mu$m. The renal artery of isolated dog kidneys was intubated with a polyethylene catheter (1.2 mm in an internal diameter). Following preliminary irrigation with saline, 12.5 mg of MMC-m.c. suspended in 40 ml of 0.3% methylcellulose solution were infused into the left artery and 10 mg of nonencapsulated Mitomycin C (MMC) dissolved in the same solution into the right artery through the catheter. In 3 cases, the kidneys were photographed with a Softex CSM following intra-arterial injection of 10% barium sulfate. In the other 3 cases, serial slices of the kidneys fixed in formalin for 48 hr were examined macroscopically.

RESULTS AND DISCUSSION

MMC-m.c. formed an indented, irregular particle with a rough surface (Fig. 1). The infused MMC-m.c. was detected mainly at the junction of interlobular artery and arterial arch (Fig. 2). Multiple violet spots, which indicated dissolution of high concentration of MMC into renal tissue from the capsules, were observed at the cortico-medullary junction of the fixed kidneys (dark spots in Fig. 3). But no colored area was found in the kidneys infused with MMC. Angiography showed that fine vascularity of the kidney infused with MMC-m.c. was moderately decreased (right side in Fig. 4) as compared with the opposite one, although the major branches of renal artery were not embolized.

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The present results would indicate that MMC-m.c. can be intra-arterially infused into the kidney, where sustained-release of MMC should be expected. There is, however, considerable difficulties in infusing the capsules of this order in size. Further improvements in preparation of the capsules will be needed to make the intra-arterial infusion easier.

Fig. 1. Photograph of MMC-m.c. encapsulated with ethylcellulose.
Fig. 2. MMC-m.c. infused into the renal artery, staying at the cortico-medullary junction.
Fig. 3. Diffusion of concentrated MMC from the microcapsules into renal parenchyma (dark areas).
Fig. 4. Angiogram of dog kidney infused with MMC-m.c. (right).

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References