Effects of different de-endothelialising injuries to the rabbit carotid artery on glycosaminoglycan content and sulphonation during early wound healing

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Injury to the arterial wall in vivo creates a variety of responses from blood proteins and leukocytes, and from intimal cells at the site of injury. De-endothelialisation, by air-drying, of a rabbit carotid artery did not attract monocytes to the site of injury. However, intimal thickening due to smooth muscle cell proliferation was observed; at 3 months, the injury site appeared as a fibrous scar (1). In contrast, de-endothelialisation by balloon catheter caused massive invasion of platelets and monocytes which was followed by intimal thickening and athero- sclerotic lesions (1). Thus, the nature of the injury may have determined the intima-medial response to injury. In the following report, we have compared the effects of these two de-endothelialising injuries on the sulphonation and content of glycosaminoglycan constituents of the injured (right) carotid artery using the uninjured (left) carotid and the carotid arteries of control rabbits for comparison.

New Zealand white rabbits (male; 2.8±0.3 kg) were allowed to recover for various times (3d - 14d) after either an air-drying or a balloon catheter injury to the right carotid artery (1). Control rabbits were sham-operated, that is the neck cavity was evident, the air-dry injury caused control carotids.

Briefly, each carotid was defatted in CHCl3-CH3OH and then freeze-dried to determine the mass of dry defatted tissue. A known mass of dry defatted tissue containing 0.35% (w/v) rabbit serum albumin. The isolated S-glycosaminoglycan content of the ballooned carotids increased in concentration. The isolated S-glycosaminoglycan of each intact carotid artery was isolated and quantified as before (2). After euthanization (Na pentobarbital; 35 mg/kg), each rabbit was exsanguinated through a femoral artery. Left and right carotid arteries were excised after either an air-drying or a balloon catheter injury to the right carotid artery (1). Control arteries of control rabbits for comparison.

Fig. 1 Relative incorporation of 35S-sulphate into glycosaminoglycan of air-dried (right). After an inflation (Na pentobarbital; 35 mg/kg), each rabbit was divided by the mean specific radioactivity (+ S.D) is given for 3 - 5 vessels.

right carotid arteries at 3d had increased 2.5-fold above that measured in control arteries (Fig. 1). By 6d, this level had decreased to 1.8-fold and, by 14d, was similar to the control level. The 35S-glycosaminoglycan of the balloon-injured carotids showed a relative decrease in desmethyl sulphate, no change in heparan sulphate, and an increase in chondroitin sulphate content at 3d. At 6d and 14d, the 35S-glycosaminoglycan profile was scarcely different from that of the left carotid or the control carotid arteries.

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Regarding the ballooned carotid arteries, sulphonation of glycosaminoglycan of the injured