LETTER TO THE EDITOR

REDUCTION OF EXPERIMENTAL MYOCARDIAL INFARCT SIZE BY PRE-TREATMENT WITH ZINC-SULPHATE IN RATS

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In the treatment of myocardial infarction an attempt has to be made to limit the size of infarcted area. Such a reduction of infarct size by gluco-corticoids (7) propanolol (9) and acetyl salicylic acid (12) has been tried.

The effect of zinc in limiting infarct size has never been investigated. Serum zinc levels fall after acute tissue injury, including myocardial infarction (4). Plasma zinc levels fall within 24-48 hr of fresh infarction, rise gradually as the patient recovers and are normal by the end of second week (5). Pronounced decline in plasma zinc during first 24 hr is a prodromal laboratory sign for eventual arrhythmia (13).

The postulated importance of zinc in wound healing (10) suggests that zinc may also play a more fundamental role in recovery after acute myocardial infarction (8). Furthermore, marginal zinc deficiency seems to be widespread (12). In view of this, prophylactic effect of zinc in myocardial infarction produced by isoprenaline was investigated.

Albino rats of either sex (200±25 g) were given injections of isoprenaline hydrochloride (8.5 *mg*/100 *g*, sc, daily) on two consecutive days (11).

In one group (n=16) zinc sulphate (1 *mg*/100 *g*, in 1 *ml* saline) was administered through a stomach tube daily for three weeks prior to isoprenaline challenge. The control group was fed with an equal volume of saline. After isoprenaline injections the animals (n=4 from each group) were sacrificed at hr 24; day 5; day 12 and day 21 to study the infarction process.

Macroscopically site of infarcted area in control animals was pale and on cutting corresponded to left ventricle of heart. Drug treated animals showed a pale area near the

apex only. The difference was also seen in the size as the control animals showed larger area of infarct at all the intervals studied (Table I). Further all drug treated animals survived whereas two of the control group animals died.

TABLE I : Macroscopic size* of the infarcts.

Drug	*24 hours*	*5th day*	*12th day*	*21st day*
Zinc	1/6th	1/6th	1/8th	Healed
Control	1/3rd	1/3rd	1/6th	Almost healed

*Assessed by injecting methylene blue (3 *ml/kg*, before sacrificing) directly into the left atrium over a period of 30 sec to differentiate between normal and ischaemic areas. Hearts were sliced and areas were traced on clear plastic sheets from both sides of all slices.

To identify the necrotic area, the slices were incubated in 1% triphenyl tetrazolium chloride solution for 20 min at 37°C. This stains the normal area brickred while necrotic area remains pale This was also traced on the plastic sheets. The areas were then measured by Planimetry.

Fig. 1 : Zinc treated : Histological section of Rat ventrical on 5th day of Myocardial Infarction. Only few small areas of muscle fragmentation are sighted.

Microscopically at 24 hr there were focal areas of fragmentation and necrosis in the drug treated group, but controls showed widespread lesions. In both leucocytic infiltration was seen in the area of necrosis.

On 5th day, in drug treated group (Fig. 1) few small areas of muscle fragmentation were sighted. Frank necrosis not seen, though dilated and congested blood vessels along with colleclion of inflammatory cells were present. Controls showed extensive areas of coagulation necrosis with haemorrhage (Fig. 2).

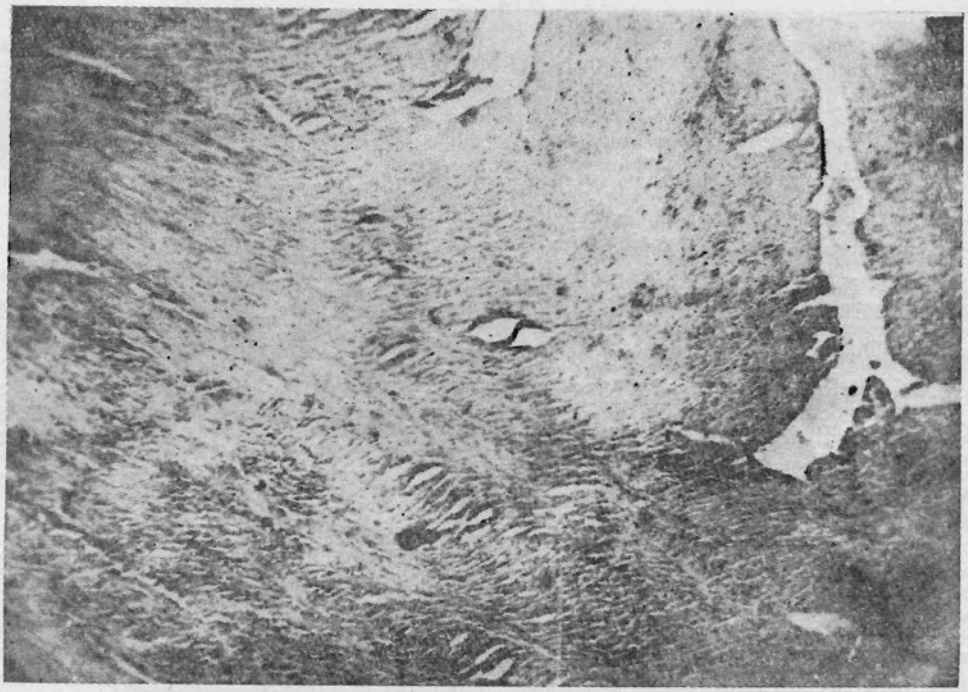

Fig. 2 : Control : Histological section of Rat ventricle on 5th day of Myocardial Infarction, showing extensive areas of coagulative necrosis with haemorrhage.

On 12th day, process of healing was seen to be much faster in drug treated than controls. Oedematous changes were persisting in controls. Our findings are in accordance with those of Singh *et al.* (14) who showed that oral zinc therapy in patients of fresh myocardial infarction helps in reducing the incidence of various arrhythmias and the recovery rate is rapid.

In the present work zinc did exhibit an impressive prophylactic effect against infarction. From present results, it is not possible to indicate the mode of its action. The action may be due to non-specific wound healing effect (2,3,6) or due to better membrane integrity related to

ATpase and phospholipase A_2 inhibition or a salutory effect on platelet aggregation (1). It would be of interest to study 'curative' effect of zinc, and also test zinc in other models of infarction.

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