

A STUDY OF THE TRANSLOCATION OF RADIOSTRONTIUM  
FROM WOUNDS AND THERAPY BY LOCAL INSOLUBILIZATION

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Abstract

The translocation of  $^{85}\text{Sr}$  was followed by a 2 h external counting of the wound and homologous bone and by measurement of the blood radioactivity. Two types of wounds were simulated on Maccacus monkeys : puncture wounds and lacerations.

The same experimental procedure was applied in order to test therapy through Sr insolubilization by rhodizonate (K),  $\text{Mg SO}_4$ , alginate (Ca) and aluminium phosphate gel, on laceration wounds either 5 or 15 min after the contamination.

It was verified that local or IV administration of DTPA did not result in an increased absorption of Sr.

Introduction

Wounds can be classified into three classes : abrasion, laceration and puncture. The first will not result in any significant absorption after contamination<sup>1</sup> ; the second one only can be treated by local insolubilization of the radionuclides. Most authors have studied wounds contaminated by untranslocable nuclides (Pu and Am), whereas our study was concerned with strontium, a translocable fission product with a high radiotoxicity. For safety purposes and easier measurement,  $^{85}\text{Sr}$  was chosen.

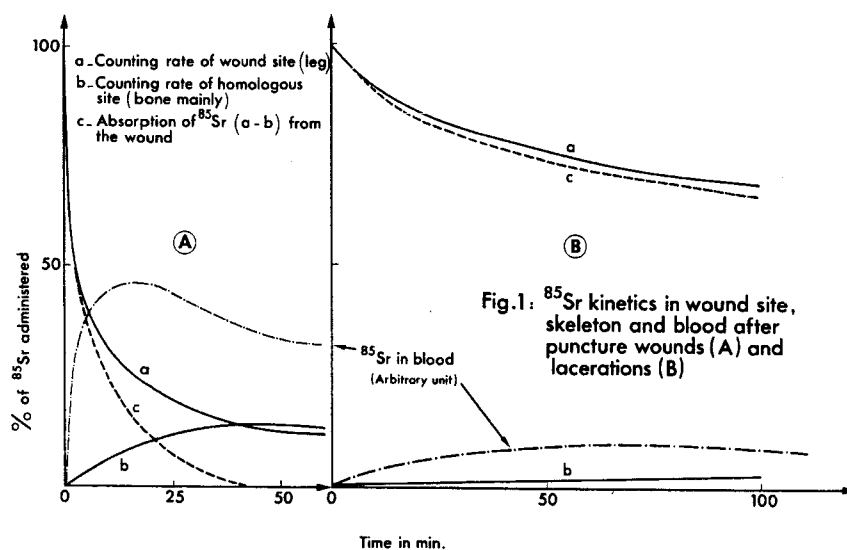
Material and methods

Twenty eight Maccacus monkeys weighing 5 kg were used. Wounds were performed on the postero-external side of the thigh. Puncture wounds were simulated by IM injections ; lacerations were made by incision and ecrasement of the muscle 2 cm long and 2.5 cm wide. A catheter was introduced into the arteria femoralis of the opposite leg for blood samples. From 10 to 100  $\mu\text{Ci}$  of  $^{85}\text{Sr}$  ( $0.1 \text{ cm}^3$ ) were deposited on the wound and the radioactivity of the wound and the homologous area on the other leg was measured by NaI (Tl) detectors with the same

counting efficiency. The radioactivity of the blood samples ( $1 \text{ cm}^3$ ) was measured in a well-type crystal. The various treatments were applied 5 or 15 min after exposure.

## Results

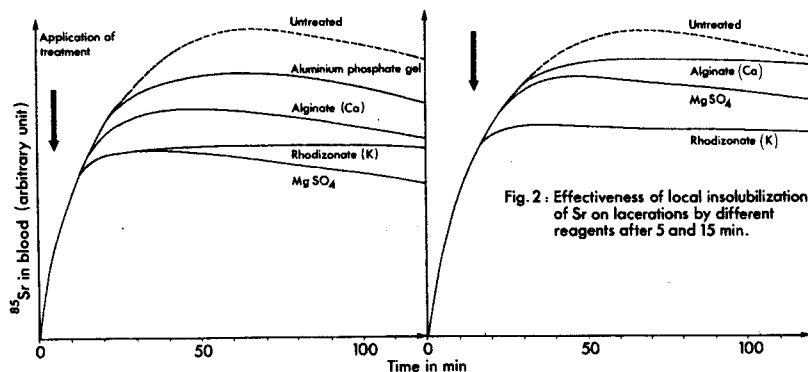
### Effect of the type of wound on absorption.



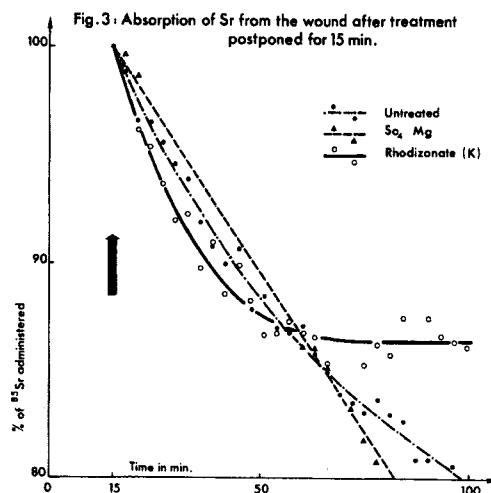
Following puncture, all the Sr was absorbed within 40 min (fig. 1 A, average on 2 animals). Blood concentration was highest within 20 min, then slowly decreased. Bone uptake seemed to stop after 50 min's time. Following laceration (fig. 1 B, average on 6 animals) these processes were slower and not so complete.

### Sr insolubilization tests on lacerations. (17 animals).

As shown by fig. 2, therapy must be early : when administered 5 min after exposure, all the insolubilizing reagents resulted in a more or less significant



decrease of absorption ; when administration occurred 15 min later, only K rhodizonate (powder) and Mg SO<sub>4</sub> (saturated solution) had a significant effect. Counting of the wound showed rhodizonate to be more efficient (fig. 3), which was verified by measurement of urinary excretion (table 1).



#### Effect of DTPA on Sr absorption. (3 animals).

In case of wounds contaminated by a mixture of fission products, DTPA (used as DTPA Ca Na<sub>3</sub>) can be used in order to chelate the lanthanons. Table 1 shows that Sr absorption was not enhanced by DTPA whether insolubilized or not.

Treatment after 15 min	Absorption from the wound % of deposit	Urinary excretion during 24 h. % of deposit
Untreated	22	7
Mg SO <sub>4</sub>	33	2,5
Rhodizonate	10	1,5
DTPA	23	5
Rhodizonate + DTPA	10	1
Rhodizonate + DTPA + DTPA (IV)	20	2,5

Table.1: Influence of treatment on absorption and urinary excretion of Sr deposited on laceration

### Discussion and conclusion

Lacerations are very difficult to standardize and result in widely dispersed data (slide number 5).

As a conclusion, laceration wounds contaminated by Sr can be treated by insolubilization whereas puncture wounds cannot, because of access and delay. Rhodizonate seemed to be the best insolubilizing reagent. DTPA did not act on Sr absorption.

### References

1. SCHOFIELD (G.B.) - Clin. Rad., 15, 1, 50-54 (1963).