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## Toxicity for White Rats of Elements Implanted into their Subcutaneous Tissues.*

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With the view of observing the host response to various elements, the author has implanted such substances over the ribs of white rats anteriorly. The animals were anaesthetized with ether, a half inch incision made, the skin dissected up for a short distance, the element placed in position and the skin edges secured by skin clips. The whole procedure required less than 10 minutes and the clips were very effective. The following elements were used: aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, bromine, cadmium, calcium, carbon, cerium, chromium, cobalt, columbium, copper, erbium, gold, iodine, iron, lead, lithium, manganese, magnesium, mercury, molybdenum, nickel, phosphorus, potassium, selenium, silicon, silver, sodium, sulphur, tantalum, tellurium, thallium, tungsten, uranium, vanadium, zinc and zirconium. Of the above elements only 2 proved fatal for the white rat—thallium and phosphorus, death occurring within 48 hours. This is in accord with the characteristics of the latter 2 elements, both thallium and the white phosphorus being poisonous. On autopsy, however, some of the phosphorus still glowed on being exposed to the air, showing that the absorption of the phosphorus was not rapid. The rats which survived were examined 7 and 30 days after implantation, and portions of tissue adjacent to the implantation were taken for histological examination. No marked reactions were noted around the implantations of aluminum, barium, beryllium, bismuth, boron, calcium, carbon, cerium, columbium, erbium, gold, iron, lead, magnesium, mercury, molybdenum, selenium, silicon, silver, tantalum, tellurium, tin, tungsten, uranium, vanadium, zinc and zirconium.

A large ulcer was noted in the case of titanium and a small ulcer in the case of bromine and potassium. Induration around the implantation was noted in the case of sulphur, antimony, arsenic, chromium, cadmium, sodium and lithium. Abscess was noted in the case of copper, nickel, manganese and cobalt and a greenish exudate in the case of iodine.

Approximately 75 rats were used and several implantations were

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made in each. The weight of the elements was not taken since the author undertook this work from the standpoint of histological study of their effect on the tissues. The approximate size of the pieces of sodium, lithium, potassium, phosphorus and thallium placed at each site of implantation was 5 x 5 x 2 mm. and from one to 2 times this amount was used in the case of the other elements, with the exception of bromine, in which instance one cubic centimeter was placed in each area of implantation. The most striking feature of the work was the fact that a large number of the elements were practically inert when placed in the tissues. In this work the author hopes to correlate some of the physical properties of the elements with the tissue reactions and their histological study after a more lengthy series has been run. The reason why a lengthy series is necessary is because of the difficulty of sterilization in the case of some of the elements and also of keeping the animal wound sterile.

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## Papain Preparations Suitable for the Prevention of Adhesions.

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The use of proteolytic enzymes in the surgical treatment of adhesions has indicated a definite superiority for the vegetable enzyme, papain.[1, 2, 3, 4] This report is concerned with the development of a sterile papain preparation suitable for clinical use, the standardization of the product and some descriptive aspects of its behavior in the peritoneum.

The two procedures previously described for the preparation of a sterile trypsin product[5] have been applied to papain with varying success. The simplest method, namely, the pressure filtration of a glycerine extract has been discarded as unsuitable for clinical purposes. Even though filtered glycerine extracts of trypsin lose very

[1] Kubota, *Mitteilungen aus der Medizinischen Facultat der Kaiserlichen Kyushu-Universtat*, 1924, Bd.9, Heft 2.

[2] Ochsner and Mason, PROC. SOC. EXP. BIOL. AND MED., 1928, **25**, 524.

[3] Ochsner and Herrmann, *Arch. Surg.*, 1922, **17**, 365.

[4] Ochsner and Garside, yet unpublished.

[5] Walton, *J. Pharm. and Exp. Ther.*, 1930, **40**, 403.