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Determination of the metal concentrations of fluids of acute wounds to study the influence of essential metals on wound healing

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Delayed wound healing is one of the major problems all over the world, and also in Sri Lanka.

The health and growth of any biological tissues is dependent on the supply of nutrients, including trace elements. Many elements are essential for balanced nutrition and have been linked with important roles in successful wound healing. It has been suggested that many wound healing processes could benefit from the correct concentration of trace metal complexes.

Samples of 5-10 mL wound fluids were collected to temporarily implanted drainage tubes on post operative day 1, 3 and 5 from clean wounds of different patients who have undergone various surgical procedures. The samples were deprotinized by digesting in a mixture of nitric and perchloric acid and the concentrations of Fe, Zn, Cu, Mn, Ca, Sn, Cr, Cd and Pb were measured using atomic absorption spectrophotometer. Blood samples of the same patients were treated in the same manner and analyzed for the same metals.

The observations are consistent with the fact that the blood contains lot of iron and the day 1 sample is almost similar to the blood. Calcium is some what stable in the wound fluid. In some cases during healing calcium is higher in the wound fluid than in the blood. In most patients the zinc concentration increases in the wound fluid with time after surgery. This can be expected, as zinc is associated with healing. The mean zinc concentration of day 5 fluid is about three times higher than those in the blood and it seems to be progressively accumulated around the site of wound when the wound is healing. The concentration of copper in wound fluid are relatively higher than that of the blood sample, and copper also seems to be accumulated around the site of healing wounds. The concentration of manganese varies with the healing of the wound; the day 3 samples had high values of Mn than day 1 and day 5. For Sn, Pb, Cd, and Cr, the concentrations were very low in the blood and in wound fluid as they were not detected even by graphite furnace AAS.

These experiments showed that the concentrations of Ca, Zn, Cu, Fe and Mn undergo wide fluctuations in thier concentrations in the fluid around wound sites.

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