THE ADDITION OF TRISODIUMPHOSPHATE SOLUTION TO GASTRIC LAVAGES FOR THE CULTIVATION OF MYCOBACTERIUM TUBERCULOSIS

by

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The culturing of gastric lavages for tubercle bacteria, which is at present a valuable diagnostic method in clinics and dispensaries, cannot be applied in central public health laboratories to the extent that the importance of the method deserves (BEKKER (3)). Because of the great distances to laboratories the gastric lavages are generally eliminated, while the notorious deleteriousness of the gastric juice for the tubercle bacteria deprives a negative result of any meaning and the culturing test of reliability.

To overcome this difficulty ARMSTRONG (1) recommended the addition of an equal part of 10 % Na₃PO₄ solution (or 23 % Na₃PO₄ 12 aq.) to the gastric lavages, and preliminary treatment according to CORPER and STONER, in the laboratory. CORPER and STONER (4) had been the first to suggest "digestion" in the incubator at 37° C. (of sputa and other materials) with the Na₃PO₄ solution for one, or by convenience for two and more days, in culturing for tubercle bacteria. In this way they claim to have achieved better results than by homogenising with 3 % NaOH or 5 % oxalic acid. Before the inoculation it was necessary only to concentrate the homogeneous mixture (20 mins. centrifuge at 2500 r.) and neutralize the concentrate. The essential virtue of the procedure is that the high alkalinity of the trisodiumphosphate solution should destroy the contaminating organisms completely, while it should not be lethal to tubercle bacteria even in eight days — at least at room temperature.

VAN VRANKEN (12) employed the procedure, seeing the simplification as a benefit for public health laboratories. It could compete with the oxalic acid preparation: 127 positive cultures against 108
with the latter, in 1000 samples of sputa and other materials. Armstrong emphasized some shortening of the time on the average needed for visibility of the culture, and the improvement of the quality of the concentrates. Besides this his good opinion was based on the inconclusive fact that the incidence of cases in which a positive direct smear of concentrate had been followed by a negative culture, had been reduced "nearly to zero".

The experiments recorded here, which lack moreover a comparison with the usual sulfuric acid preliminary treatment of Loewenstein-Simuyoshi, could not entice to disloyalty to the latter well-tried, brief method, but could excite an endeavour to investigate empirically the utility of the Na₃PO₄ solution to gastric lavages. This paper is a report on the results of that investigation.

A few preliminary notes must be made. It is not as yet known by what mechanism Na₃PO₄ checks the deleteriousness of the gastric juice for the tubercle bacteria in spite of its doubtlessly detrimental high alkalinity. The deleteriousness which is such that the culturing of positive gastric lavages fails within 24 hours to furnish a culture of \(M.\) tuberculosis (Schwarting (8), Floyd and Page (5), Sprick and Towey (10), Vincent and Birge (11) a.o.), has been imputed to the hydrochloric acid, scil. the high hydrogen ion concentration of the gastric juice. However, the neutralization of the small quantities of HCl by the Na₃PO₄ must be of secondary importance. There is evidence that much greater concentrations of hydrochloric acid than those of the gastric juice are not so noxious as the gastric juice itself (Roper and Ordway (7), Kramer (6)). So the digestive enzymes are today thought to be the chief factor in destroying the tubercle bacteria. This explains easily the retarding effect of refrigeration and of neutralization.

The investigation was carried out by comparing the results of the cultivation on Loewenstein media, after the preparation according to Corper and Stoner, with those after the direct treatment of the fresh material with 3% hydrochloric acid, which is the usual practice in this laboratory ¹), both methods on the same

¹) Procedure: Concentrate by centrifuge, mix with about 4 parts of HCl (conc. 30 ml aq. ad 1000 ml), shaking apparatus 15 mins, standing 30 mins, concentrate and wash with sterile 0.85% NaCl. This procedure is, according to Bekker (not published), slightly superior to the treatment with 6% sulfuric acid, as far as gastric washings are concerned.