

Effect of a Copper—Containing Intrauterine Device
on *Neisseria gonorrhoeae* *In vitro*

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OBJECTIVE: To determine if a copper containing intrauterine device (IUD) inhibits the growth of *Neisseria gonorrhoeae* *in vitro*.

BACKGROUND: Copper possesses antifertility properties (1). It also inhibits both adult and fetal cell growth in tissue culture (2). Metallic copper and cupric ion either kill or inhibit the growth of *N. gonorrhoeae* *in vitro* (3).

DESCRIPTION: Thayer—Martin selective media (G.C. Agar Base, hemoglobin VCN and IsoVitaleX, Baltimore Biological Laboratories, Cockeysville, Maryland 21030 U.S.A.) was used for isolation. Determinations of growth inhibition by copper were made on a typing medium developed by Kellogg (4). All plates were incubated at 36°C for 24 or 48 hours in candle jars in an increased CO₂ atmosphere. Electrolytic copper wire, 0.5 mm in diameter, was cut to one inch lengths and sterilized by autoclaving. An electrolytic copper plate was cut into discs approximately 1.5 cm in diameter and sterilized by autoclaving. The copper—containing IUD (Gravigard) was furnished by G.D. Searle (Thailand) Ltd. and was aseptically prepackaged. The strain of *N. gonorrhoeae* used was isolated from the urethral exudate of a male with acute urethritis. The exudate was streaked directly on freshly prepared Thayer—Martin media which was then incubated at 36°C in a candle extinction jar. The culture was inspected at 24 and 48 hour intervals and those colonies with gross morphology resembling *Neisseria* were subjected to Gram staining and tested with oxidase reagent. All colonies of Gram negative diplococci that gave positive tests with oxidase reagent were verified as *N. gonorrhoeae* by sugar fermentation.

The copper wires, discs and copper—containing IUD were placed on Kellogg's typing medium previously streaked with gonococci and incubated at 36°C for 48 hours under an increased CO₂ atmosphere.

PROGRESS: The copper wires and discs inhibited the growth of *N. gonorrhoeae* as previously described (3). In addition, the copper coil portion of the Gravigard IUD also inhibited the growth of the organism (Figure 1). When the IUD was removed from the medium (Figure 2), it was observed that the presence of the plastic portion of the IUD had also prevented growth; however, we believe that this was not due to the plastic, but to the fact that the medium had been covered as no zone of inhibition was observed in these areas. A similar absence of growth has also been observed when plastic tubing was placed on the medium. The area surrounding the copper coil (approximately 2 mm on either side of the IUD), however, did not have bacterial growth.

SUMMARY: This preliminary study suggests that the copper—containing IUD may play a useful role in preventing gonorrhea. The solubilization of copper has been estimated at one microgram of copper per day (3) which is within the known bactericidal range *in vitro* suggesting that growth of *N. gonorrhoeae* may be inhibited for a period of time after the IUD has been inserted in the uterus.

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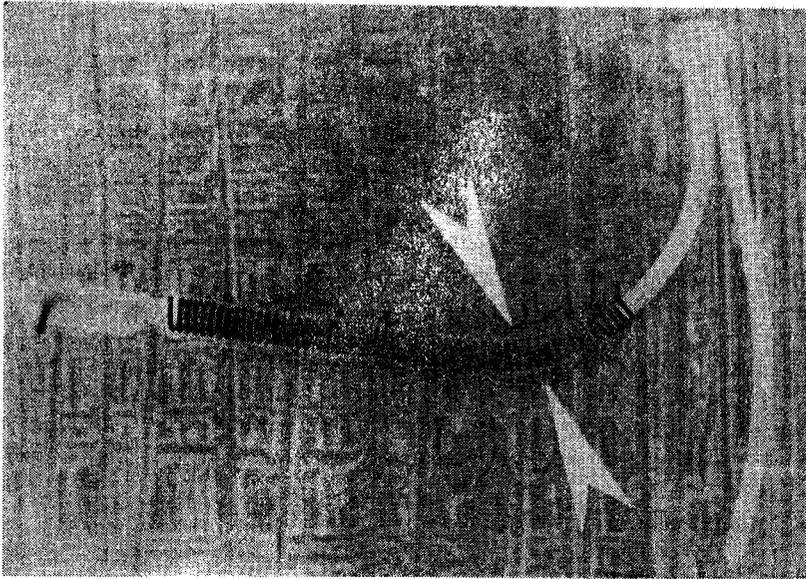


Figure 1. Inhibition of the growth of gonococci by a copper-containing intrauterine device (Gravigard). A zone of inhibition indicated by arrows at the margins may be seen surrounding the copper-containing portion of the IUD

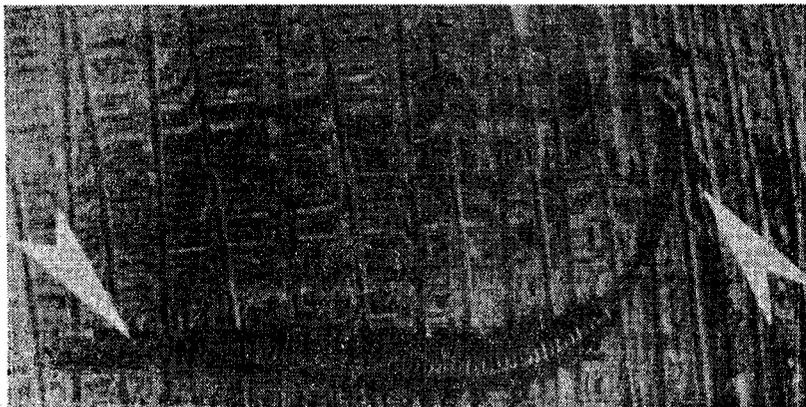


Figure 2. Inhibition of the growth of gonococci by a copper-containing intrauterine device (Gravigard). The IUD has been removed to better demonstrate the zone of inhibition. Although growth has been inhibited in the area where the plastic was present (arrows), it is believed that this is not due to any peculiar characteristic of the plastic, rather to the media being covered as discussed in the text.