

# Research Summary: PLUS Antibacterial Sutures

**TITLE:** Bacterial Adherence to Surgical Sutures: Can Antibacterial-Coated Sutures Reduce the Risk of Microbial Contamination?

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## KEY FINDINGS:

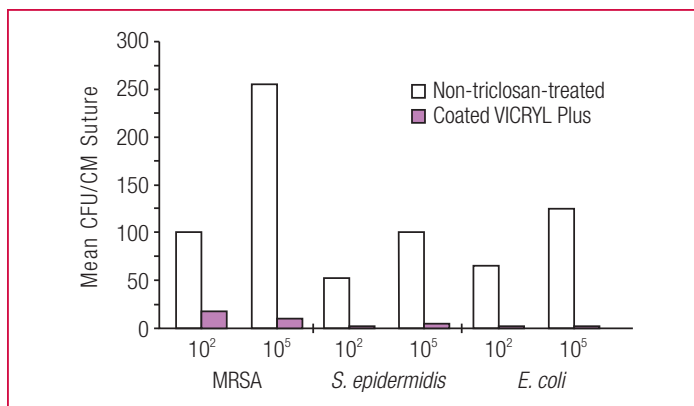
- Bacteria adhere rapidly to non-triclosan-treated suture, but not to Coated VICRYL\* Plus Antibacterial (polyglactin 910) Suture
- Fewer bacteria adhere to Coated VICRYL Plus Antibacterial Suture than to non-triclosan-treated suture
- Triclosan activity sustained for at least 4 days (the time required for wound re-epithelialization)
- Coated VICRYL Plus Antibacterial Suture is bactericidal and inhibits the adherence of select bacteria
- Coated VICRYL Plus Antibacterial Suture and MONOCRYL\* Plus Antibacterial (poliglecaprone 25) Suture are active against antibiotic-resistant *S. aureus* and *E. coli*
- Antibacterial activity not diminished by serum proteins (bovine serum albumin, BSA)
- Antibacterial activity present during the period when wound contamination is likely

## Methods:

Standard *in vitro* techniques were used. Bacterial strains tested were: methicillin-resistant *S. aureus*, extended spectrum beta-lactamase-resistant *E. coli*, and biofilm-positive *S. epidermidis*.

## Results:

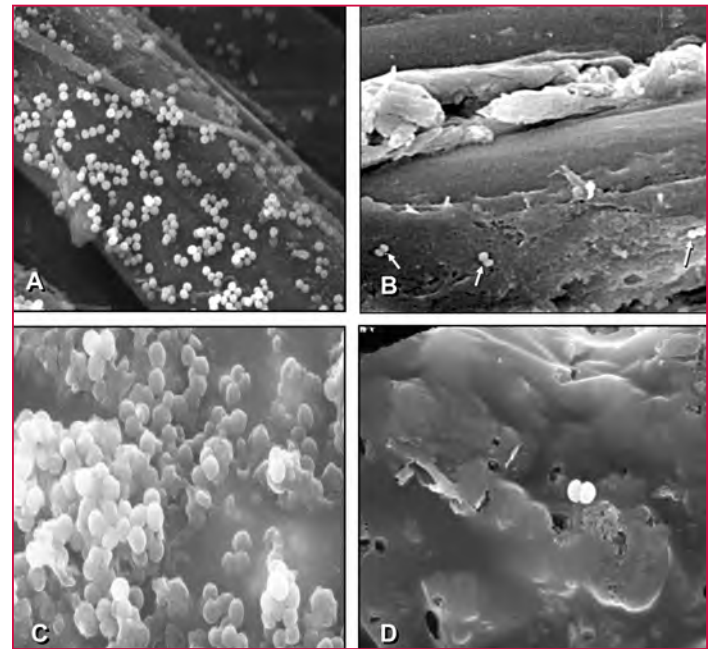
**Bacteria adhere rapidly to non-triclosan-treated suture, but not Coated VICRYL Plus Antibacterial Suture**



During contact times as short as 5 seconds, significantly fewer bacteria were recovered from Coated VICRYL Plus Antibacterial Sutures compared to non-triclosan-treated sutures ( $P < 0.01$ ). Fewer than 25 bacteria were recovered from 1 centimeter of Coated VICRYL Plus Antibacterial Suture after exposure to 100,000 organisms.

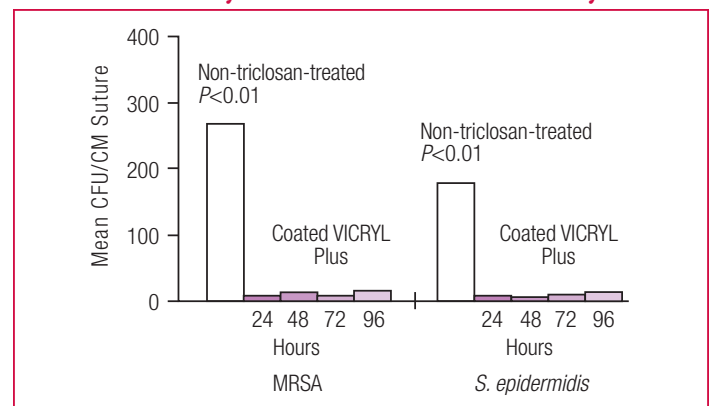
\*Trademark

## Fewer bacteria adhere to Coated VICRYL Plus Antibacterial Suture



Scanning electron micrographs of Coated VICRYL Plus Antibacterial Suture and non-triclosan-treated sutures exposed briefly to 100,000 bacteria. (A) MRSA adhere to non-triclosan-treated suture, magnification 5,400X. (B) Few MRSA (arrows) adhere to Coated VICRYL Plus Antibacterial Suture, magnification 5,260X. (C) Biofilm producing *S. epidermidis* adhere to non-triclosan-treated suture, magnification 12,600X. (D) Few biofilm cells adhere to Coated VICRYL Plus Antibacterial Suture, magnification 11,200X.

## Triclosan activity sustained for at least 4 days



The difference in activity between Coated VICRYL Plus Antibacterial Suture and non-triclosan-treated sutures was significant ( $P < 0.01$ ). There was no marked difference in activity for Coated VICRYL Plus Antibacterial Sutures tested at 24, 48, 72, and 96 hours. (Redrawn from figure 4.)

**Coated VICRYL Plus Antibacterial Suture is bactericidal and inhibits the adherence of select bacteria**

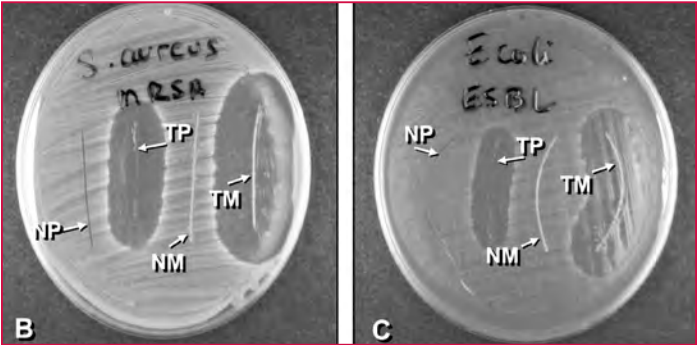
In addition to preventing bacterial adhesion, Coated VICRYL Plus Antibacterial Suture demonstrated significant ( $P<0.001$ ) bactericidal activity against both Gram-positive and Gram-negative bacteria.

**Bactericidal Activity of Coated VICRYL Plus Antibacterial Sutures**

| Average number of bacteria per mL |                                         |                       |                                               |                             |
|-----------------------------------|-----------------------------------------|-----------------------|-----------------------------------------------|-----------------------------|
|                                   | Coated VICRYL Plus Antibacterial Suture | Non-triclosan-treated | Coated VICRYL Plus Antibacterial Suture + BSA | Non-triclosan-treated + BSA |
| <i>S. aureus</i>                  | 0                                       | 2,511                 | 2                                             | 7,943                       |
| <i>E. coli</i>                    | 0                                       | 398                   | 1                                             | 1,258                       |
| P value                           | <0.001                                  |                       | < 0.001                                       |                             |

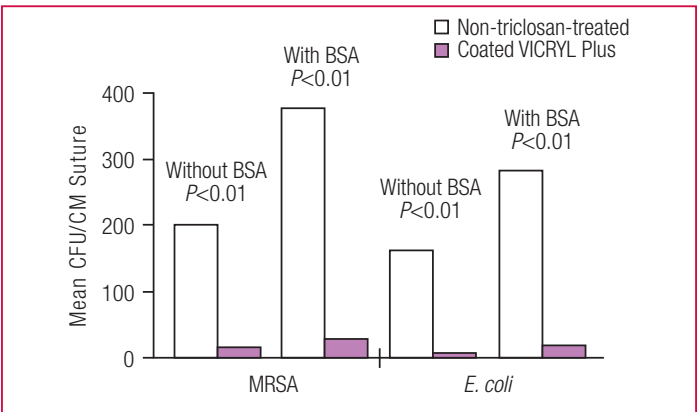
Adapted from Table 1. Log<sub>10</sub> numbers converted to standard form.

**Coated VICRYL Plus Antibacterial Suture and MONOCRYL Plus Antibacterial Suture are active against antibiotic-resistant *S. aureus* and *E. coli***



Zones of inhibition are present around Coated VICRYL Plus Antibacterial Suture and MONOCRYL Plus Antibacterial Suture but not non-triclosan-treated suture. The left Petri dish contains methicillin-resistant *S. aureus*, the right beta-lactamase-resistant *E. coli*. TP is Coated VICRYL Plus Antibacterial Suture, TM is MONOCRYL Plus Antibacterial Suture, NP is non-triclosan-treated braided suture, and NM is non-triclosan-treated monofilament suture.

**Antibacterial activity not diminished by serum proteins**



Coated VICRYL Plus Antibacterial Suture possessed bactericidal activity and nonadhesive properties against both Gram-positive and Gram-negative bacteria regardless of interference from serum albumin.

**Antibacterial activity present when wound contamination is likely**

- Triclosan activity is present immediately and persists for at least 4 days

**AUTHORS' CONCLUSIONS:**

**Active during re-epithelialization**

“... this study demonstrates that the antimicrobial activity of triclosan was sustained over a time frame when re-epithelialization should occur (4 days) during the early postoperative period ...”

**Active when contamination likely**

“... and during the interval when a surgical wound is subject to microbial challenge from technical complications and lymphatic or hematogenous contamination.”

**No interference by tissue proteins**

“... the antiseptic activity of triclosan was not diminished when the suture material was coated with biologic substrates, mimicking the tissue proteins recruited to the margins of a surgical wound.”

**Cost effective**

“... antibacterial-coated sutures may well prove cost effective in reducing morbidity (infection) in the surgical patient. The morbidity from surgical wounds is very expensive because of the associated treatment costs for antibiotics, wound care, prolonged hospitalization, and loss of patients' work productivity.”

Figures reprinted with permission from the American College of Surgeons from *Journal of the American College of Surgeons*. 2006;Vol 203(4):481-489; Edmiston CE, Seabrook GR, Goheen MP, Krepel CJ, Johnson CP, Lewis BD, Brown KR, Towne JB; Bacterial Adherence to Surgical Sutures: Can Antibacterial-Coated Sutures Reduce the Risk of Microbial Contamination?

See package insert for full prescribing information.