

INNOVATIVE TEXTILE TECHNOLOGY: PRELIMINARY TESTS ON ANTIMICROBIAL PROPERTIES OF UPEC MICROORGANISMS

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INTRODUCTION AND AIM OF THE STUDY

Urinary tract infections (UTI): epidemiologically a relevant condition.

Antibiotic abuse and antibiotic resistance are increasingly a clinical problem.

Antiseptic and disinfectant substances are getting increasing interest.

Textiles with antiseptic properties can be an interesting solution for the containment of colonizing microorganisms.

Aim of the study:

*to verify whether the innovative *Nexus EnergyFiber*[®] (Italy) has an *in vitro* antimicrobial effect compared to conventional pure cotton fabrics.

*to tests both in direct contact and in close proximity with cultures of microorganisms responsible for UTIs.

MATERIALS AND METHOD

Antimicrobial activity:

Nexus Energy Fiber[®] vs pure cotton fabric (control tissue).

Clinical strains (Urinecultures from hospitalized pts):

E. coli, Pseudomonas aeruginosa,

Enteroc. faecalis, Staphylococcus saprophytic

American Type Culture Collection (ATCC) reference strains:

- Staphylococcus aureus ATCC 6538
- Klebsiella pneumoniae ATCC 4352

Analytical procedure performed in accordance with "ASTM E-2180-07" standardization document[1].

Round 1 (direct contact): fabrics in direct contact with microbial cultures in their exponential phase of growth in the slurry.

Round 2 (remote condit): fabrics 0.5-1 cm away from the microbial culture in their exponential phase of growth in the slurry.

*positive and negative controls: verify media

*reliability & exclude possible contaminations

*all tests were performed in triplicate

*incubation/assessment times: 0, 6, 24, 48 h

The **antimicrobial effect** was estimated by comparing the different decline in the CFUs between growth on pure cotton and direct-contact and remote tests on Nexus Energy Fiber[®], respectively.

RESULTS

Round 1

(direct contact) Nexus Energy Fiber[®] vs pure cotton

Microorganisms	Antimicrobial effect (%) in function of time			
	0 hours	6 hours	24 hours	48 hours
K. pneumoniae. ATCC 4352	4.3%	22%	49%	99%
S. aureus. ATCC 6538	86%	91%	0%	0%
E. coli	13%	35%	51%	37%
E. fecalis	0%	0%	0%	0%
S.saprophyticus.	0%	0%	0%	0%
P.aeruginosa.	0%	0%	0%	21%

Round 2

(remote conditions) Nexus Energy Fiber[®] vs pure cotton

Microorganisms	Antimicrobial effect (%) in function of time			
	0 hours	6 hours	24 hours	48 hours
K. pneumoniae. ATCC 4352	0%	0%	0%	100%
S. aureus. ATCC 6538	0%	0%	24%	100%
E. coli	0%	0%	0%	70%
P. aeruginosa.	0%	0%	23.7%	75%

INTERPRETATION OF RESULTS

Direct-contact tests proved that Nexus Energy Fiber[®]:

- has no antimicrobial effect against wild strains of E. faecalis and S. saprophyticus
- has bactericidal effect against P. aeruginosa strain after 48 hours
- showed an almost total killing of S. aureus after a 6-hours long contact
- 48 hours were needed to obtain a 100%-effective antimicrobial effect against K. pneumoniae and E. coli.

Nexus Energy Fiber[®]: bactericidal effect on most of tested microb. Strains

Both the contact times and the distance play a significant role:

- **direct-contact:** contact t. to measure an effect, it disappears at longer t.
- **remote condition:** effects for contact times only

CONCLUSIONS

Antibacterial properties of Nexus Energy Fiber[®] are worth to be further tested.