

M. Knausz<sup>1</sup>, I. Schlakkerne K.<sup>2</sup>, A. Becker<sup>3</sup>

<sup>1</sup>Department of Microbiology Hygiene, Petz Aladar Teaching Hospital, Gyor, Hungary ; <sup>2</sup>Department of Hygiene, Petz Aladar Teaching Hospital, Gyor, Hungary ; <sup>3</sup>Department of Microbiology, Petz Aladar Teaching Hospital, Gyor, Hungary

## Objectives

Medical application of the experimental results of nanotechnology, which uses nano-sized materials in different fields of medicine improving fast. The Grabo Silver Knight flexible floor covering was developed by Graboplast Co. Thanks to the patented TECH Surface technology and the application of the photocatalytic activity of nano-titanium dioxide and nano-silver, it is able to eliminate the majority of microorganisms without chemicals. The aim of this study was to prove the antimicrobial efficacy in the daily routine of healthcare.

## Methods

Standard method for efficacy measurements of nanomaterial surfaces during practical use still does not exist. The examinations took place in Petz Aladar Teaching Hospital Departments of Gastroenterology and Haematology. The number of microorganisms was compared between the floor of the control and study rooms. Size, bed number and load of the hospital room pairs were the same. For sampling we used Medical Wire Polywipes swabs. Samples were collected in the mornings before cleaning. With the wipes replicated samples from the same places of the rooms, four times in two-week periods were collected with aseptic technique. Wipes were placed on Columbia agar. In the laboratory, wipes were removed from the medium, and they were incubated over 5 days at 36 °C later at room temperature. Total aerobic microbial count was determined and the possible pathogens were identified.

## Results

In patient surroundings beside the harmless microbes pathogens can be found, which can stay alive for months under drought conditions.

Gastroenterology				
Place of sampling	Grabo Silver Knight		Conventional floor	
	Mean colony forming unit	Pathogen	Mean colony forming unit	Pathogen
Entrance	32	pseudomonads	58	<i>P. aeruginosa</i> , <i>E. coli</i> , <i>S. aureus</i> , <i>E. faecalis</i>
Near lavatory	44	<i>E. faecalis</i> , Enterobacter, <i>Aspergillus</i> , pseudomonads	70	<i>Aspergillus</i> enterococci, pseudomonads, <i>S. aureus</i>
Nurse desk	37	<i>Aspergillus</i>	93	<i>Pantoea</i> , <i>E. coli</i> , Enterobacter, <i>Aspergillus</i>
Near sickbed	64	<i>P.aeruginosa</i> , enterococci <i>A. calcoaceticus</i>	116	<i>Aspergillus</i> , pseudomonads. <i>S. aureus</i>
Near window	23	pseudomonads, <i>Aspergillus</i>	101	<i>Aspergillus</i> , <i>S. aureus</i>
Between sickbeds	47	enterococci	76	<i>Aspergillus</i> , pseudomonads. <i>S. aureus</i>

The table shows the results of sampling in the Department of Gastroenterology. The mean colony numbers and the possible pathogens are presented. Besides *Pseudomonas* strains, presence of members of the family Enterobacteriaceae and enterococci was proved on the floor. In the Department of Haematology pseudomonads and aspergilli occurred more frequently, which endanger the severe immunodeficient patients. The statistical analysis confirmed significant differences in the measurement results between the study and control rooms.

## Conclusion

The nanotechnology-based Grabo Silver Knight covering is able to reduce the majority of microorganisms in healthcare settings. It is not substitute but complement the conventional infection control. The personnel has to continue all the previously used processes to prevent the spread of microbes including proper cleaning and surface disinfection.