

# Tomasz Banasiewicz

## TERAPIA TRUDNO GOJĄCYCH SIĘ RAN TIME czyli nie dolewajmy oliwy do ognia

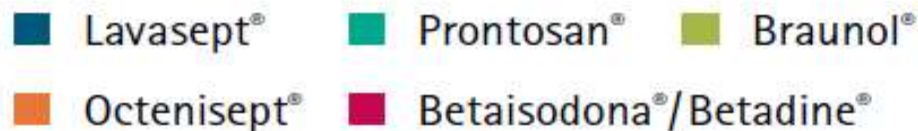
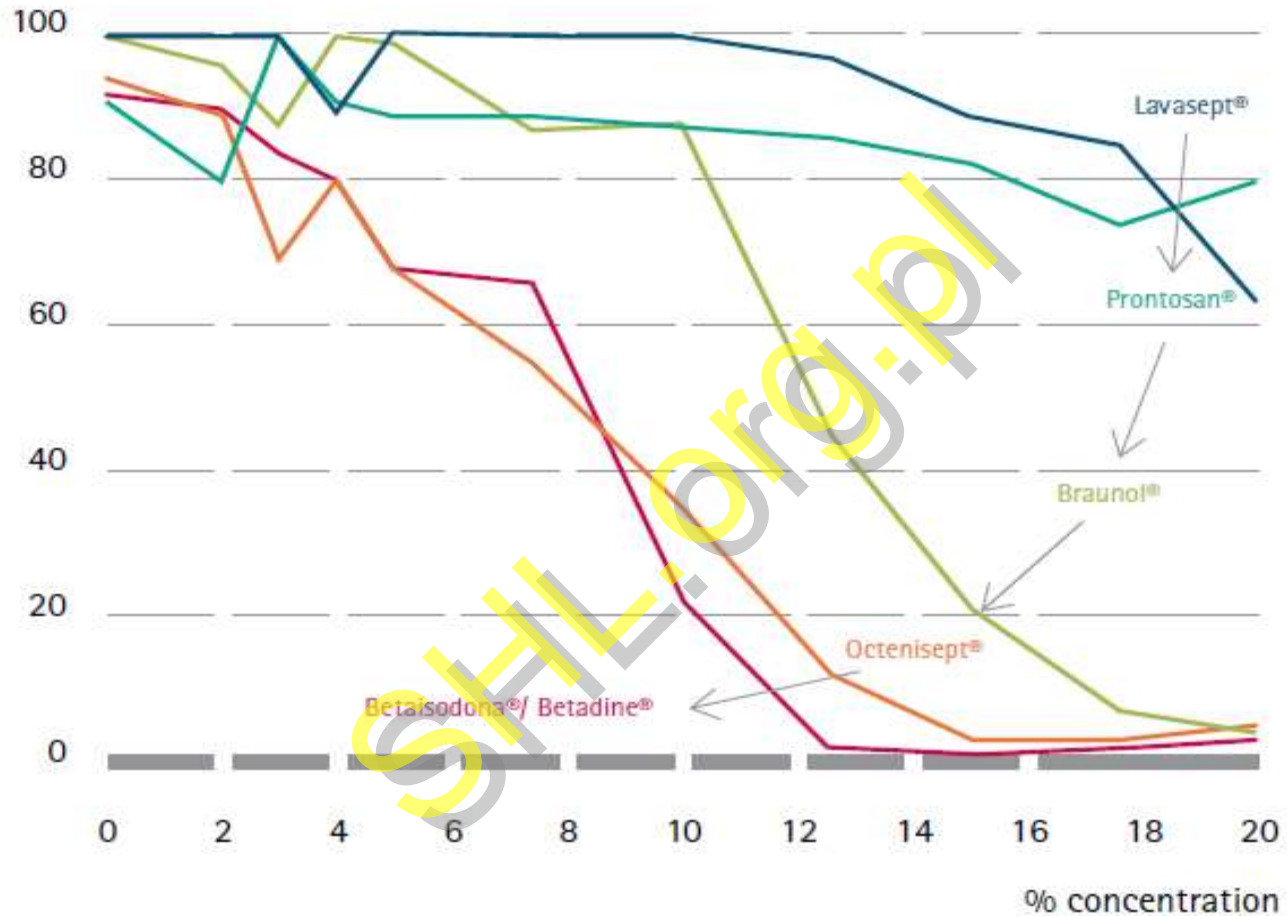


Konflikt interesów: wykład sponsorowany przez B. Braun (Prontosan)

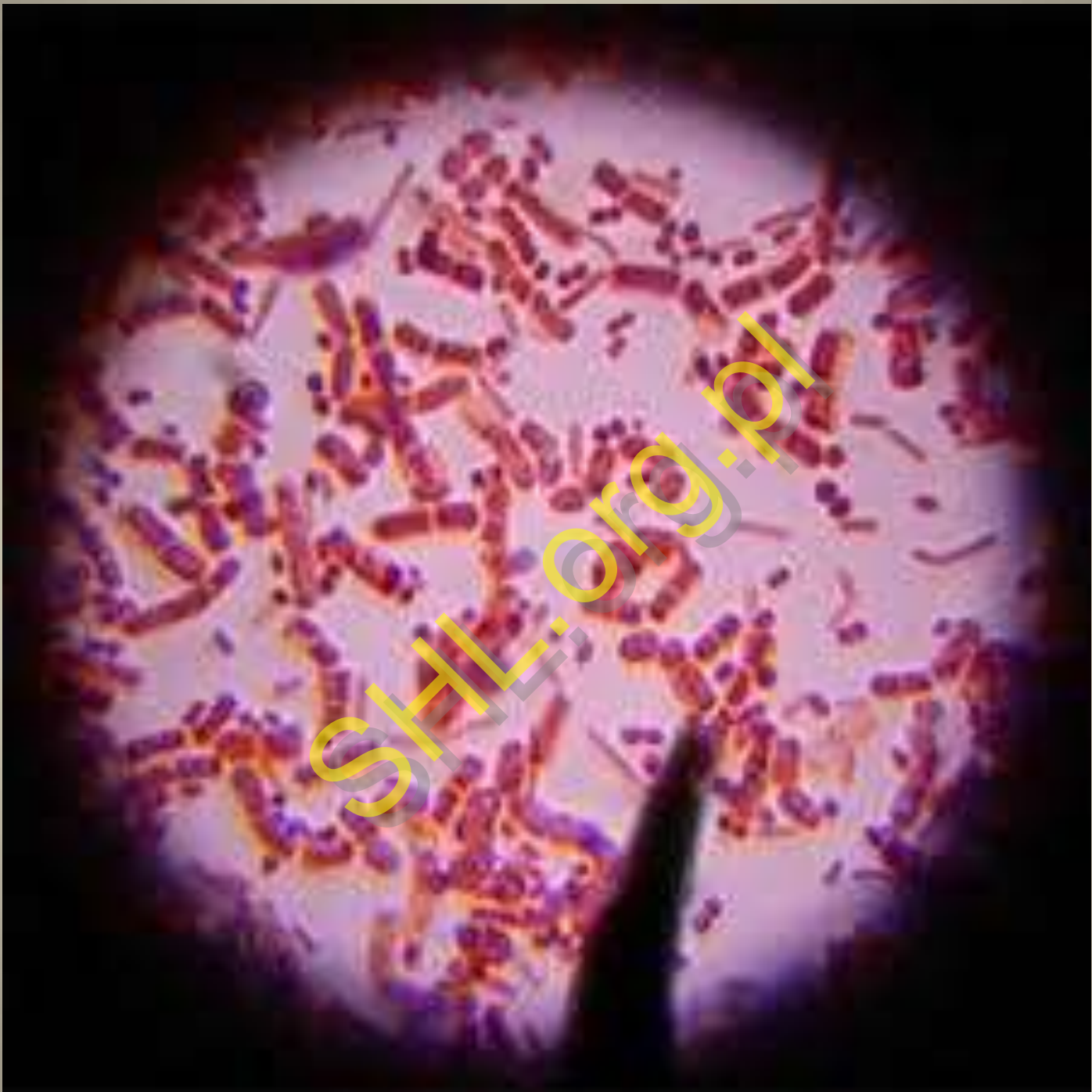
**Istotnym problemem w gojeniu się ran przewlekłych jest nie tyle odczyn „destruktywny” (zakażenie, martwica) co brak odpowiedniej regeneracji tkanek (układ odpornościowy, neoangiogeneza, proliferacja fibroblastów, epitelializacja...).**

## Cytotoxicity of products on skin cells.

cell viability %







*Z raportu Europejskiego Centrum  
Zapobiegania i Kontroli Chorób (ECDC)  
2013 wynika, że z powodu infekcji  
bakteriami opornymi na antybiotyki w UE  
co roku umiera 25 tys. ludzi.*

Number of infections, deaths and hospital days caused by resistant bacteria in the EU, 2007

<b>Bacteria</b>	<b>Infections</b>	<b>Deaths</b>	<b>Hospital days</b>
Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)	171,200	5,400	1,050,000
Vancomycin-resistant <i>Enterococcus faecium</i> (VRE)	18,100	1,500	111,000
Penicillin-resistant <i>Streptococcus pneumoniae</i>	3,500	N.a.	N.a.
3rd generation cephalosporin-resistant <i>Escherichia coli</i>	32,500	5,100	358,000
3rd generation cephalosporin-resistant <i>Klebsiella pneumoniae</i>	18,900	2,900	208,000
Carbapenem-resistant <i>Pseudomonas aeruginosa</i>	141,900	10,200	809,000

**First Methicillin resistant *Staphylococcus aureus* (MRSA) is estimated to cause 19.000 deaths per year in the United States ([Klevens 2007](#)). Apart from their high mortality rate MRSA infections lead to an estimated 4 billions US - dollar of additional costs per year. Furthermore, the rising prevalence of MRSA increases the likelihood that vancomycin - resistant *S. aureus* (VRSA) will become a new scourge in hospitals.**

*Kujath P, Kujath C. Complicated skin, skin structure and soft tissue infections - are we threatened by multi-resistant pathogens?  
Eur J Med Res. 2010 Nov 30;15(12):544-53.*



Tissue infections occur at any age and both men and women are affected. Skin and soft tissue infections are very common. They account for 5-10% of the patient collective in surgical clinics ([Kujath 1999](#)).

Approximately 2/3 of patients have a severe systemic disease associated with immunosuppression (malnutrition, s./p. transplantation, steroid therapy, diabetes mellitus).

*Kujath P, Kujath C. Complicated skin, skin structure and soft tissue infections - are we threatened by multi-resistant pathogens?  
Eur J Med Res. 2010 Nov 30;15(12):544-53.*

## Costs of treating infections caused by methicillin-resistant staphylococci and vancomycin-resistant enterococci

Claude Carbon\*

**Table I.** Baseline characteristics and outcomes (mean  $\pm$  S.E.M., unless otherwise indicated) in patients with MRSA infection, and matched controls, in the intensive care unit<sup>11</sup>

	MRSA ( <i>n</i> = 35)	Control ( <i>n</i> = 35)
Baseline characteristics		
age	54.8 ( $\pm$ 2.6)	59.7 ( $\pm$ 2.8)
gender (male:female)	18:17	21:14
APACHE II	22.3 ( $\pm$ 1.7)	22.5 ( $\pm$ 1.7)
APACHE II derived risk of death	40.4 ( $\pm$ 4.9)	42.2 ( $\pm$ 4.9)
Outcome		
mean daily therapeutic intervention score (TISS)	25.1 ( $\pm$ 1.4)	27.1 ( $\pm$ 1.1)
median length of stay (days)	31	5
died in ICU (number)	7	7
died on ward (number)	7	3
discharged (number)	21	25

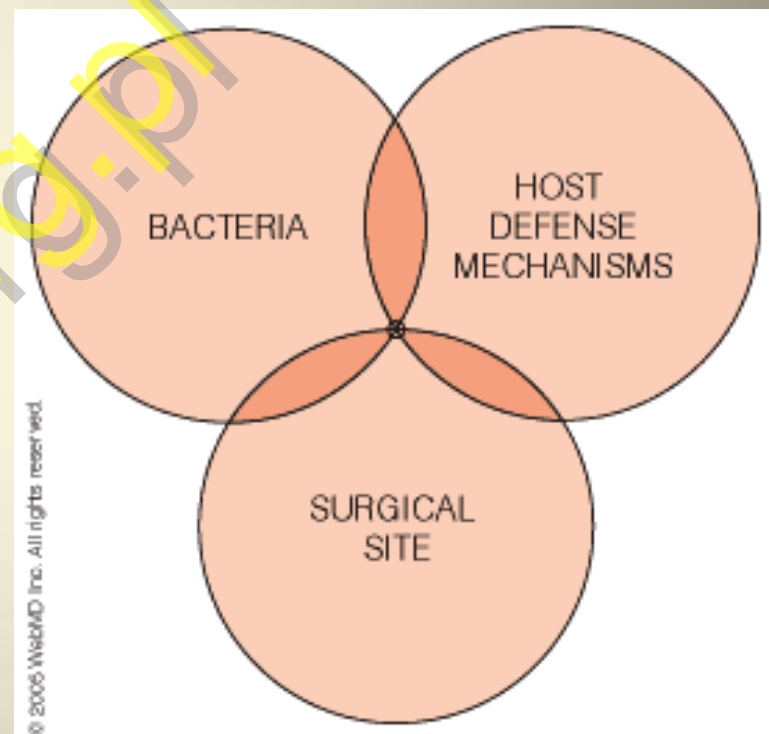




# Czynniki ryzyka zakażenia tkanek miękkich i skóry

## Czynniki zależne od pacjenta

- **Wiek**
- **Oslabienie odporności**
- **NYHA, ASA**
- **Choroby współwystępujące**
- **Schorzenia ogólnoustrojowe (cukrzyca, AIDS)**
- **Przyjmowane leki (steroidoterapia)**



McCollum M, Sorensen SV, Liu LZ.: A comparison of costs and hospital length of stay associated with intravenous/oral linezolid or intravenous vancomycin treatment of complicated skin and soft-tissue infections caused by suspected or confirmed methicillin-resistant *Staphylococcus aureus* [in elderly US patients](#). Clin Ther. 2007 Mar;29(3):469-77.

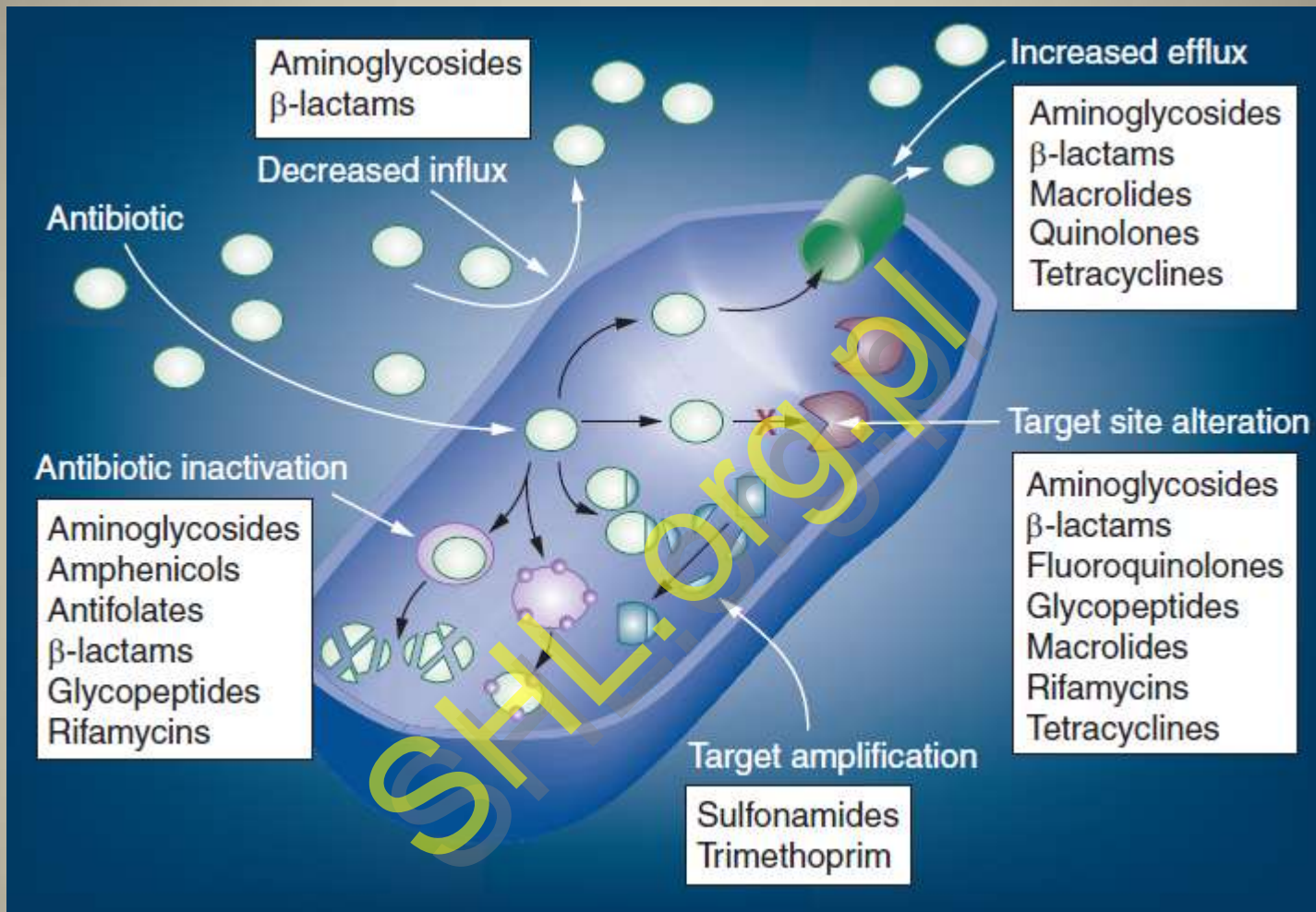
- Zakażenia miejsca operowanego związane są z:
- czynnikami zależnymi od pacjenta (niedożywienie, choroby i nałogi zmniejszające odporność, zaniedbania higieniczne)
    - Zakresem zabiegu operacyjnego
  - warunkami sanitarno - epidemiologicznymi,
  - poziomem edukacji personelu medycznego,
    - stosowaniem antybiotykoprofilaktyki,
    - opornością bakteryjną (ściśle związaną z antybiotykoterapią a w zasadzie jej błędami).

Zakażenia miejsca operowanego związane są z:

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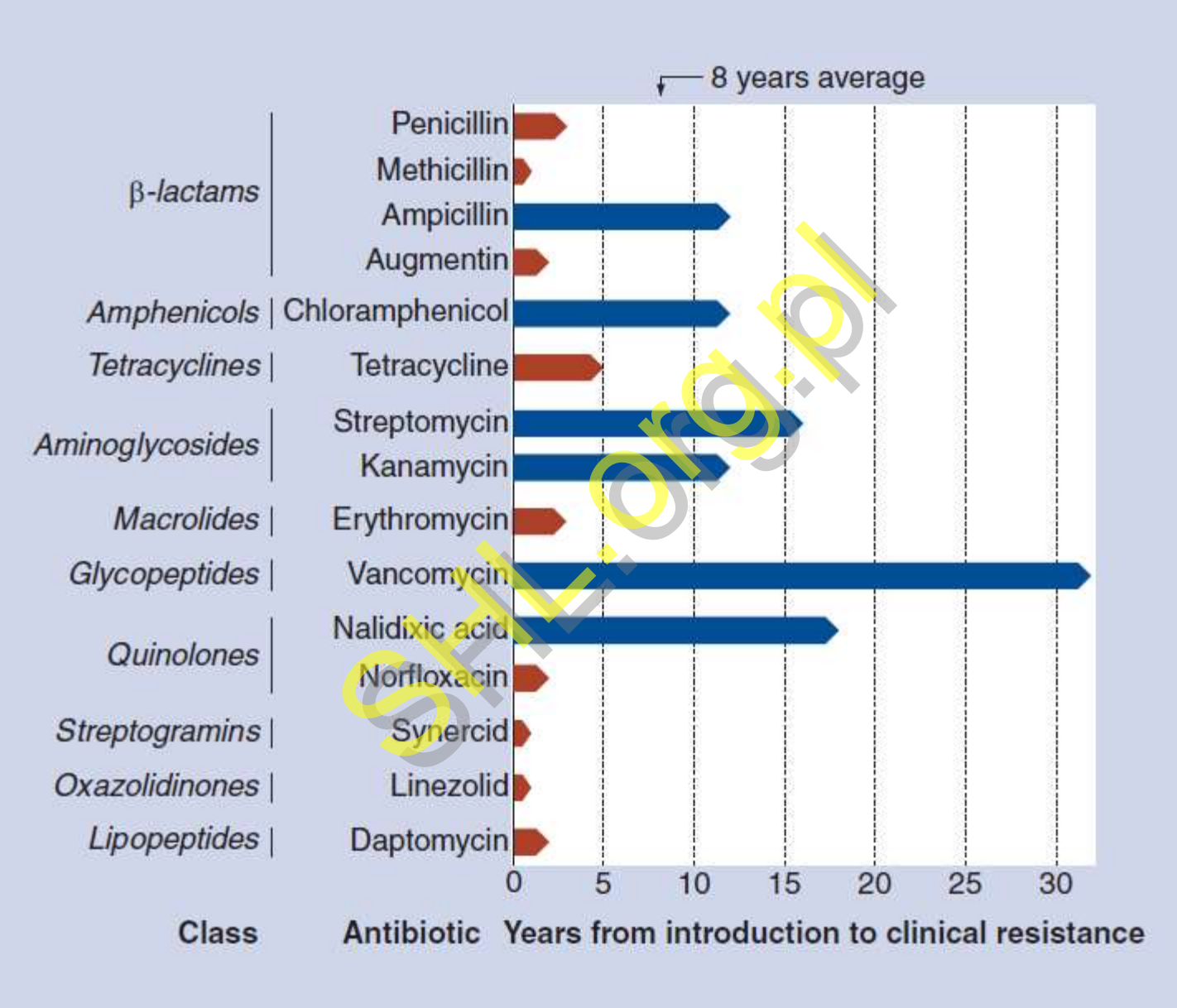
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Część gronkowców produkuje betalaktamazy rozkładające penicyliny, jednak mają one małe znaczenia. Większe znaczenie mają białka wiążące penicyliny (PBP), szczepy posiadające dodatkowe białko PBP2' odporne są na wszystkie antybiotyki betalaktamowe. szczepy takie nazywamy metycylinoopornymi (MRSA i MRCNS), białko PBP2' kodowane jest przez gen *mecA*.

Schmieder R, Edwards R.: Insights into antibiotic resistance through metagenomic approaches. Future Microbiol. 2012 Jan;7(1):73-89.





**Clinically important: The discovery of antibiotic-resistant bacteria in Lechuguilla Cave (above) in New Mexico, U.S., could open the door to new drugs Lechuguilla Cave, which reaches to a depth of 1,604 feet, is one of the largest and deepest unspoiled cave systems in the world.**



**'Hard-wired': It is widely thought that antibiotic-resistant bacteria like MRSA (above) are caused by over-use of medication, but this find suggests otherwise**



## EPIC TV

### High Quality



## Discovery of antibiotic-resistant bacteria in ancient cave could lead to cure for superbugs

- Bugs hidden from outside world for four million years
- Resistance believed to be result of over use of drugs
- But this discovery shows it is 'hard-wired' in nature

By SIMON TOMLINSON

PUBLISHED: 06:08 GMT, 12 April 2012 | UPDATED: 09:31 GMT, 12 April 2012

[Comments \(11\)](#) | [Share](#)    [Tweet](#) 18 | [Like](#)  311

Antibiotic-resistant bacteria cut off from the outside world for more than four million years have been found in a deep cave.

The discovery is surprising because scientists had thought bacteria built up resistance to antibiotics after being repeatedly exposed to the treatment.

However, the resistant bugs from Lechuguilla Cave in New Mexico, U.S., have had no contact with humans, suggesting the environment may be to blame.

Site Web  Search 



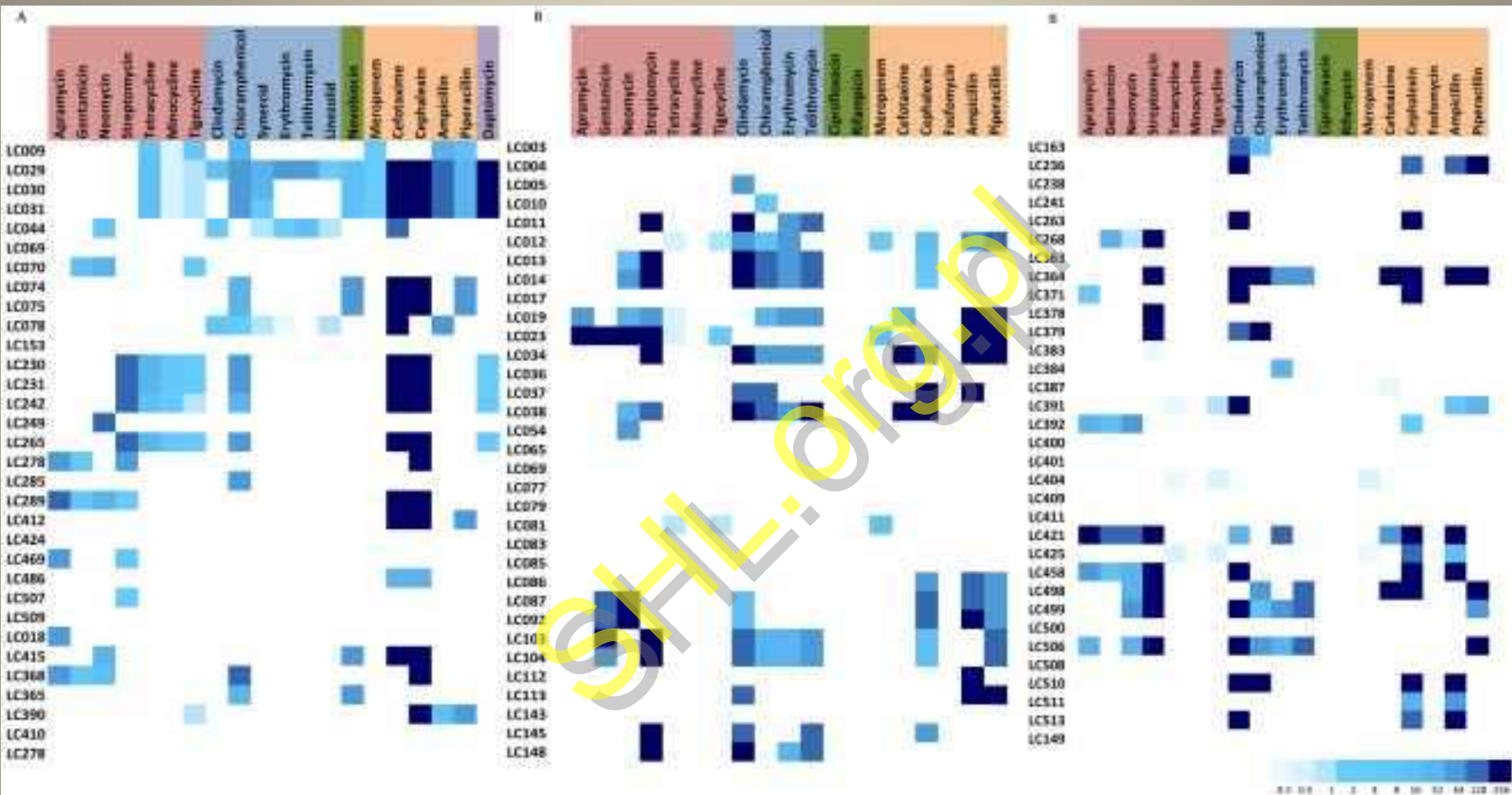
Finally, it's the App you've all been waiting for...

### FEMAIL TODAY

► Now that's a PDA! Loved up Kim Kardashian and Kanye West share a moment as they take Kylie and Kendall out to dinner



Bhullar K, Waglechner N, Pawlowski A, Koteva K, Banks ED, Johnston MD, Barton HA, Wright GD.: Antibiotic resistance is prevalent in an isolated cave microbiome. PLoS One. 2012;7(4):e34953. Epub 2012 Apr 11.



Heat Plot for (A) Gram-positive strains (B) Gram-negative strains against various antibiotics. Antibiotics are grouped according to their mode of action and the gradient from light blue to dark blue represents the range from lowest MIC value (0.3 µg/ml) to highest MIC value (256 µg/ml) as shown in the legend. White means no MIC was determined.



EDITORIAL

Open Access

# Ready for a world without antibiotics? The Pensières Antibiotic Resistance Call to Action

Jean Carlet<sup>1\*</sup>, Vincent Jarlier<sup>2</sup>, Stephan Harbarth<sup>3</sup>, Andreas Voss<sup>4</sup>, Herman Goossens<sup>5</sup> and Didier Pittet<sup>3</sup>, for the Participants of the 3rd World Healthcare-Associated Infections Forum<sup>6</sup>

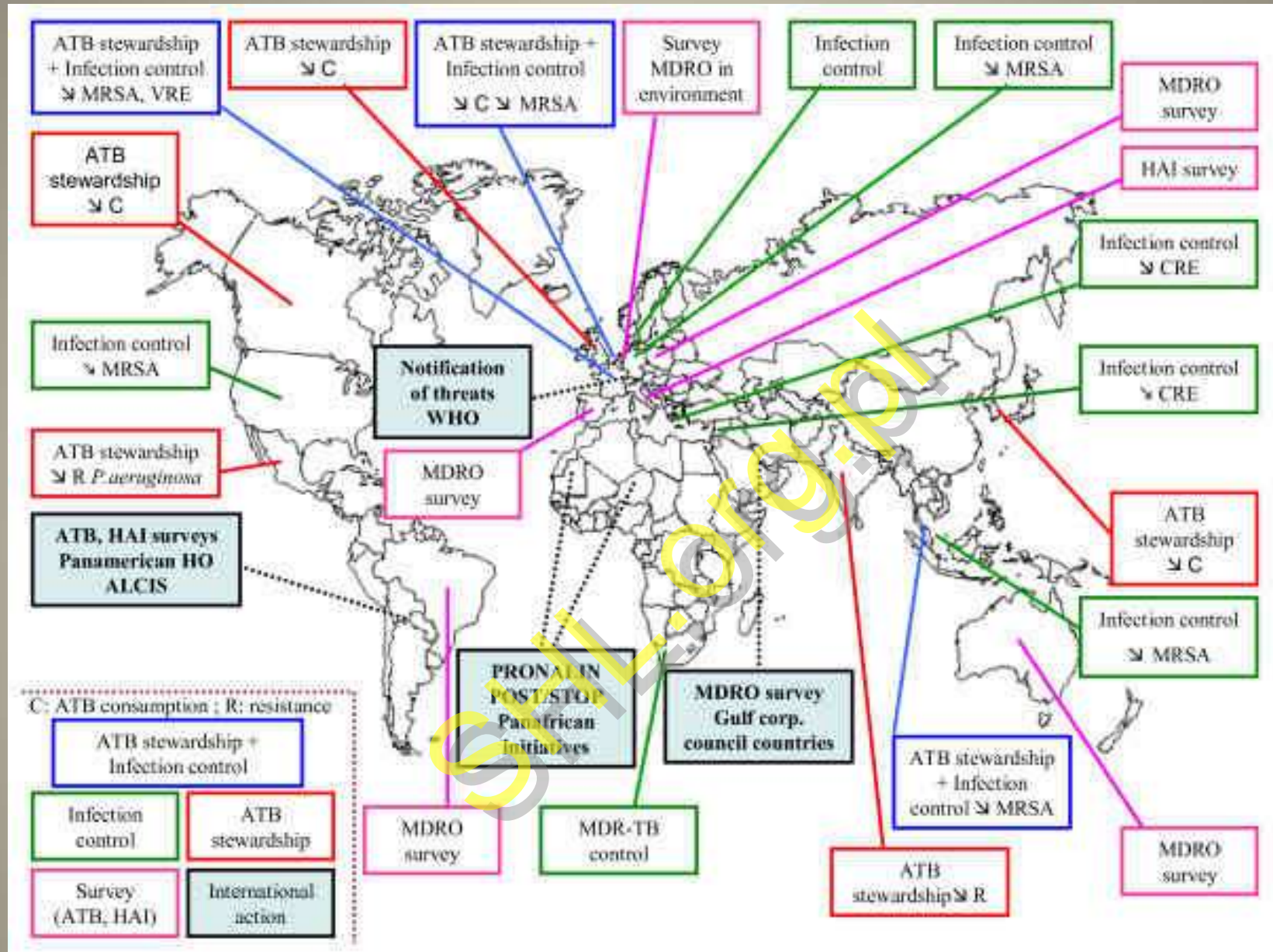
## Abstract

Resistance to antibiotics has increased dramatically over the past few years and has now reached a level that places future patients in real danger. Microorganisms such as *Escherichia coli* and *Klebsiella pneumoniae*, which are commensals and pathogens for humans and animals, have become increasingly resistant to third-generation cephalosporins. Moreover, in certain countries, they are also resistant to carbapenems and therefore susceptible only to tigecycline and colistin. Resistance is primarily attributed to the production of beta-lactamase genes located on mobile genetic elements, which facilitate their transfer between different species. In some rare cases, Gram-negative rods are resistant to virtually all known antibiotics. The causes are numerous, but the role of the overuse of antibiotics in both humans and animals is essential, as well as the transmission of these bacteria in both the hospital and the community, notably via the food chain, contaminated hands, and between animals and humans. In addition, there are very few new antibiotics in the pipeline, particularly for Gram-negative bacilli. The situation is slightly better for Gram-positive cocci as some potent and novel antibiotics have been made available in recent years. A strong and coordinated international programme is urgently needed. To meet this challenge, 70

**Carlet J, Rambaud C, Pulcini C.: WAAR (World Alliance against Antibiotic Resistance): Safeguarding antibiotics. Antimicrob Resist Infect Control. 2012 Jul 9;1(1):25. [Epub ahead of print]**

**ABSTRACT:** Resistance to antibiotics has increased recently to a dramatic extent, and the pipeline of new antibiotics is almost dry for the five next years. Failures happen already for trivial community acquired infections, like pyelonephritis, or peritonitis, and this is likely to increase. Difficult surgical procedures, transplants, and other immunosuppressive therapies will become far more risky. Resistance is mainly due to an excessive usage of antibiotics, in all sectors, including the animal one. Action is urgently needed. Therefore, an alliance against MDRO has been recently created, which includes health care professionals, consumers, health managers, and politicians. The document highlights the different proposed measures, and represents a strong consensus between the different professionals, including general practitioners, and veterinarians.

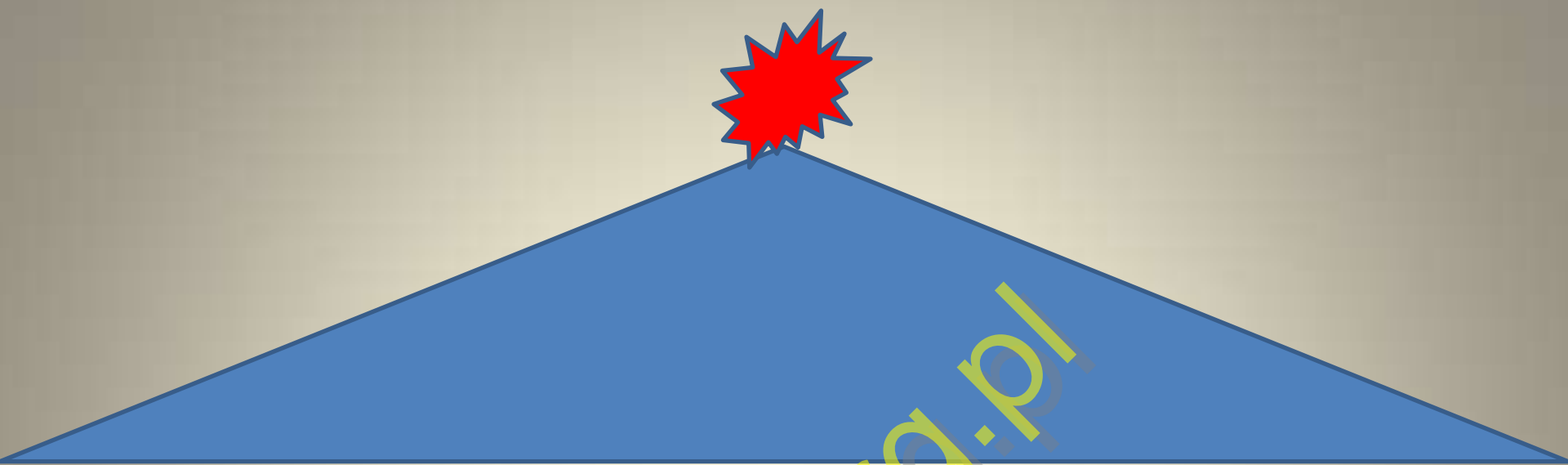




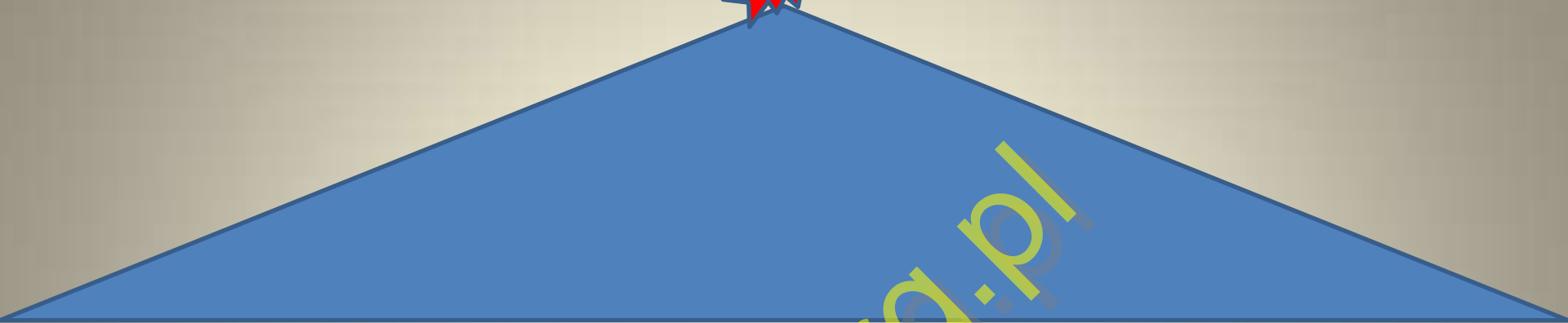
Jarlier V, Carlet J, McGowan J, Goossens H, Voss A, Harbarth S, Pittet D; the Participants of the 3rd World Healthcare-Associated Infections Forum: Priority actions to fight antibiotic resistance: results of an international meeting. Antimicrob Resist Infect Control. 2012 May 3;1(1):17.



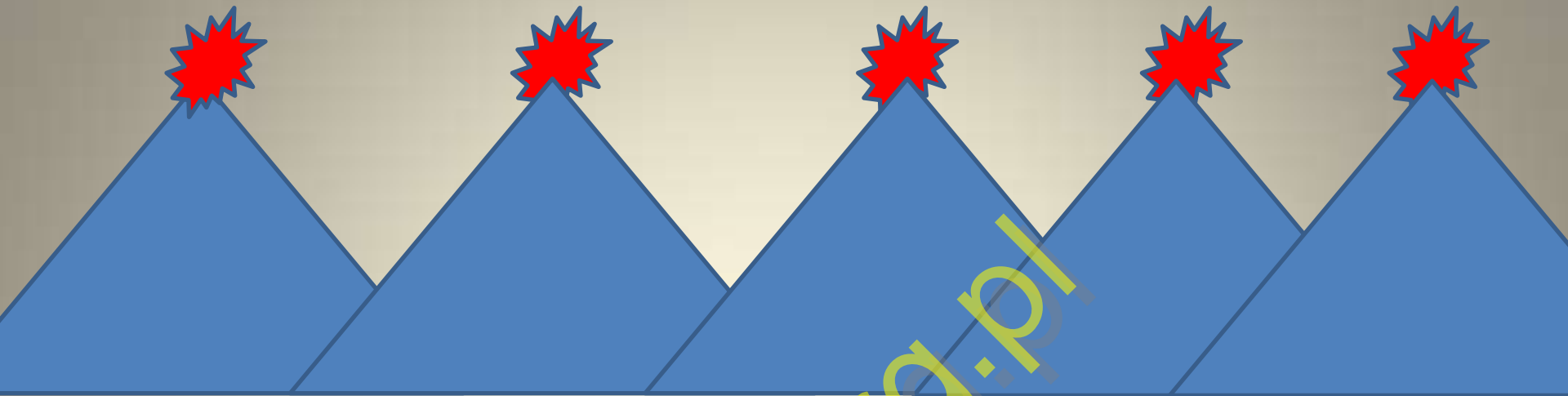
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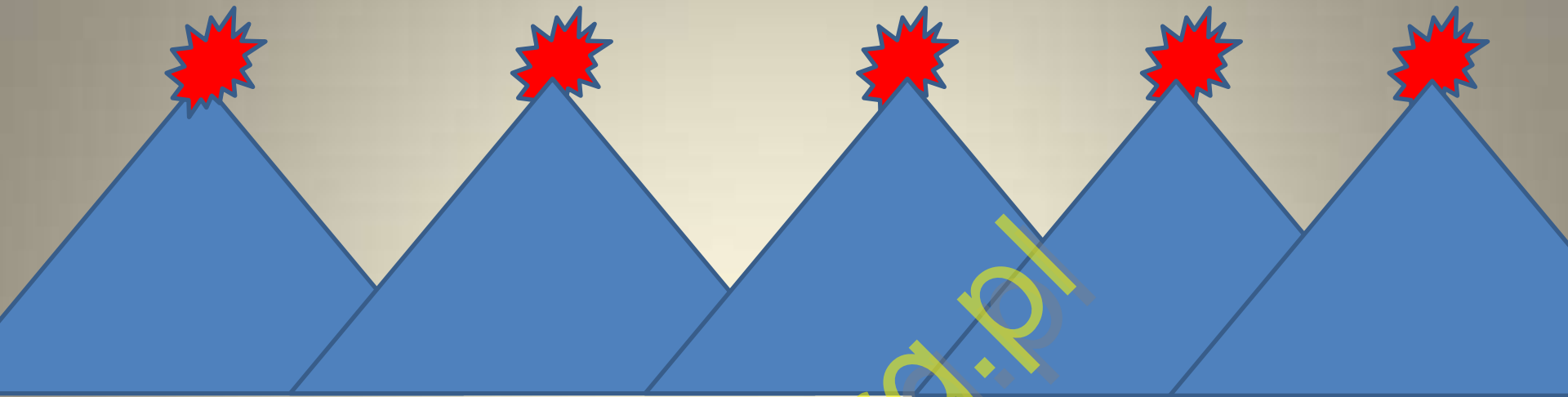


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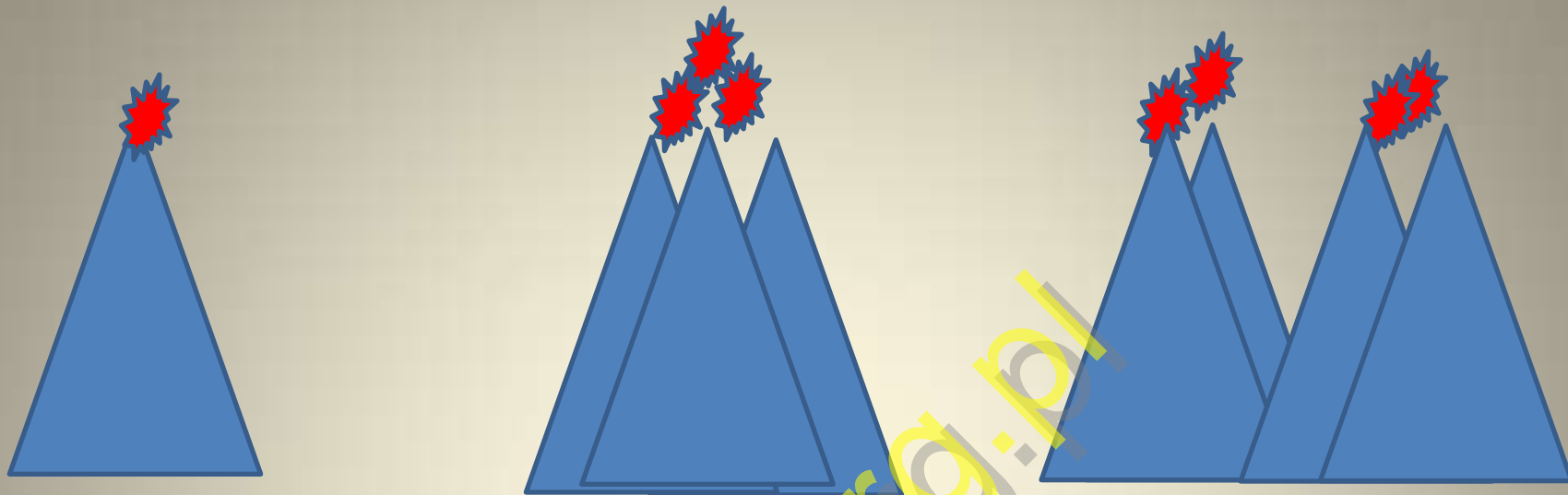


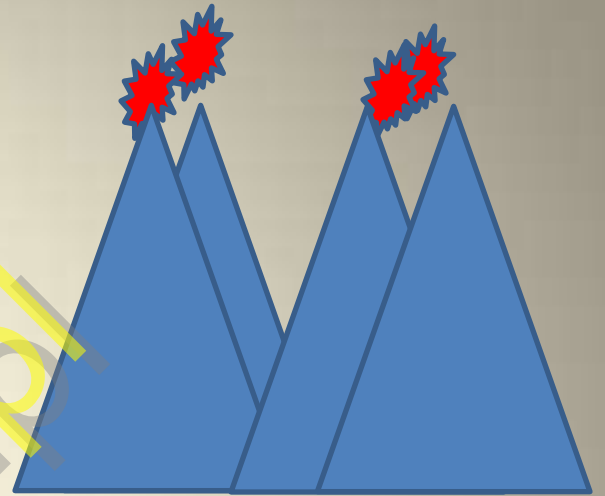
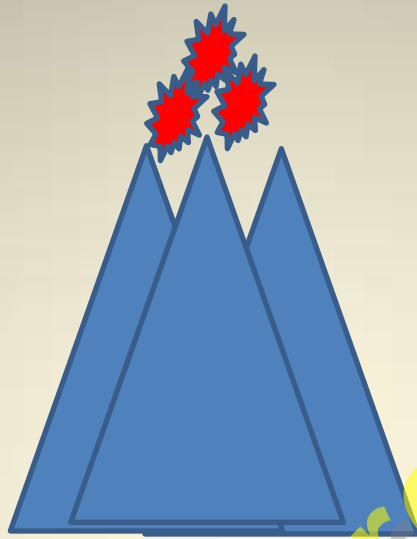
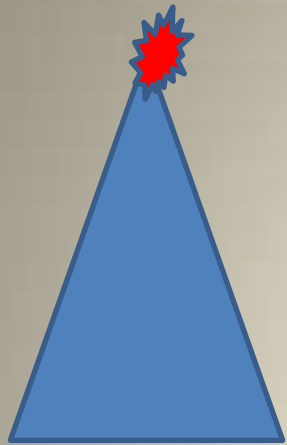
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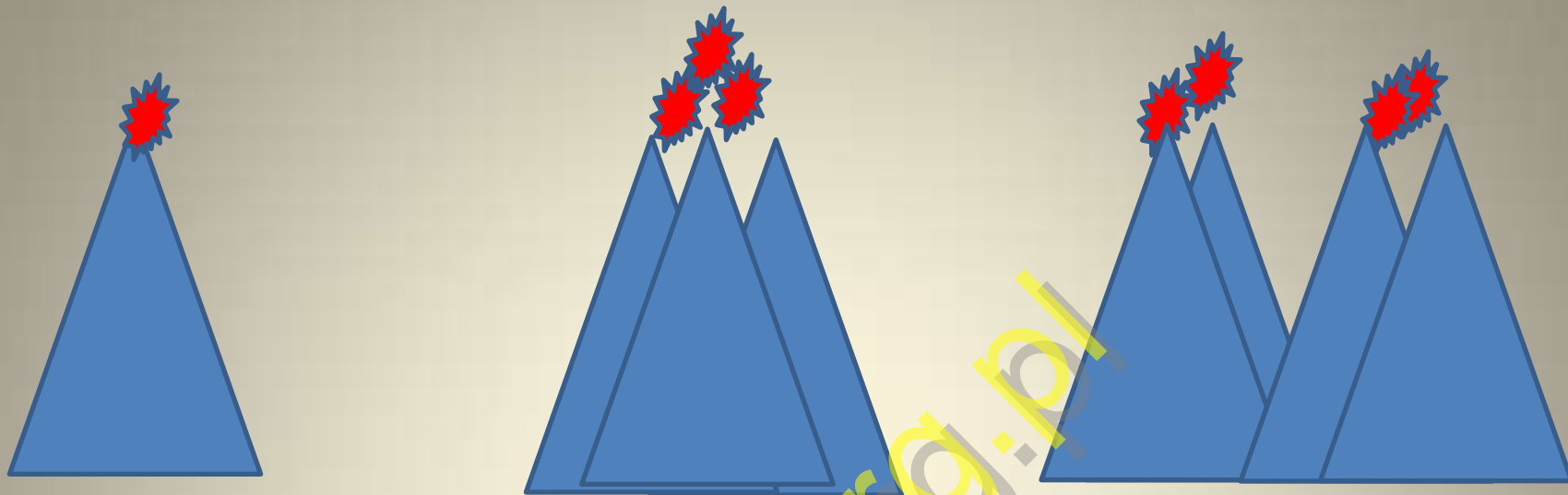


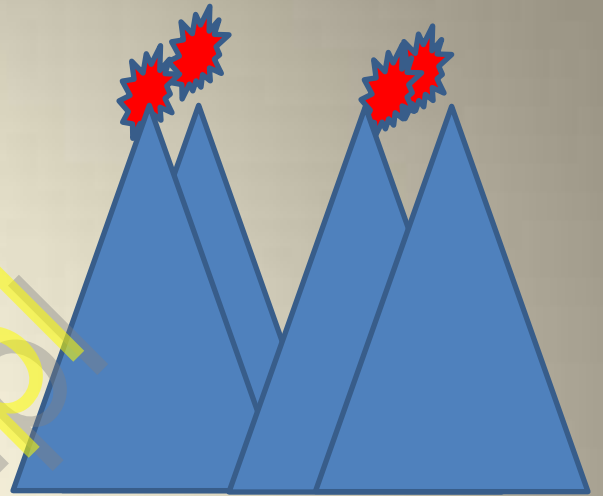
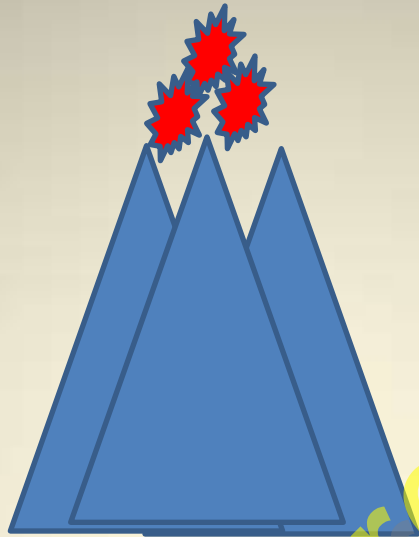
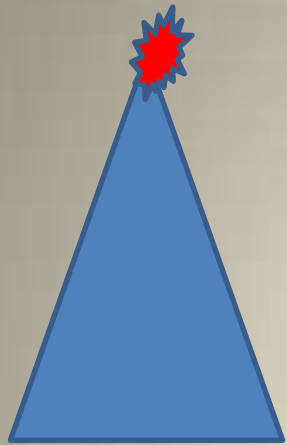
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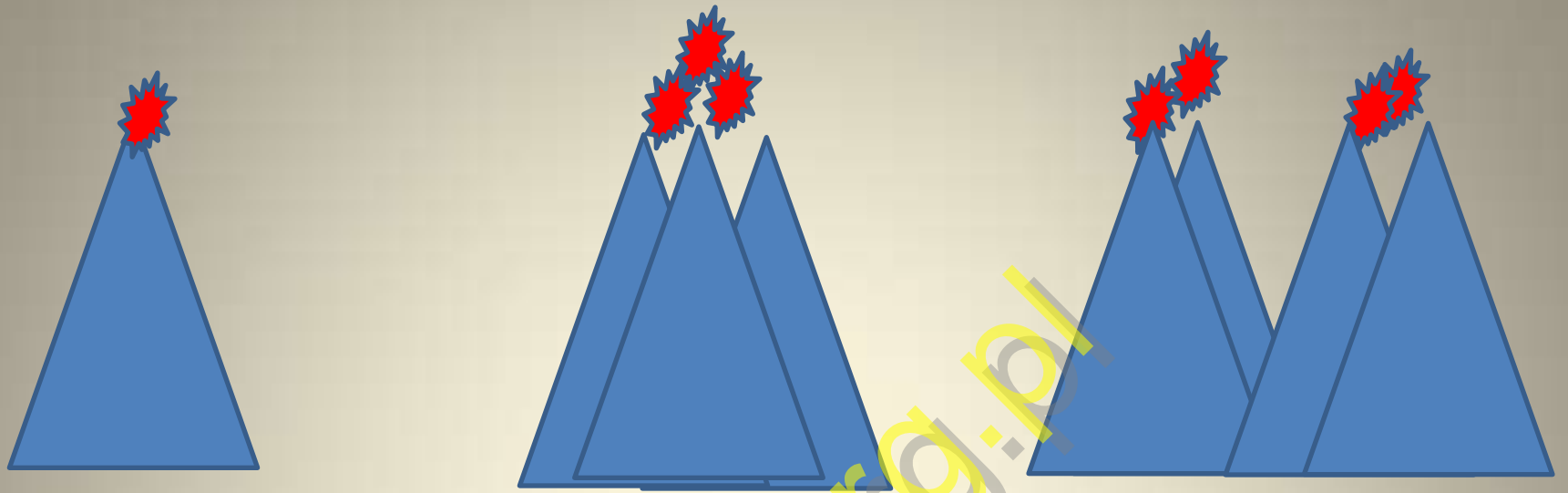


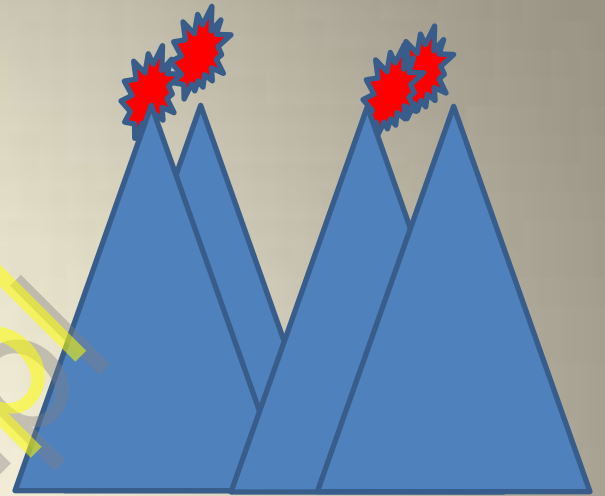
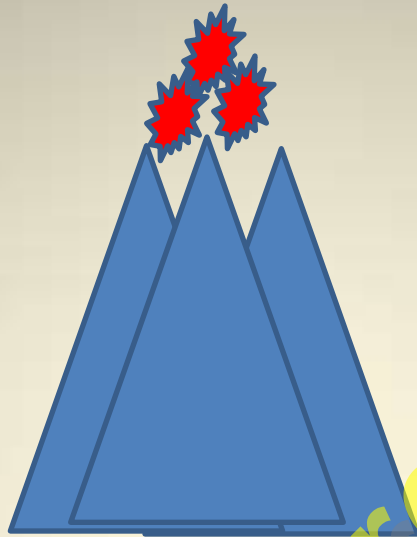
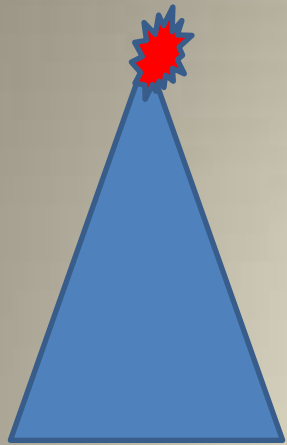




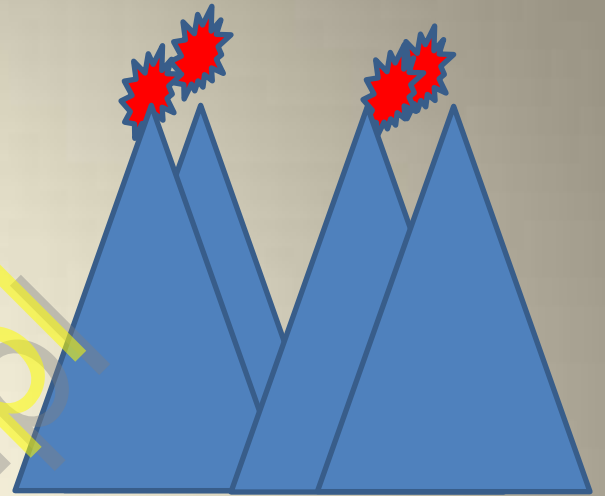
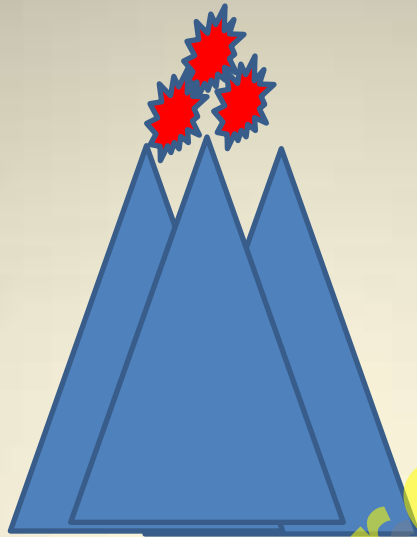
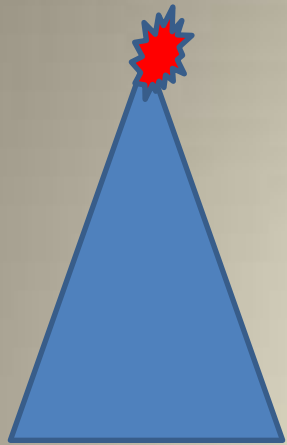


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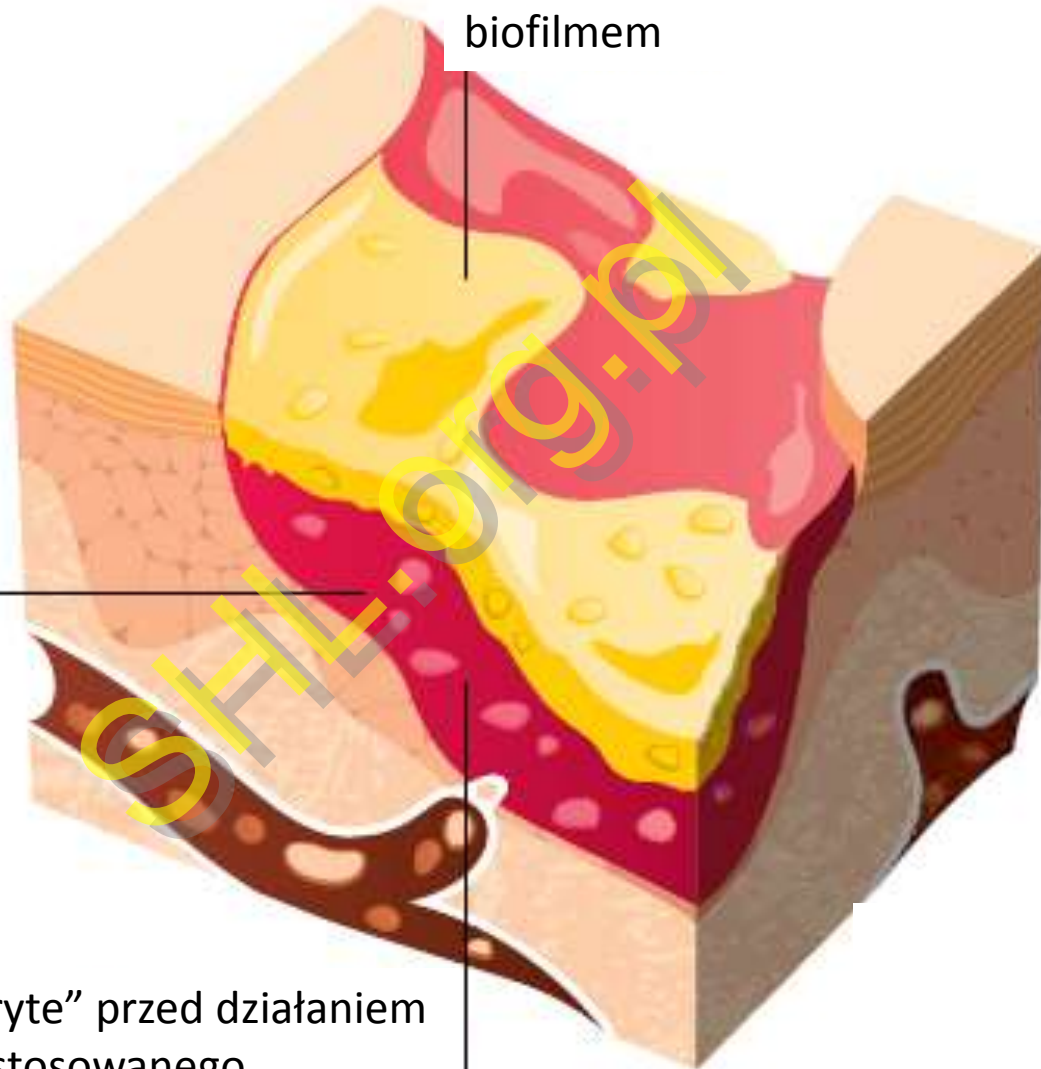




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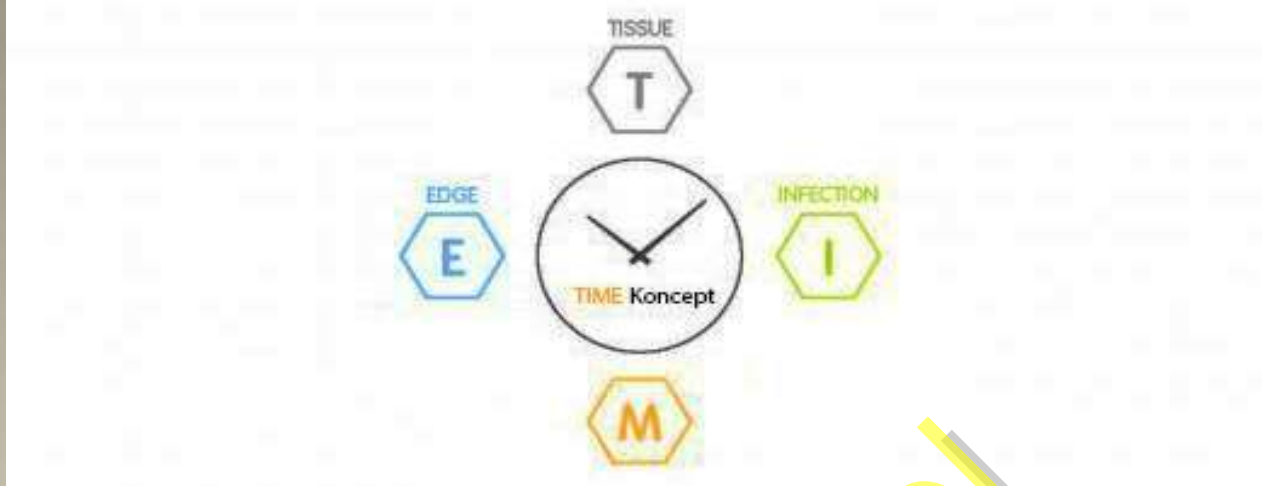


Bakterie „ukryte” przed działaniem antyseptyku biofilmem



Upośledzenie migracji i proliferacji keratynocytów.

Bakterie „ukryte” przed działaniem antybiotyku stosowanego systemowo



**T**issue – tkanka – oczyszczenie martwicy

**I**nfection (inflammation) – infekcja – usunięcia czynnika infekcyjnego

**M**oisture – wilgotność rany – odpowiednie warunki do gojenia

**E**dge – krawędź - zbliżanie brzegów rany

**O**czyszczenie rany

**Z**akażenie – eliminacja czynnika infekcyjnego

**O**dpowiednie warunki środowiska

**N**askórkowanie – dążenie do ostatecznego wygojenia rany



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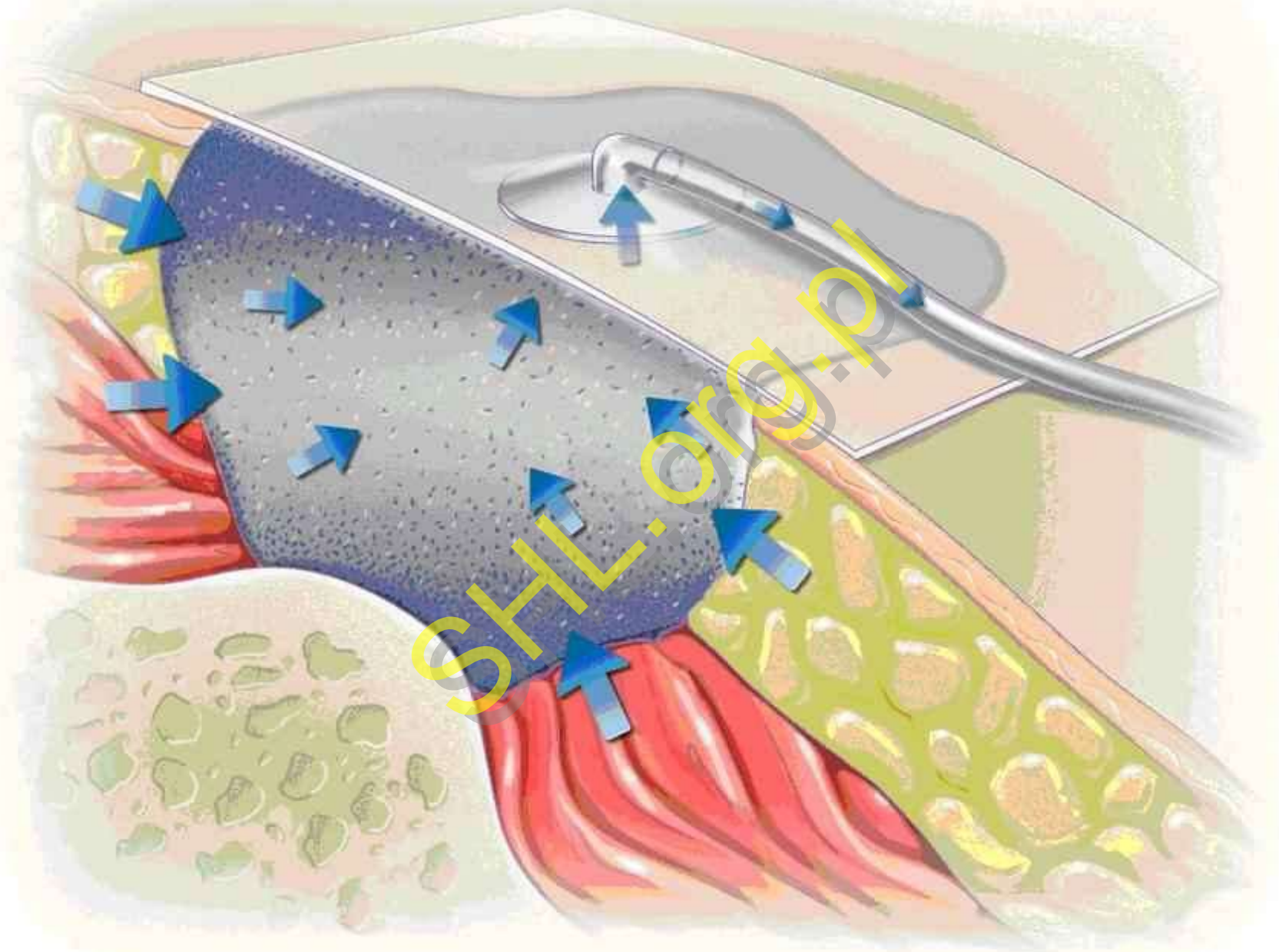








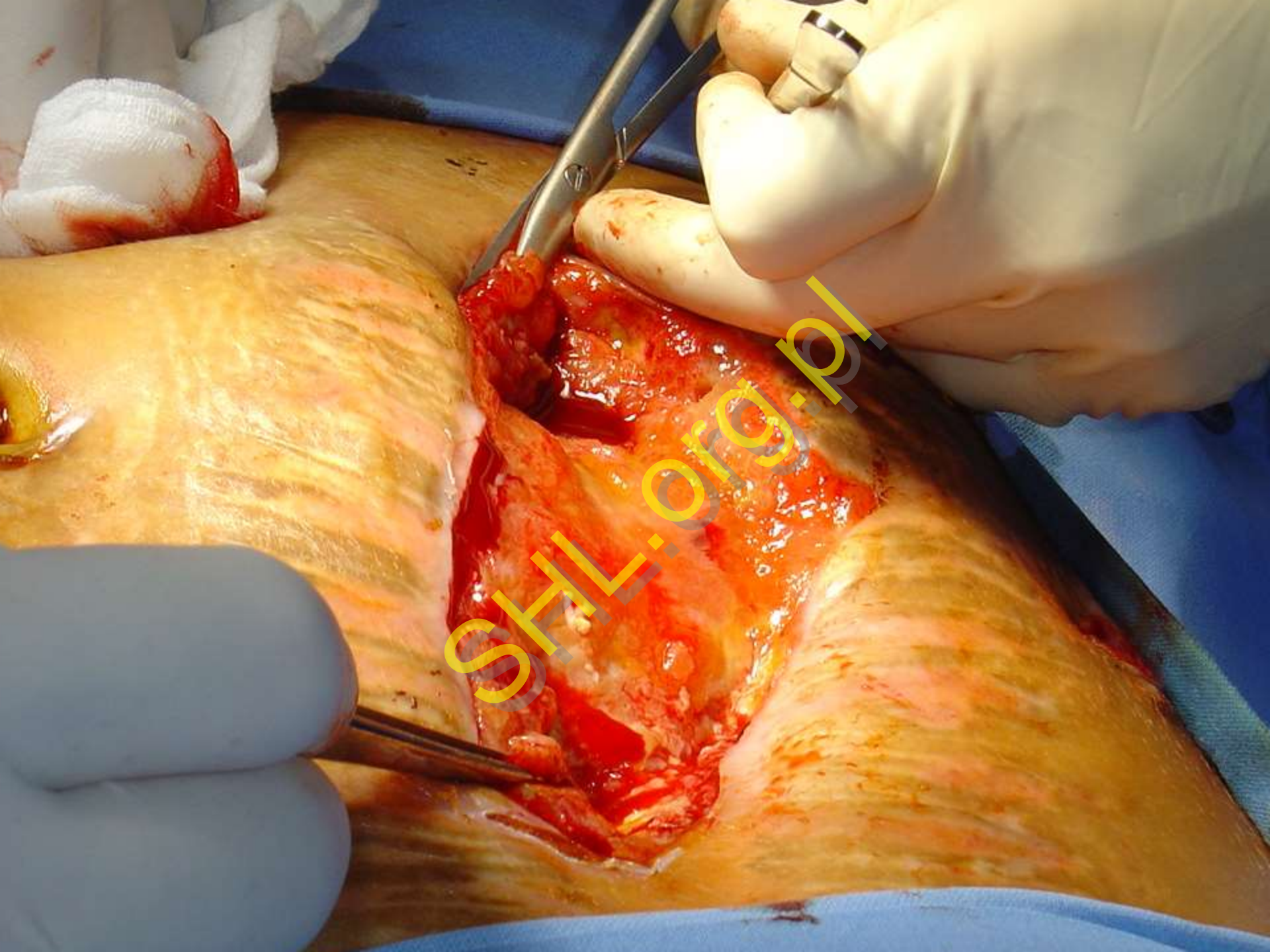


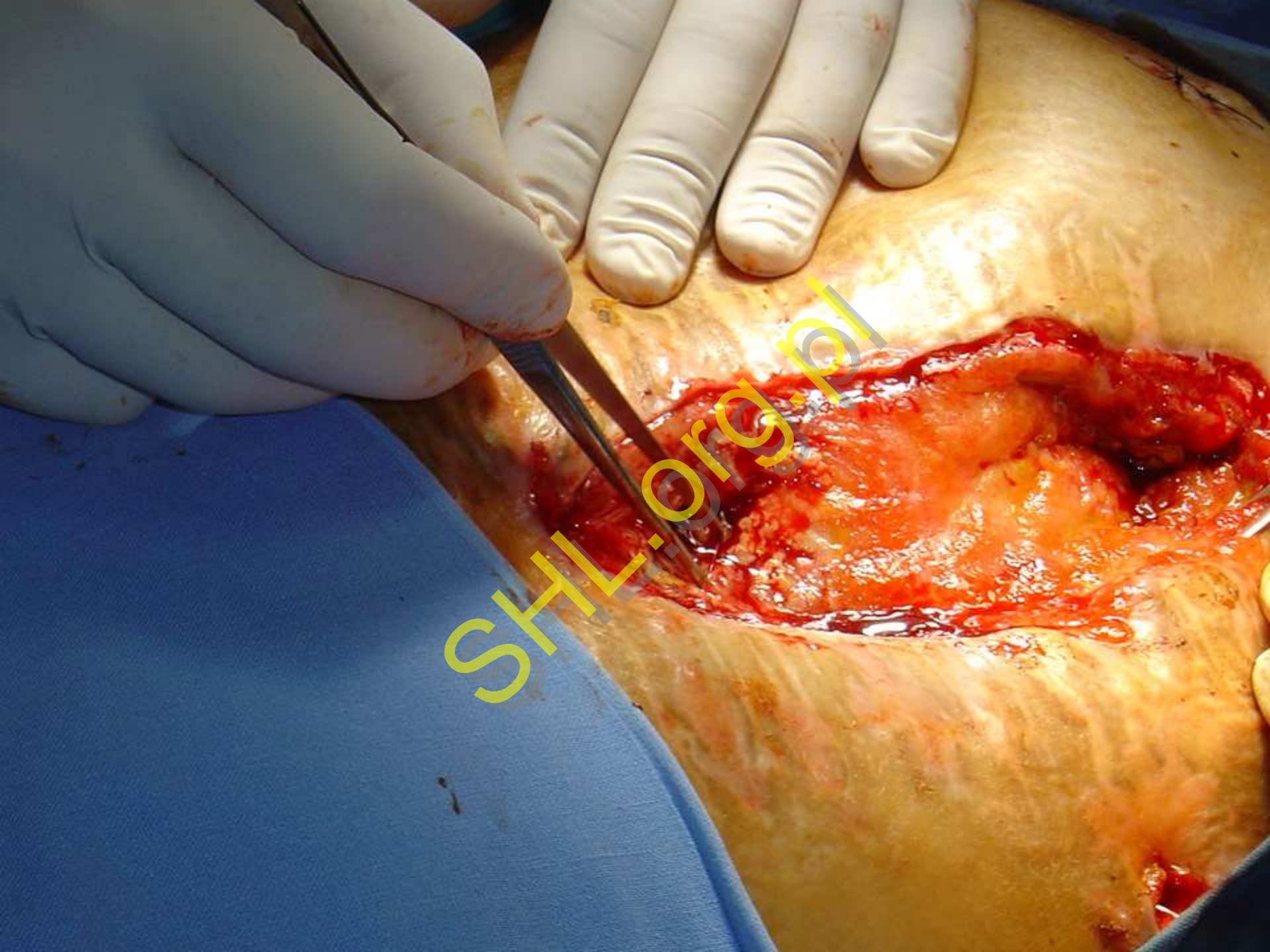


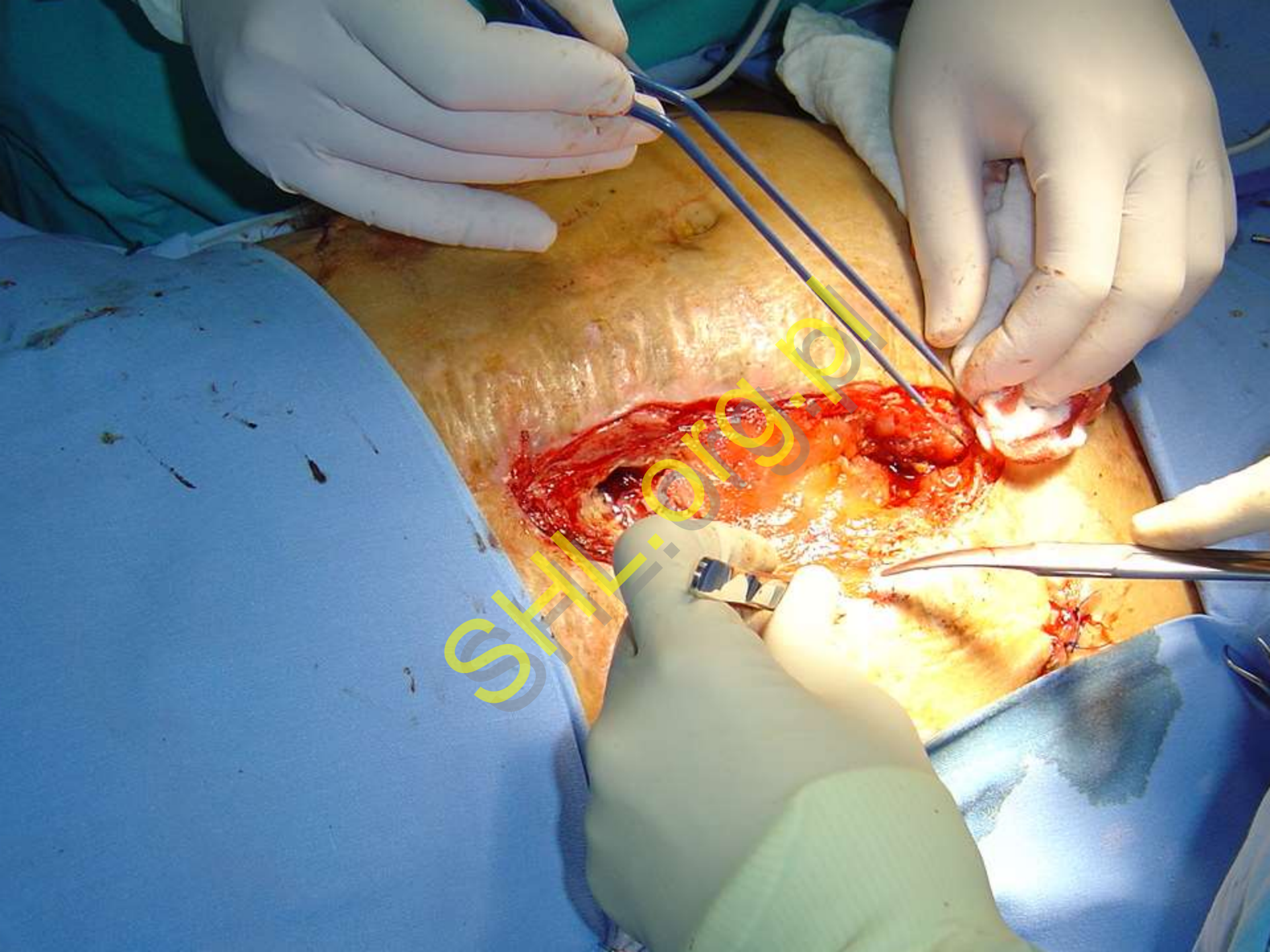








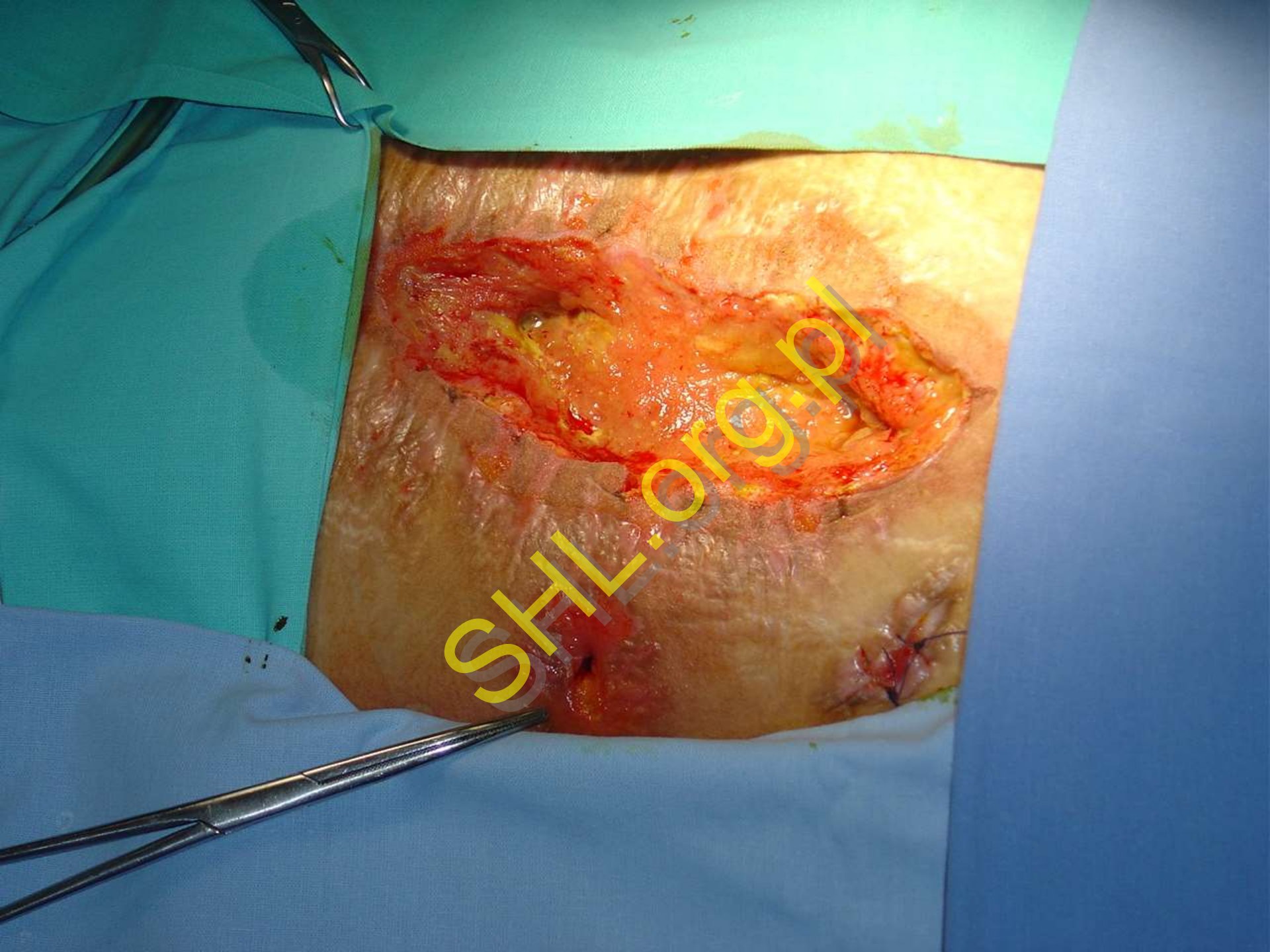


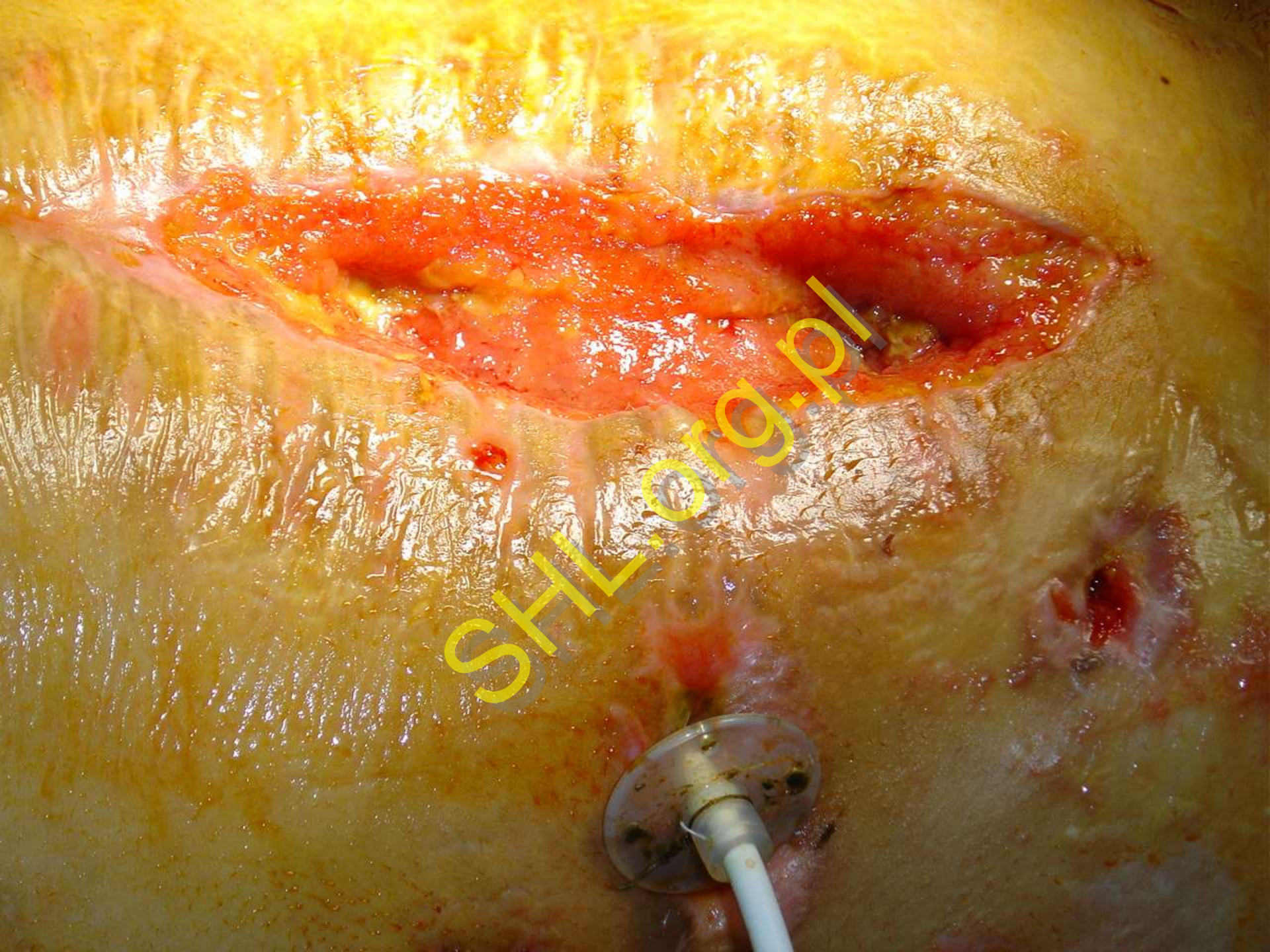
















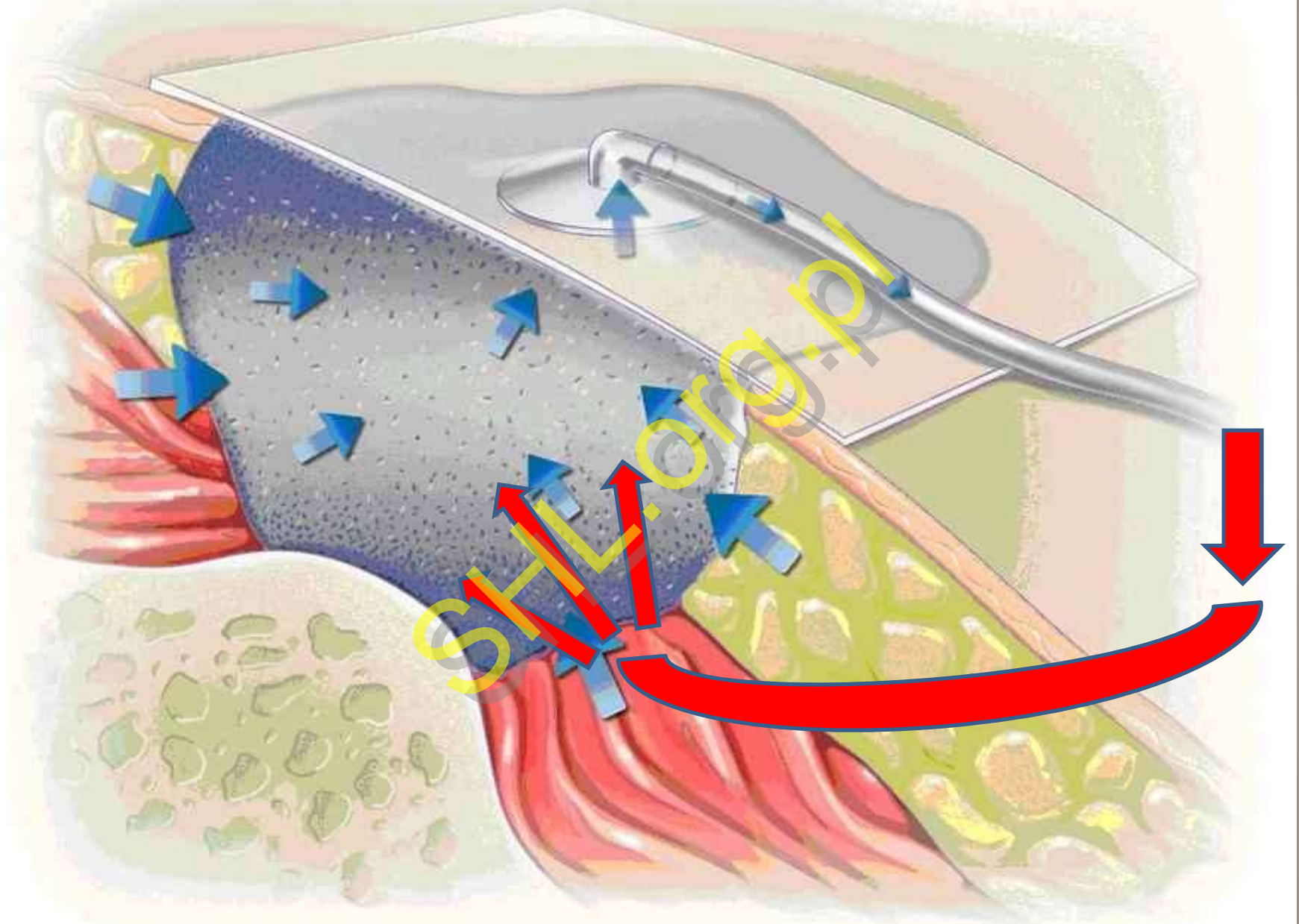




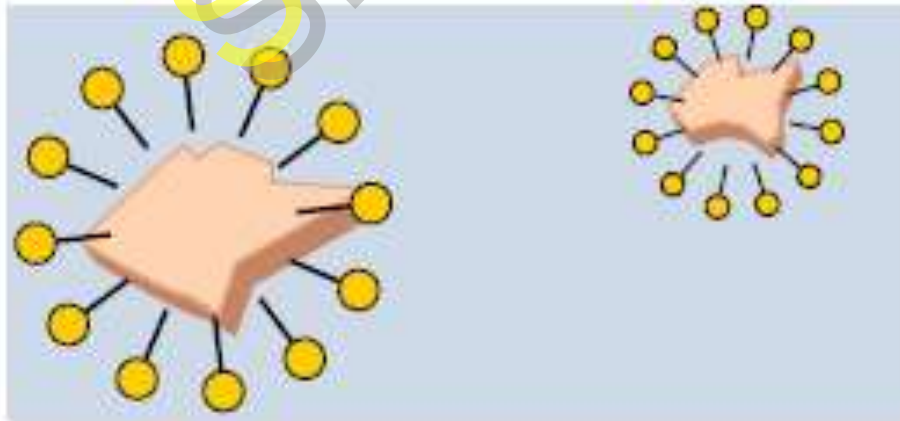
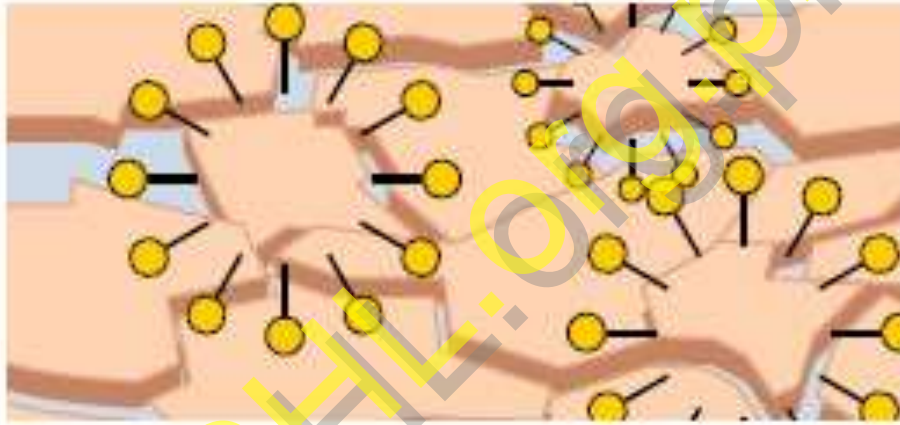
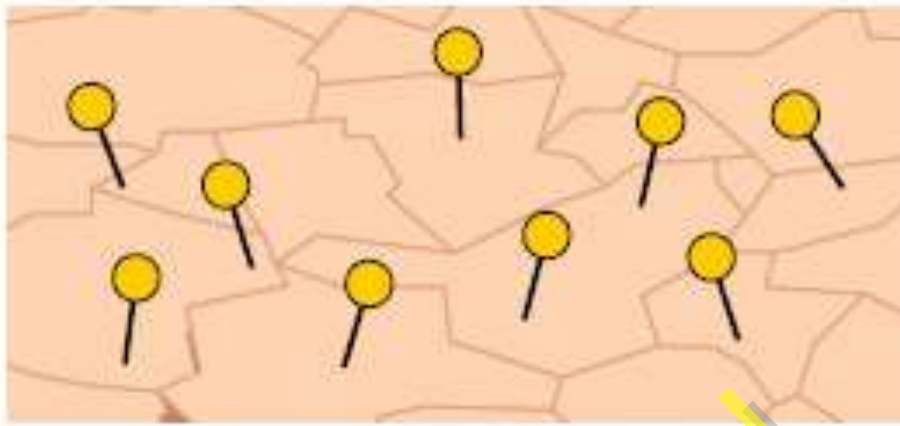










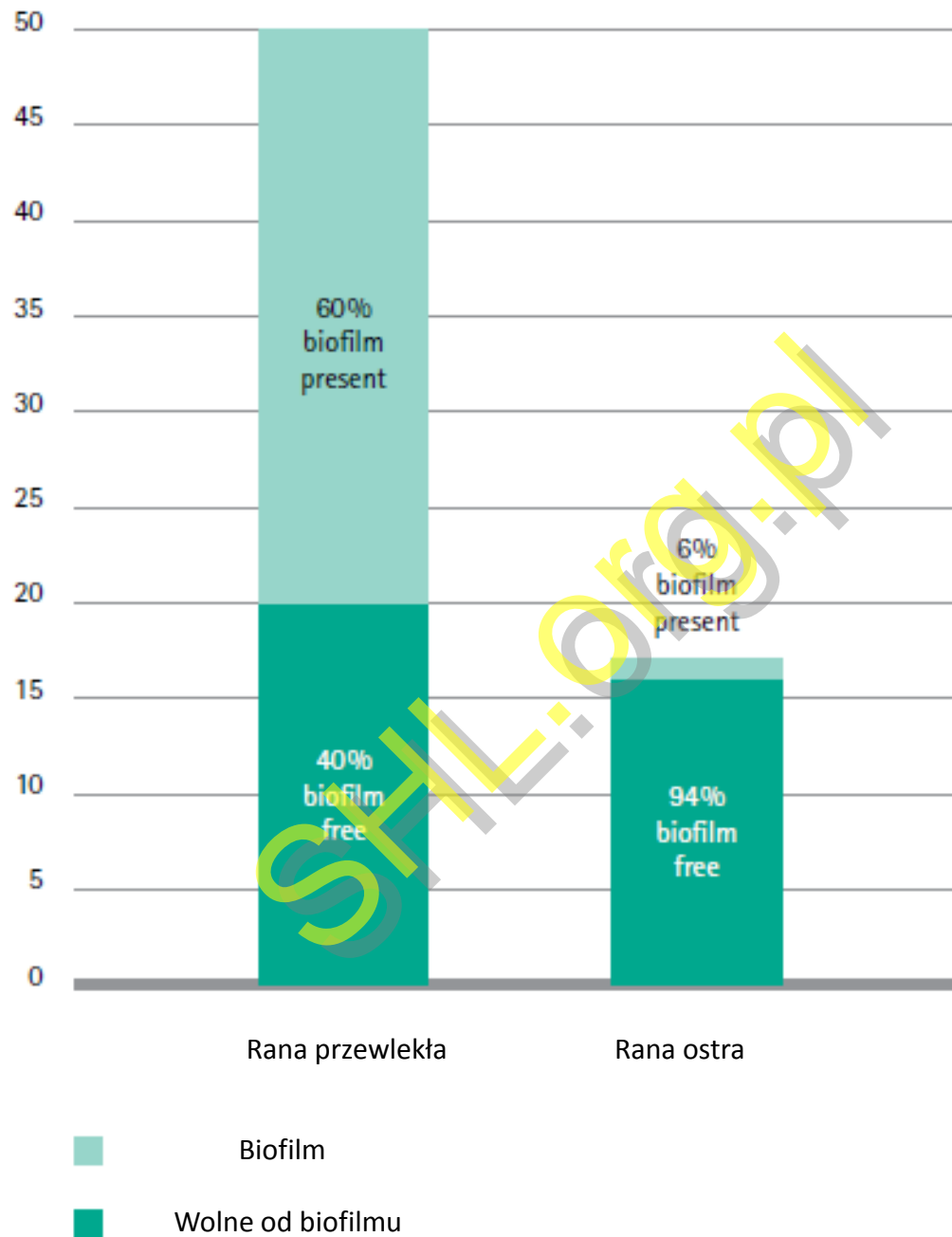




**Płukanie zawierające wodę – 0,9%NaCl, płyn Ringera nie  
wyptukują biofilmu**



**Prontosan usuwa biofilm poprzez zniszczenie jego  
struktury**

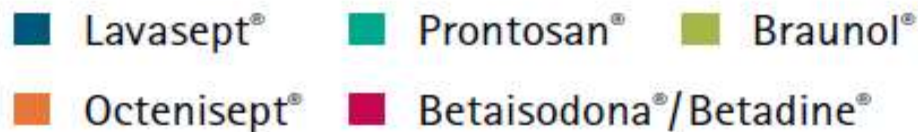
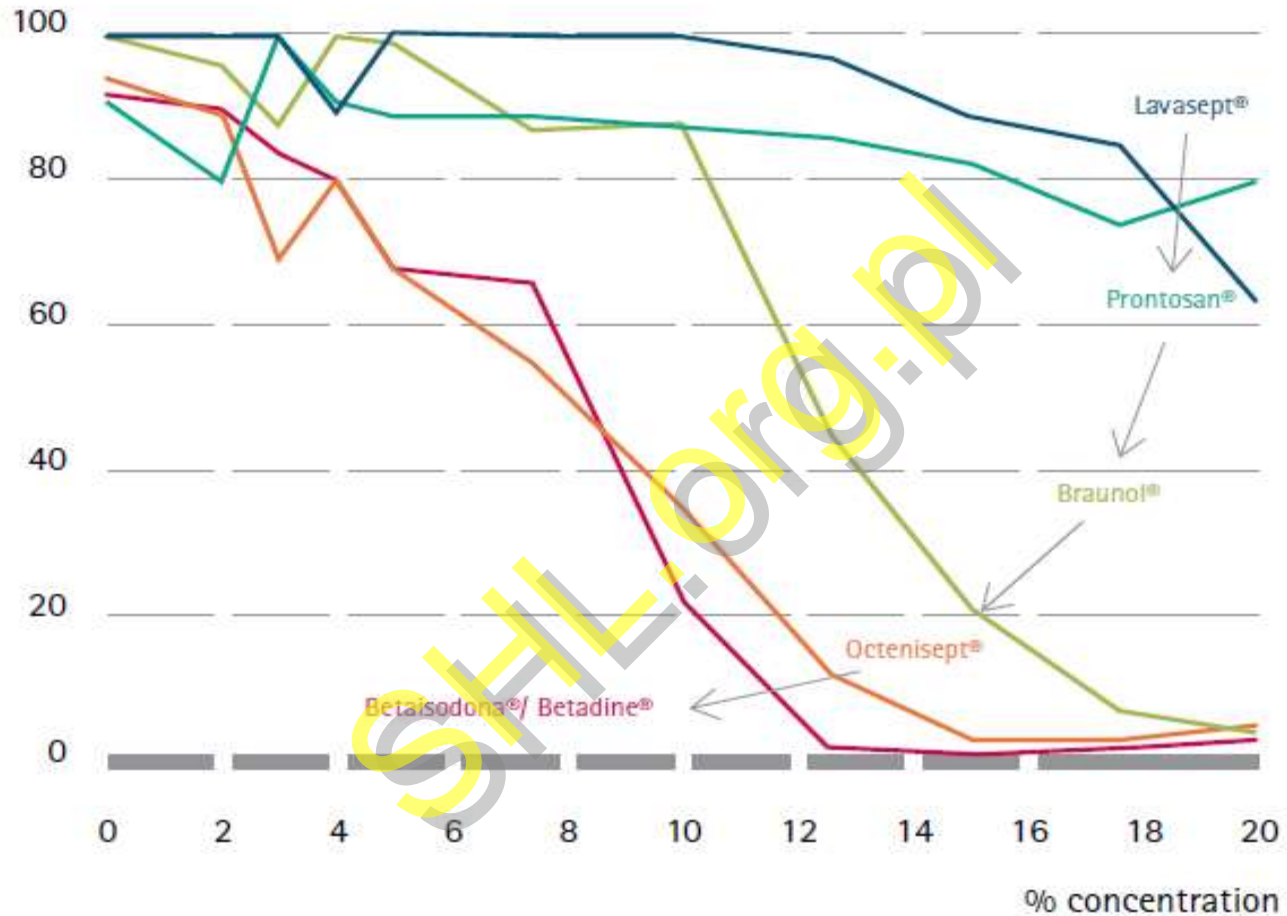


Generic Solution Class	Trade Name	Considerations for Use with V.A.C. VeraFlo™ Therapy
Hypochlorite based solutions (e.g.Hypochlorous acid, Sodium hypochlorite)	Dakin's Solution (quarter strength), Dermacyn®, Microcyn®	<ul style="list-style-type: none"> <li>• Dakin's Solution should not be used in concentrations greater than 0.125% (quarter strength).</li> <li>• Consider using the fewest irrigation cycles and minimizing hold times to the lowest level that is clinically relevant.</li> </ul>
Silver nitrate (0.5%)	Various	Silver nitrate is light sensitive. Protect V.A.C. VeraLink™ Instillation Tubing from light during use of silver nitrate.
Sulfur-based solutions (sulfonamides)	Mafenide acetate, Sulfamylon®	Refer to manufacturer's labeling for solution-specific considerations. No device related considerations for use with V.A.C. VeraFlo™ Therapy.
Biguanides (Polyhexanide)	Prontosan®	May need to be transferred to a container that can be accessed with a spike.
Cationic solutions (Octenidine, Benzalkonium Chloride)	Octenilin®	Refer to manufacturer's labeling for solution-specific considerations. No device-related considerations for use with V.A.C. VeraFlo™ Therapy.
Isotonic Solutions	Normal Saline Solution, Lactated Ringer's Solution	Refer to manufacturer's labeling for solution-specific considerations. No device-related considerations for use with V.A.C. VeraFlo™ Therapy.

\*Based on KCI in-house testing of disposables mechanical properties, biocompatibility, and solution interaction. Listing of specific solutions is not an endorsement of or indication of a solution's clinical efficacy. If wound healing goals are not being achieved, consider an alternate instillation frequency, solution concentration, or solution type as deemed appropriate by a physician.

## Cytotoxicity of products on skin cells.

cell viability %





# Evaluation of toxic side effects of clinical used antiseptics in vitro

Hirsch T, Koerber A, Jacobsen F, et al.  
J Surg Res 2010;164(2):344 – 350.

## Results

The agents tested showed effective antibacterial properties (Octenisept<sup>®</sup>, Lavasept<sup>®</sup>, and Prontosan<sup>®</sup> showed higher efficacy than Braunol<sup>®</sup> and Betaisodona<sup>®</sup>) and different degrees of cytotoxicity. Lavasept<sup>®</sup> and Prontosan<sup>®</sup> demonstrated less toxicity on primary human fibroblasts and keratinocytes, whereas Octenisept<sup>®</sup>, Betaisodona<sup>®</sup> and Braunol<sup>®</sup> showed a significant ( $p < 0.05$ ) decrease in cell viability to 0% on keratinocytes at concentrations of 4%, 7.5%, and 12.5%, and on fibroblasts at 7.5% and 10%, respectively.

## Conclusion

Due to the cytotoxic effect of some antiseptics on human skin cells, it is advised that health care professionals balance the cytotoxicity of the medication, their antiseptic properties and the severity of colonization when selecting a wound care antiseptic. In this study, Lavasept<sup>®</sup> and Prontosan<sup>®</sup> showed best result regarding antibacterial efficacy and cell toxicity.











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TIME = MONEY

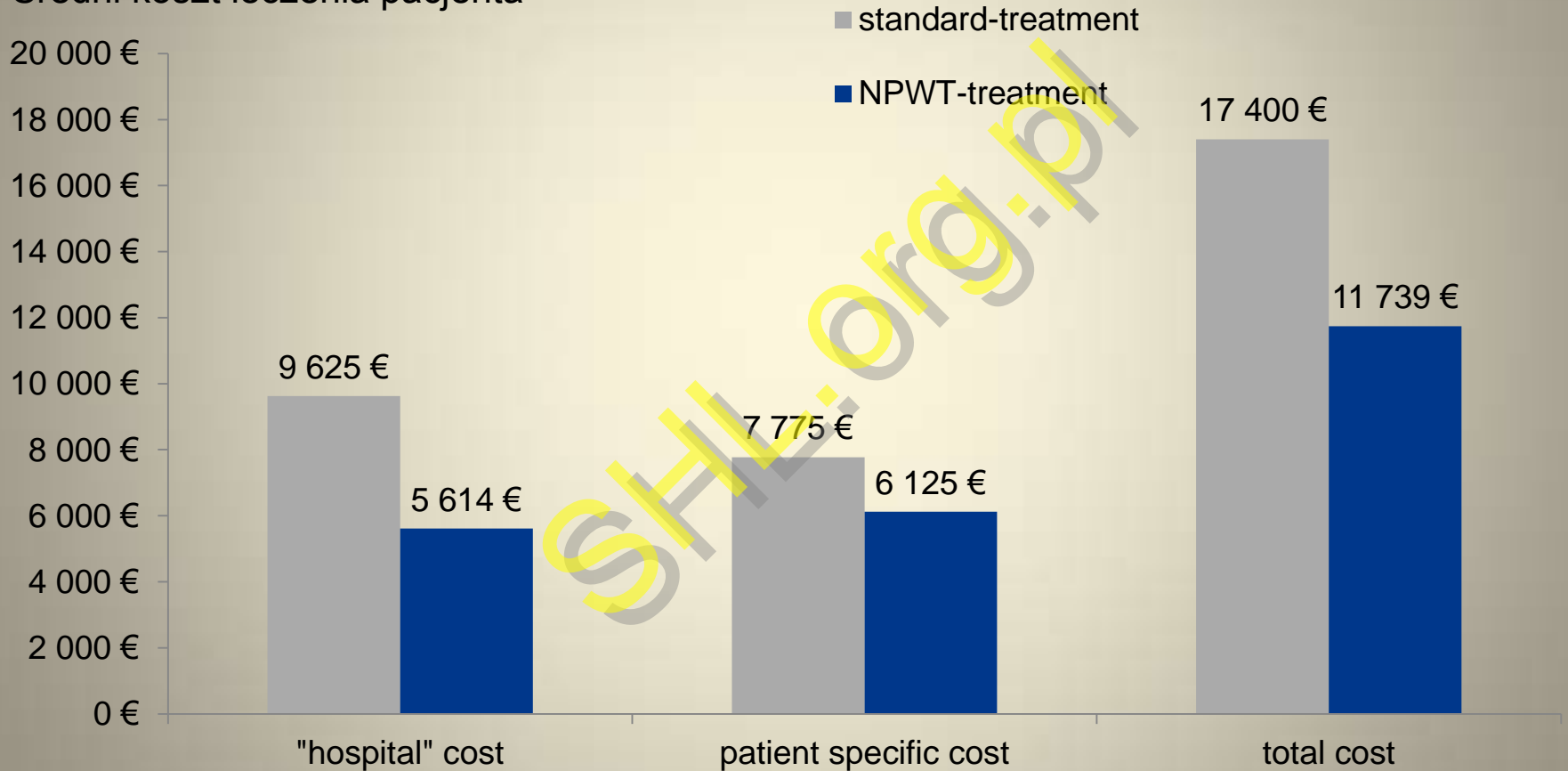






# Koszty leczenia terapii podciśnieniowej

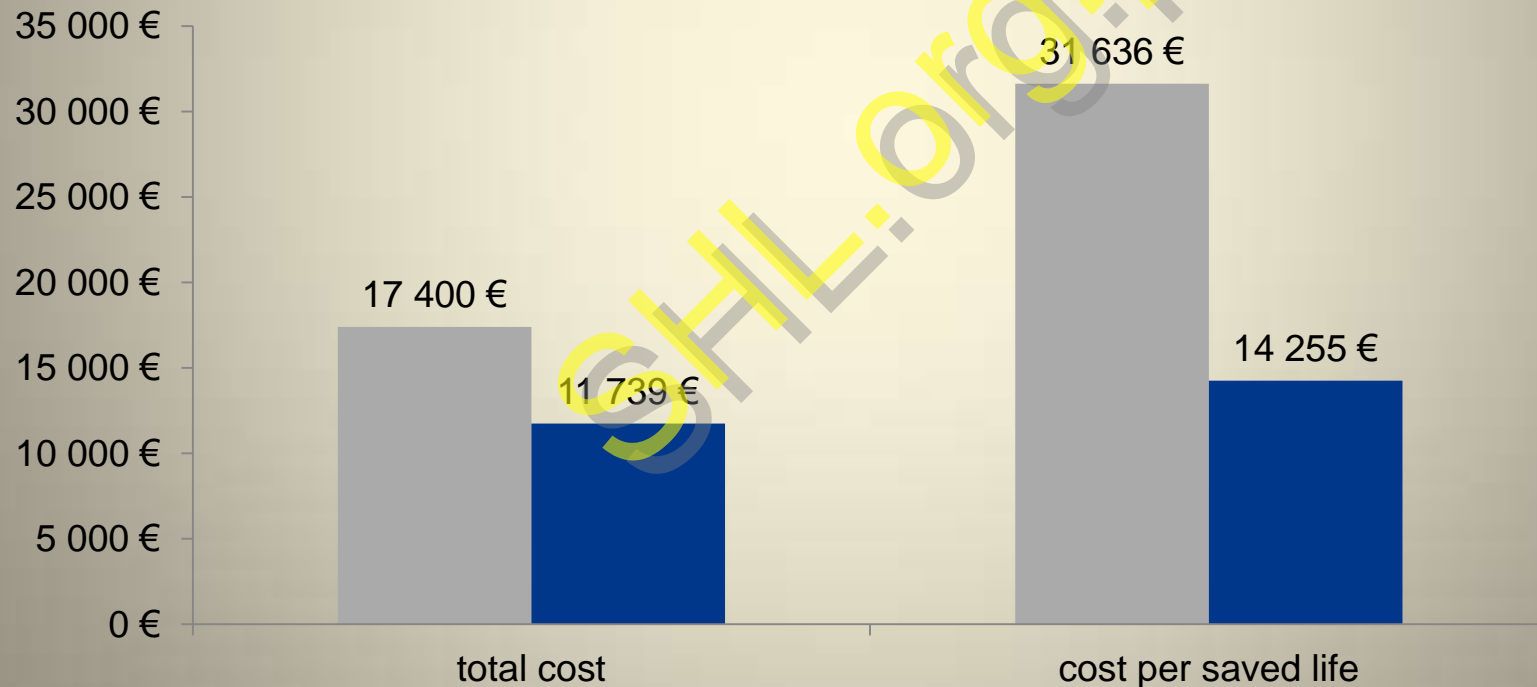
Średni koszt leczenia pacjenta



# Koszty leczenia terapii podciśnieniowej

koszt uratowanego życia =  $\frac{\text{koszt leczenia wszystkich pacjentów}}{\text{ilość pacjentów, którzy przeżyli}}$

Koszt uratowanego życia



# Płukanie rany za pomocą wody wodociągowej w porównaniu z użyciem 0,9% roztworu NaCl lub wody destylowanej nie zwiększa ryzyka zakażenia

25.08.2008

opracowanie na podstawie: Water for wound cleansing

Fernandez R. i wsp.

Cochrane Database of Systematic Reviews, 2008; Issue 1. Art. No.: CD003861.

DOI: 10.1002/14651858.CD003861.pub2

## **Metoda**

Przegląd systematyczny z metaanalizą 11 badań z randomizacją lub pseudorandomizacją

## **Populacja**

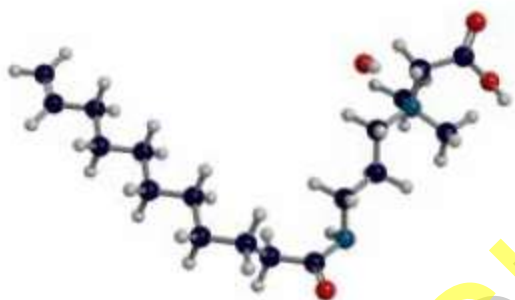
2873 osoby dorosłe i 576 dzieci z ostrymi lub przewlekłymi ranami o dowolnej etiologii

## **Wnioski**

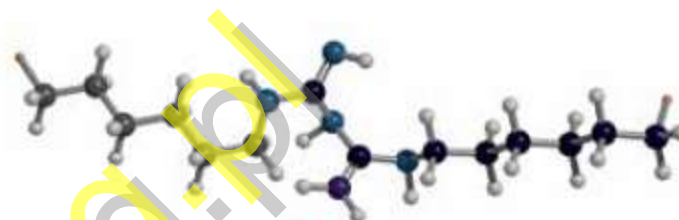
Zastosowanie wody wodociągowej (przegotowanej lub nie) do płukania rany nie zwiększa ryzyka jej zakażenia, a w przypadku ran ostrych u osób dorosłych może to ryzyko zmniejszyć.

Prontosan®

Betaina: działanie o charakterze surfaktantu/detergentu



Polihexanid (PHMB): działanie o charakterze przeciwbakteryjnym



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## Clinical use of polihexanide on acute and chronic wounds for antisepsis and decontamination

Eberlein T, Assadian O.

Skin Pharmacol Physiol 2010;23(Suppl 1):45–51.

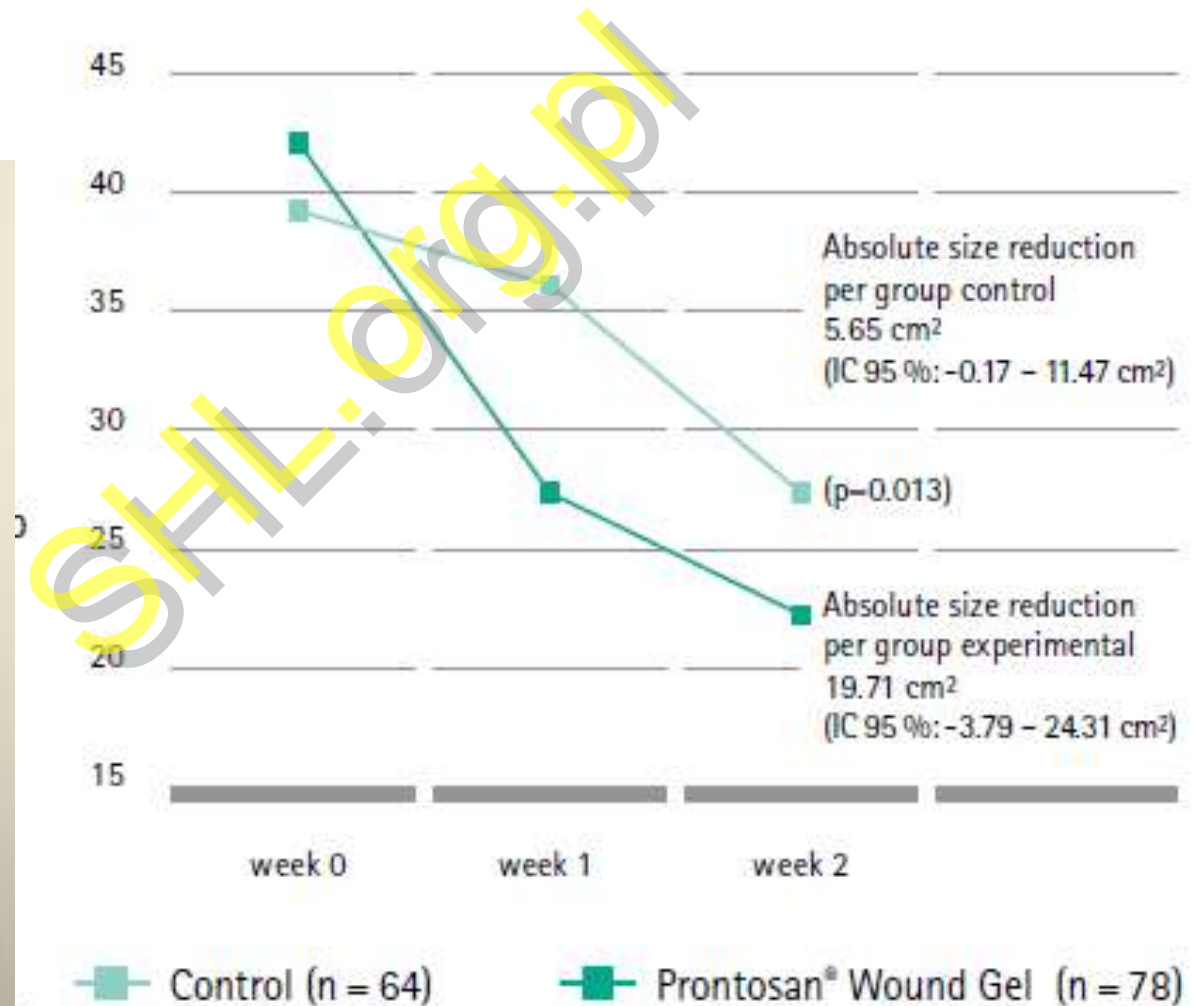
### Conclusion

- Polihexanide is an antimicrobial substance that is highly suitable for use in critically colonized or infected wounds.
- Polihexanide has a broad antimicrobial spectrum, good cell and tissue tolerability, the ability to bind to the organic matrix, a low risk of contact sensitization and a wound healing promoting effect.
- No development of microorganism resistance has been detected with polihexanide use to date, nor does this risk appear imminent.

## The effectiveness of a 0.1% polihexanide gel

Valenzuela AR, Perucho NS.  
Rev ROL Enf 2008;31(4):247-252.

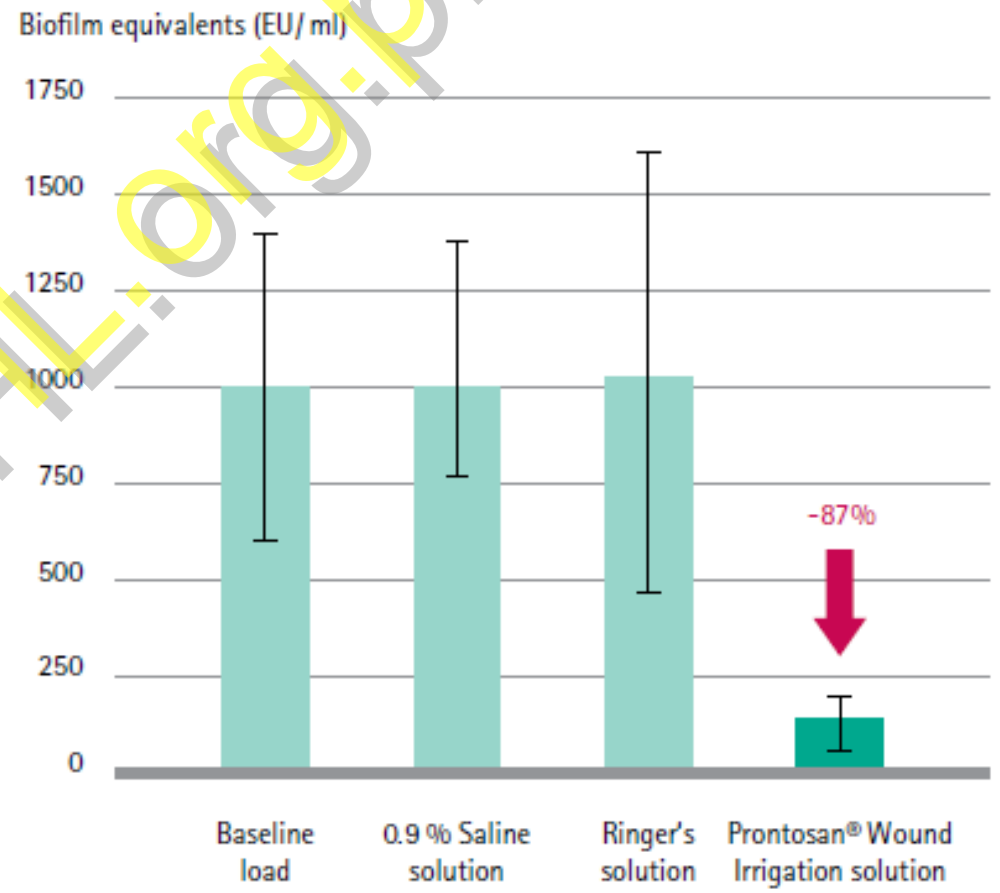
### Absolute size reduction (cm<sup>2</sup>) per group



## Efficacy of various wound irrigation solutions against biofilms

Seipp HM, Hofmann S, Hack A, Skowronsky A, Hauri A.  
ZfW 2005;4(5):160-163.

### Comparison of the efficacy of wound rinsing solutions on biofilm.





# Podsumowanie

- Działanie zgodnie ze schematem TIME (dostosowanym każdorazowo do charakteru rany) jest optymalną formą leczenia ran przewlekłych
- Przewlekłe stosowanie antyseptyków na rany (szczególnie niezakażone!) należy raczej uznać za błąd w sztuce, prowadzący niejednokrotnie do wydłużenia procesu gojenia rany.
- Rana niezakażona nie powinna być zgodnie ze schematem TIME rutynowo odkażana (antyseptyk).
- Celem pielęgnacji rany (także ostrej) powinno być m.in. niedopuszczenie do rozwinięcia się biofilmu (powszechnego na ranach przewlekłych) prowadzącego do spowolnienia procesu gojenia rany lub jej zakażenia.
- Cennym praktycznym uzupełnieniem schematu TIME jest stosowanie lavaseptyków (T, I, M, E) i terapii podciśnieniowej (T, I, E, M?)