

# Chronic Wound Infections Don't Need Antibiotics

BY BETSY BATES  
Los Angeles Bureau

VANCOUVER, B.C. — If physicians had a better understanding of the bacteriology of chronic wounds, they would stop overprescribing antibiotics for this indication—a strategy that rarely works and contributes to antibiotic resistance.

That's the assessment of Brian Kunimoto, M.D., director of the Wound Healing Clinic at the Vancouver Hospital and Health Sciences Centre and a member of the dermatology faculty at

the University of British Columbia in Vancouver.

"Is there a problem with bacteria that grow in wounds, convincing some of us to do silly things like order useless tests, and worse yet, actually act on such useless information ...[by] prescribing drugs that have no chance of working? I think it's a big problem, and it has nasty consequences," said Dr. Kunimoto at the annual meeting of the Pacific Dermatologic Association.

Wounds come in many forms, with bacteria acting as attackers that have more or less of an impact depending on the vulnerability of the host as well as their own numbers and virulence, he said. (See chart.)

When bacteria are planktonic, they live an independent, nomadic life, disorganized and generally in a fluid state. In this form, they pose little threat to a human host.

However, when they begin to unite in an organized, adherent, cooperative "city-state," they form a biofilm that poses a considerable challenge to physicians, Dr. Kunimoto said. Approximately 65% of all bacterial skin infections are related to biofilms characterized by their creamy, adherent properties.

"You brush off a biofilm every night when you brush your teeth. The classic biofilm is plaque on your teeth," he said.

Biofilms, he explained, are made up of an exopolysaccharide matrix that allows for intracellular communication, production of a food supply, an escape route for waste, and most troubling, the sharing of genetic information.

A biofilm is polymicrobial, allowing for a harmonious existence of many forms of bacteria.

"I think bacteria do a better job at multiculturalism than our country, Canada," he mused.

Culturing a biofilm is useless, he maintained. "It's no different from culturing your nose. You will find—wow!—bacteria! It gives us no really useful information."

A culture may identify some bacteria present in the biofilm, but it will not characterize the rich and diverse population flourishing in a wound.

Moreover, neither topical nor systemic antibiotics penetrate a biofilm effectively, so they will be impotent, or worse, will provide highly useful resistance information to bacteria essentially sharing a bulletin board in a bustling city.

The best clinical practice for attacking biofilms is relentless debridement, according to Dr. Kunimoto.

"As I say to the residents in the clinic, 'Don't slough sloughing the slough.'

"Don't throw an antibiotic at this. Get out your tools and dig away. Don't give up," he said.

Several antimicrobial agents can be used as adjuncts, including silver, starch iodine, and even manuka honey.

But the most critical treatment is repeated debridement, performed, if necessary, after a lengthy (2-3 hour) application of a topical anesthetic such as EMLA, he said.

Antibiotics are of use only in true clinical infections. ■

## Nitric Oxide Gas Wards Off Bacteria

In the frustrating war against chronic wounds, Brian Kunimoto, M.D., and associates at the University of British Columbia think they may have found a secret weapon that comes in a tank.

It's nitric oxide gas.

A naturally produced, lipophilic molecule, nitric oxide, unlike antibiotics, easily penetrates biofilms, well-organized populations of bacteria that can form in chronic, difficult-to-heal wounds.

"I call it a smoking gun," said Dr. Kunimoto, director of the Wound Healing Clinic at Vancouver Hospital and Health Sciences Centre.

He explained that nitric oxide combines with reactive oxygen to create "an entire soup of bacteriocidal intermediates" in a wound, and poisons the iron enzyme aconitase.

In the presence of this onslaught, "unless a bacterium can quickly develop into an anaerobic organism, it will die," he said at the annual meeting of the Pacific Dermatologic Association.

Nitric oxide also deaminates DNA

and enhances the damaging effects of hydrogen peroxide when it is present as a reactive oxygen intermediate.

Studies at the University of British Columbia found that counts of bacteria, including *Staphylococcus aureus*, *Pseudomonas*, and methicillin-resistant *S. aureus*, plummeted to zero within hours of exposure to gaseous nitric oxide.

Home therapy involving nighttime exposure to the gas quickly healed a 2-year-old, nonhealing ankle ulcer in a 55-year-old man with severe venous disease, said Dr. Kunimoto, who recently published the case (*J. Cutan. Med. Surg.* 2004;8:233-9).

"This is remarkable for this gentleman, [considering] we worked on him for 2 years and got nowhere," he said. "We've shifted the balance in favor of the host."

The Canadian government has recently approved funding for a large study of nitric oxide gas to see if the results can be duplicated in other non-healing wounds. ■

## How to Identify Wound Types

### Contamination

- ▶ Example: Fall from a bike, abraded skin.
- ▶ Bacteria: "Just passing through."
- ▶ Signs and symptoms: None.
- ▶ Healing: Not compromised.
- ▶ Testing: None necessary.
- ▶ Treatment: Cleansing with normal saline.

### Simple Colonization

- ▶ Example: Wound of a few days' duration.
- ▶ Bacteria: Living in the wound, but planktonic and disorganized.
- ▶ Signs and symptoms: None of note.
- ▶ Healing: Not compromised.
- ▶ Testing: None required.
- ▶ Treatment: Cleansing with normal saline.

### Complicated Colonization (Biofilm)

- ▶ Example: Chronic wound.
- ▶ Bacteria: Significant in numbers and virulence. Well organized, often as a "biofilm."
- ▶ Signs and symptoms: New onset of wound pain and wound-bed deterioration (granulation tissue loss, friability of granulation tissue).
- ▶ Healing: Compromised.
- ▶ Testing: None required.
- ▶ Treatment: Aggressive debridement, possibly with adjunctive antimicrobial measures (such as manuka honey or starch iodine).

### Clinical Infection (Rare)

- ▶ Example: Markedly worsening chronic wound.
- ▶ Bacteria: Very significant in numbers and virulence.
- ▶ Signs and symptoms: Significant in numbers and virulence. Well organized, often as "biofilm." There is evidence of a host inflammatory response (cellulitis) and possible systemic toxicity (fever and malaise).
- ▶ Healing: Compromised.
- ▶ Testing: Wound biopsy of base preferable to culture.
- ▶ Treatment: Systemic antibiotics.

Source: Dr. Kunimoto

## Wound Care More Painful For Nonsurgical Patients

BY HEIDI SPLETE  
Senior Writer

CHICAGO — Nonsurgical patients reported greater pain than did surgical patients during dressing changes and when having two or more treatment procedures, said Nancy Stotts, R.N., Ed.D., at the annual meeting of the Wound Healing Society.

She and her colleagues conducted a study of pain in 412 hospitalized adults at multiple locations, 74% of whom were surgical patients. Most of the patients were male (53%) and white (74%), and had chest wounds (60%). The average wound was 11.8 cm long and 2.5 cm deep.

Of the 412 patients, 93 (23%) were premedicated, and 19 (5%) received pain medications during wound care. Only 7.3% of the surgical patients and 5.9% of the nonsurgical patients received analgesics after their dressings were changed, noted Dr. Stotts, a professor of physiological nursing at the University of California, San Francisco.

Opioids were the most common medications, and the mean dose was 6.8 mg for surgical and nonsurgical patients alike. Sedatives and NSAIDs were rarely used in this patient population, Dr. Stotts said.

The patients' subjective experience of pain was measured using a numeric rating scale (NRS), on which 0 equals no pain and 10 equals the worst possible pain. Patients' pain scores were mea-

sured before, immediately after, and 10 minutes after the wound care procedures, which included dressing change, debridement, packing, and irrigation.

Overall, the patients reported the most intense pain during a wound care procedure, when the average NRS score was 4.4.

Nonsurgical patients reported significantly greater pain than did surgical patients, with average NRS scores of 5.3 and 4.1, respectively.

The higher pain scores in the nonsurgical patients were associated only with dressing changes and with undergoing two or more wound care procedures.

"Pain intensity did not differ with age, sex, or race," Dr. Stotts observed.

When patients were given a choice of words that described their pain, the word "stinging" was often used to describe debridement; "stabbing" and "sharp" were often used to describe pain associated with any wound care procedure.

In addition to pain medications, patients and nurses used techniques such as humor, distraction, and deep breathing to manage pain during wound care procedures.

Pain seems to be undertreated in the hospitalized population, although it may be managed more effectively in surgical patients, Dr. Stotts said.

Further research on the effect of pain on wound-related patient outcomes could help develop pain management strategies, she added, pointing out that current data are limited. ■