

# Laser 'Gun' Can Decrease IV Cannulation Pain

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TORONTO — Pretreating the skin with a low-power erbium:YAG laser significantly reduced the pain of intravenous cannulation in children in a double-blind randomized trial of 94 patients.

The laser treatment works by removing a small area of the stratum corneum, which allows for rapid absorption of local anesthesia, coinvestigator Dr. Deena

Berkowitz explained. Laser pretreatment takes less than 10 seconds, followed by a 5-minute application of topical anesthesia before needle placement. This dramatically reduces the time of transdermal absorption, a limiting factor in the use of topical anesthetics before intravenous cannulation.

The study confirms the results of laser-assisted anesthesia previously reported in 30 healthy adults (Acad. Emerg. Med. 2005;12:804-7) and in 61 adult and pedi-

atric emergency department patients (Acad. Emerg. Med. 2006;13:623-8).

Dr. Berkowitz and coauthor Dr. Ira T. Cohen of Children's National Medical Center, Washington, randomized 94 children who required intravenous cannulation to laser or sham laser with the Epiture Easytouch erbium:YAG laser prior to lidocaine 4% cream application and IV cannulation.

Pain was assessed on age-appropriate scales including the Wong-Baker FACES

Pain Rating Scale and a 10-cm visual analog scale (a 10-point pain scale measured along a vertical or horizontal line). The patients ranged in age from 3 to 18 years, with an average age of 9 years in the laser group and 11 years in the control group.

The average pain of IV cannulation was significantly less for the 47 children treated with the laser than for the 47 children in the control group (2.94 cm vs. 5.36 cm), Dr. Berkowitz reported at the annual meeting of the Pediatric Academic Societies.

The median pain of laser application was 0 in both groups. Satisfaction surveys indicate that significantly more parents of patients enrolled in the laser group reported their children had less pain with IV cannulation after laser treatment than in the control group (72% vs. 38%).

An audience member questioned whether patients or their parents may have anticipated less pain because of the use of an additional treatment prior to cannulation. "These were children who had had IVs before, but we did see some placebo effect in patients and parents," said Dr. Berkowitz.

Audience member Dr. Lei Chen of Yale-New Haven (Conn.) Children's Hospital, said when he and his colleagues tested the device, some patients were troubled by the laser's gun-like appearance and the release of a small puff of smoke.

Wrapping the device in colorful coverings could have alleviated potential anxiety, but hasn't entirely stopped young boys from wanting to pick up the laser and shoot it, although that's not possible without a key, Dr. Berkowitz said. Only one patient in the treatment arm noticed an odor with the laser application, although staff members did remark on it.

Erythema was observed in some patients with lighter skin color, and hypopigmentation in those with darker skin. Finding the 6 mm in diameter area treated by the laser also can be a problem, but she said stickers can ensure that the exact site is identified for needle insertion.

At \$2,500 per laser, "the biggest drawback is going to be cost," said Dr. Berkowitz, who said the study lasers were provided by Norwood Abbey Inc. She disclosed no personal conflicts of interest with the company.



Colorful coverings can reduce the gunlike laser device's ability to induce either anxiety or playfulness in children.

## Rx Only



Keep out of reach of children.

## Brief Summary of Full Prescribing Information

### INDICATIONS AND USAGE

ORACEA is indicated for the treatment of only inflammatory lesions (papules and pustules) of rosacea in adult patients.

The dosage of ORACEA differs from that of doxycycline used to treat infections. To reduce the development of resistant bacteria as well as to maintain the effectiveness of other antibacterial drugs, ORACEA should be used only as indicated.

### CLINICAL PHARMACOLOGY

#### Pharmacokinetics

ORACEA capsules are not bioequivalent to other doxycycline products.

### CONTRAINDICATIONS

This drug is contraindicated in persons who have shown hypersensitivity to doxycycline or any of the other tetracyclines.

### WARNINGS

**Teratogenic effects:** 1) Doxycycline, like other tetracycline-class antibiotics, can cause fetal harm when administered to a pregnant woman. If any tetracycline is used during pregnancy or if the patient becomes pregnant while taking these drugs, the patient should be informed of the potential hazard to the fetus and treatment stopped immediately.

ORACEA should not be used during pregnancy (see PRECAUTIONS: Pregnancy).

2) The use of drugs of the tetracycline class during tooth development (last half of pregnancy, infancy, and childhood up to the age of 8 years) may cause permanent discoloration of the teeth (yellow-gray-brown). This adverse reaction is more common during long-term use of the drug but has been observed following repeated short-term courses. Enamel hypoplasia has also been reported. Tetracycline drugs, therefore, should not be used during tooth development unless other drugs are not likely to be effective or are contraindicated.

3) All tetracyclines form a stable calcium complex in any bone-forming tissue. A decrease in fibula growth rate has been observed in premature human infants given oral tetracycline in doses of 25 mg/kg every 6 hours. This reaction was shown to be reversible when the drug was discontinued.

Results of animal studies indicate that tetracyclines cross the placenta, are found in fetal tissues, and can cause retardation of skeletal development on the developing fetus. Evidence of embryotoxicity has been noted in animals treated early in pregnancy (see PRECAUTIONS: Pregnancy section).

**Gastrointestinal effects:** Pseudomembranous colitis has been reported with nearly all antibacterial agents and may range from mild to life-threatening. Therefore, it is important to consider this diagnosis in patients who present with diarrhea subsequent to the administration of antibacterial agents.

Treatment with antibacterial agents alters the normal flora of the colon and may permit overgrowth of clostridia. Studies indicate that a toxin produced by *Clostridium difficile* is a primary cause of "antibiotic-associated colitis".

If a diagnosis of pseudomembranous colitis has been established, therapeutic measures should be initiated. Mild cases of pseudomembranous colitis usually respond to discontinuation of the drug alone. In moderate to severe cases, consideration should be given to management with fluids and electrolytes, protein supplementation, and treatment with an antibacterial drug clinically effective against *Clostridium difficile* colitis.

**Metabolic effects:** The anti-anabolic action of the tetracyclines may cause an increase in BUN. While this is not a problem in those with normal renal function, in patients with significantly impaired function, higher serum levels of tetracycline-class antibiotics may lead to azotemia, hyperphosphatemia, and acidosis. If renal impairment exists, even usual oral or parenteral doses may lead to excessive systemic accumulations of the drug and possible liver toxicity. Under such conditions, lower than usual total doses are indicated, and if therapy is prolonged, serum level determinations of the drug may be advisable.

**Photosensitivity:** Photosensitivity manifested by an exaggerated sunburn reaction has been observed in some individuals taking tetracyclines. Although this was not observed during the duration of the clinical studies with ORACEA, patients should minimize or avoid exposure to natural or artificial sunlight (tanning beds or UVA/B treatment) while using ORACEA. If patients need to be outdoors while using ORACEA, they should wear loose-fitting clothes that protect skin from sun exposure and discuss other sun protection measures with their physician.

### PRECAUTIONS

**General:** Safety of ORACEA beyond 9 months has not been established.

As with other antibiotic preparations, use of ORACEA may result in overgrowth of non-susceptible microorganisms, including fungi. If superinfection occurs, ORACEA should be discontinued and appropriate therapy instituted. Although not reported in clinical trials with ORACEA, the use of tetracyclines may increase the incidence of vaginal candidiasis.

ORACEA should be used with caution in patients with a history of or predisposition to candidiasis overgrowth. Bacterial resistance to tetracyclines may develop in patients using ORACEA. Because of the potential for drug-resistant bacteria to develop during the use of ORACEA, it should be used only as indicated.

**Autoimmune Syndromes:** Tetracyclines have been associated with the development of autoimmune syndromes. Symptoms may be manifested by fever, rash, arthralgia, and malaise. In symptomatic patients, liver function tests, ANA, CBC, and other appropriate tests should be performed to evaluate the patients. Use of all tetracycline-class drugs should be discontinued immediately.

**Tissue Hyperpigmentation:** Tetracycline class antibiotics are known to cause hyperpigmentation. Tetracycline therapy may induce hyperpigmentation in many organs, including nails, bone, skin, eyes, thyroid, visceral tissue, oral cavity (teeth, mucosa, alveolar bone), sclerae and heart valves. Skin and oral pigmentation has been reported to occur independently of time or amount of drug administration, whereas other pigmentation has been reported to occur upon prolonged administration. Skin pigmentation includes diffuse pigmentation as well as over sites of scars or injury.

**Pseudotumor cerebri:** Bulging fontanels in infants and benign intracranial hypertension in adults have been reported in individuals receiving tetracyclines. These conditions disappeared when the drug was discontinued.

**Laboratory Tests:** Periodic laboratory evaluations of organ systems, including hematopoietic, renal and hepatic studies should be performed. Appropriate tests for autoimmune syndromes should be performed as indicated.

**Drug Interactions:** 1. Because tetracyclines have been shown to depress plasma prothrombin activity, patients who are on anticoagulant therapy may require downward adjustment of their anticoagulant dosage. 2. Since bacteriostatic drugs may interfere with the bactericidal action of penicillin, it is advisable to avoid giving tetracycline-class drugs in conjunction with penicillin. 3. The concurrent use of tetracycline and methoxyflurane has been reported to result in fatal renal toxicity. 4. Absorption of tetracyclines is impaired by bismuth subsalicylate, proton pump inhibitors, antacids containing aluminum, calcium or magnesium and iron-containing preparations. 5. Doxycycline may interfere with the effectiveness of low dose oral contraceptives. To avoid contraceptive failure, females are advised to use a second form of contraceptive during treatment with doxycycline. 6. There have been reports of pseudotumor cerebri (benign intracranial hypertension) associated with the concomitant use of isotretinoin and tetracyclines. Since both oral retinoids, including isotretinoin and acitretin, and the tetracyclines, primarily minocycline, can cause increased intracranial pressure, the concurrent use of an oral retinoid and a tetracycline should be avoided.

## MICROBIOLOGY

The plasma concentrations of doxycycline achieved with ORACEA during administration (see DOSAGE AND ADMINISTRATION) are less than the concentration required to treat bacterial diseases. *In vivo* microbiological studies utilizing a similar drug exposure for up to 18 months demonstrated no detectable long-term effects on bacterial flora of the oral cavity, skin, intestinal tract, and vagina.

**Carcinogenesis, Mutagenesis, Impairment of Fertility:** Doxycycline was assessed for potential to induce carcinogenesis in a study in which the compound was administered to Sprague-Dawley rats by gavage at dosages of 20, 75, and 200 mg/kg/day for two years. An increased incidence of uterine polyps was observed in female rats that received 200 mg/kg/day, a dosage that resulted in a systemic exposure to doxycycline approximately 12.2 times that observed in female humans who use ORACEA (exposure comparison based upon area under the curve (AUC) values). No impact upon tumor incidence was observed in male rats at 200 mg/kg/day, or in either gender at the other dosages studied. Evidence of oncogenic activity was obtained in studies with related compounds, i.e., oxytetracycline (adrenal and pituitary tumors) and minocycline (thyroid tumors).

Doxycycline demonstrated no potential to cause genetic toxicity in an *in vitro* point mutation study with mammalian cells (CHO/HGPRT forward mutation assay) or in an *in vivo* micronucleus assay conducted in CD-1 mice. However, data from an *in vitro* assay with CHO cells for potential to cause chromosomal aberrations suggest that doxycycline is a weak clastogen.

Oral administration of doxycycline to male and female Sprague-Dawley rats adversely affected fertility and reproductive performance, as evidenced by increased time for mating to occur, reduced sperm motility, velocity, and concentration, abnormal sperm morphology, and increased pre- and post-implantation losses. Doxycycline induced reproductive toxicity at all dosages that were examined in this study, as even the lowest dosage tested (50 mg/kg/day) induced a statistically significant reduction in sperm velocity. Note that 50 mg/kg/day is approximately 3.6 times the amount of doxycycline contained in the recommended daily dose of ORACEA for a 60-kg human when compared on the basis of AUC estimates. Although doxycycline impairs the fertility of rats when administered at sufficient dosage, the effect of ORACEA on human fertility is unknown.

**Pregnancy; Teratogenic Effects:** Pregnancy Category D. (see WARNINGS section). Results from animal studies indicate that doxycycline crosses the placenta and is found in fetal tissues.

**Nonteratogenic effects:** (see WARNINGS section).

**Labor and Delivery:** The effect of tetracyclines on labor and delivery is unknown.

**Nursing Mothers:** Tetracyclines are excreted in human milk. Because of the potential for serious adverse reactions in infants from doxycycline, ORACEA should not be used in mothers who breastfeed. (see WARNINGS section).

**Pediatric Use:** ORACEA should not be used in infants and children less than 8 years of age (see WARNINGS section). ORACEA has not been studied in children of any age with regard to safety or efficacy, therefore use in children is not recommended.

## ADVERSE REACTIONS

**Adverse Reactions in Clinical Trials of ORACEA:** In controlled clinical trials of adult patients with mild to moderate rosacea, 537 patients received ORACEA or placebo over a 16-week period. The most frequent adverse reactions occurring in these studies are listed in the table below.

Incidence (%) of Selected Adverse Reactions in Clinical Trials of ORACEA (n=269) vs. Placebo (n=268)	ORACEA	Placebo
Nasopharyngitis	13 (4.8)	9 (3.4)
Pharyngolaryngeal Pain	3 (1.1)	2 (0.7)
Sinusitis	7 (2.6)	2 (0.7)
Nasal Congestion	4 (1.5)	2 (0.7)
Fungal Infection	5 (1.9)	1 (0.4)
Influenza	5 (1.9)	3 (1.1)
Diarrhea	12 (4.5)	7 (2.6)
Abdominal Pain Upper	5 (1.9)	1 (0.4)
Abdominal Distention	3 (1.1)	1 (0.4)
Abdominal Pain	3 (1.1)	1 (0.4)
Stomach Discomfort	3 (1.1)	2 (0.7)

Note: Percentages based on total number of study participants in each treatment group.

**Adverse Reactions for Tetracyclines:** The following adverse reactions have been observed in patients receiving tetracyclines at higher, antimicrobial doses:

**Gastrointestinal:** anorexia, nausea, vomiting, diarrhea, glossitis, dysphagia, enterocolitis, and inflammatory lesions (with vaginal candidiasis) in the anogenital region. Hepatotoxicity has been reported rarely. Rare instances of esophagitis and esophageal ulcerations have been reported in patients receiving the capsule forms of the drugs in the tetracycline class. Most of the patients experiencing esophagitis and/or esophageal ulceration took their medication immediately before lying down. (see DOSAGE AND ADMINISTRATION section).

**Skin:** maculopapular and erythematous rashes. Exfoliative dermatitis has been reported but is uncommon. Photosensitivity is discussed above. (see WARNINGS section).

**Renal toxicity:** Rise in BUN has been reported and is apparently dose-related. (see WARNINGS section).

**Hypersensitivity reactions:** urticaria, angioneurotic edema, anaphylaxis, anaphylactoid purpura, serum sickness, pericarditis, and exacerbation of systemic lupus erythematosus.

**Blood:** Hemolytic anemia, thrombocytopenia, neutropenia, and eosinophilia have been reported.

## OVERDOSAGE

In case of overdosage, discontinue medication, treat symptomatically, and institute supportive measures. Dialysis does not alter serum half-life and thus would not be of benefit in treating cases of overdose.

## DOSAGE AND ADMINISTRATION

**THE DOSAGE OF ORACEA DIFFERS FROM THAT OF DOXYCYCLINE USED TO TREAT INFECTIONS. EXCEEDING THE RECOMMENDED DOSAGE MAY RESULT IN AN INCREASED INCIDENCE OF SIDE EFFECTS INCLUDING THE DEVELOPMENT OF RESISTANT MICROORGANISMS.**

One ORACEA Capsule (40 mg) should be taken once daily in the morning on an empty stomach, preferably at least one hour prior to or two hours after meals.

Efficacy beyond 16 weeks and safety beyond 9 months have not been established.

Administration of adequate amounts of fluid along with the capsules is recommended to wash down the capsule to reduce the risk of esophageal irritation and ulceration. (see ADVERSE REACTIONS section).

## HOW SUPPLIED

ORACEA (beige opaque capsule printed with CGPI 40) containing doxycycline, USP in an amount equivalent to 40 mg of anhydrous doxycycline. Bottle of 30 (NDC 64682-009-01).

**Storage:** All products are to be stored at controlled room temperatures of 15°C-30°C (59°F-86°F) and dispensed in tight, light-resistant containers (USP). Keep out of reach of children.

Patent Information: U.S. Patents 5,789,395; 5,919,775 and patents pending.

ORACEA is a trademark of CollaGenex Pharmaceuticals, Inc., Newtown, PA, 18940

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