

The Medical Letter®

On Drugs and Therapeutics

Published by The Medical Letter, Inc. • 1000 Main Street, New Rochelle, NY 10801 • A Nonprofit Publication

Volume 47 (Issue 1210)
June 6, 2005

www.medicalletter.org

IN THIS ISSUE

Picaridin – A New Insect Repellent.....p 46

An alternative to DEET for protection against mosquitoes.

Picaridin – A New Insect Repellent

Picaridin (KBR 3023), which has been used as an insect repellent for years in Europe and Australia (*Autan Repel*, and others), is now available in the US in a 7% solution as *Cutter Advanced* (Spectrum Brands). The US Centers for Disease Control and Prevention (CDC) is recommending it as an alternative to DEET.

DEET — DEET is available in the US in many formulations with concentrations of 5%-40% and 100%; higher concentrations offer complete protection for a longer period of time, but the duration of effectiveness reaches a plateau at a 50% concentration. A long-acting DEET formulation, originally developed for the US Armed Forces (US Army Extended Duration Topical Insect and Arthropod Repellent, EDTIAR) is available in the US as *Ultrathon* (3M). *Ultrathon* contains 25% (in aerosol) or 33% (in cream) DEET in a polymer formulation, which prevents loss from the skin surface through absorption and evaporation. Studies have

shown that it provides complete protection against mosquitoes for 6-12 hours.

Safety and Acceptability – Despite earlier concerns, toxic and allergic reactions to DEET have been uncommon, and serious adverse effects are rare.¹ Some patients dislike its odor and find it irritating or uncomfortably oily or sticky on the skin. DEET can damage clothes made from synthetic fibers such as spandex or rayon and can also damage leather and plastics on eyeglass frames and watch crystals.

PICARIDIN — Laboratory and field studies documenting the efficacy of picaridin are summarized in the table on page 47. No published data are available on the efficacy of the 7% solution now available in the US. Insect repellents are registered by the Environmental Protection Agency (EPA); they do not require FDA approval.

Safety and Acceptability – In Australia and in Europe, no serious toxicity has been reported with picaridin. It has shown no evidence of dermal, organ or reproductive toxicity or carcinogenicity in animals, except for some hepatic toxicity in rats at extremely high doses.^{6,7} Unlike DEET, it is odorless, does not feel greasy or sticky, is less likely to irritate the skin, and does not damage plastics or fabrics.

DOSAGE AND COST — The manufacturer recommends spraying picaridin on the skin every 3 to 4 hours. *Cutter*

SOME CLINICAL STUDIES OF PICARIDIN

| STUDY | REPELLENT | DESIGN/VECTOR | RESULTS |
|--|---|--|--|
| AM Pretorius et al (2003) ² South Africa | 20% picaridin lotion vs. 20% DEET lotion | Laboratory tests/ticks: <i>Amblyomma hebraeum</i> (African tick bite fever) | Protection after 1,2,3 and 4 hours: Picaridin: >85%, 56%, 55%, 54% DEET: >85%, 84%, 68%, 71% |
| A Badolo et al (2004) ³ Burkina Faso | Picaridin vs. DEET (varying concentrations) | Laboratory tests/mosquitoes: <i>Aedes aegypti</i> (yellow fever & dengue) <i>Anopheles gambiae</i> (malaria) | Relative potency: Picaridin at least as effective as DEET; both less effective against <i>An. gambiae</i> than <i>Ae. aegypti</i> |
| SP Frances et al (2004) ⁴ Australia | 19.2% picaridin vs. 20% DEET and 35% DEET | Field trial/mosquitoes: <i>Culex annulirostris</i> (arbovirus) <i>Anopheles bancrofti</i> and <i>meraukensis</i> (malaria) | >95% protection: <i>Cx. annulirostris</i> : Picaridin 5 hrs; DEET >7 hrs <i>Anopheles</i> spp: Picaridin 1 hr, 20% DEET <1h, 35% DEET 1 hr |
| C Costantini et al (2004) ⁵ Burkina Faso | Picaridin vs. DEET (varying concentrations) | Field trial/mosquitoes: <i>Anopheles</i> spp. (98.5%) (malaria) | Relative potency after 10 hr: Picaridin similar to DEET |

Advanced (with 7% picaridin) is the only formulation available commercially in the US; a 6-ounce pump-spray bottle can be purchased over the counter for about \$4.

CONCLUSION — The 7% picaridin formulation currently sold in the US might be as effective in repelling mosquitoes as low concentrations of DEET, but no data are available. Higher strength products sold in Europe (with 20% picaridin) protect against mosquitoes for up to 8 hours and against ticks for a shorter period of time. If higher concentrations become available in the US, picaridin could replace DEET due to its superior tolerability, but its long-term safety is less well established. □

1. Insect Repellents. *Med Lett Drugs Ther* 2003; 45:41.
2. AM Pretorius et al. Repellent efficacy of DEET and KBR 3023 against *amblyomma hebraeum* (Acari: Ixodidae). *J Med Entomol* 2003; 40:245.
3. A Badolo et al. Evaluation of the sensitivity of *Aedes aegypti* and *Anopheles gambiae* complex mosquitoes to two insect repellents: DEET and KBR 3023. *Trop Med Int Health* 2004; 9:330.
4. SP Frances et al. Field evaluation of repellent formulations containing DEET and picaridin against mosquitoes in Northern Territory, Australia. *J Med Entomol* 2004; 41:414.
5. C Costantini et al. Field evaluation of the efficacy and persistence of insect repellents DEET, IR3535, and KBR 3023 against *Anopheles gambiae* complex and other Afrotropical vector mosquitoes. *Trans R Soc Trop Med Hyg* 2004; 98:644.
6. BS Wahle et al. Chronic toxicity and carcinogenicity testing in the Sprague-Dawley rat of a prospective insect repellent (KBR 3023) using the dermal route of exposure. *Toxicology* 1999; 142:41.
7. AB Astroff et al. Conduct and interpretation of a dermal developmental toxicity study with KBR 3023 (a prospective insect repellent) in the Sprague-Dawley rat and Himalayan rabbit. *Teratology* 2000; 61:222.

The Medical Letter®

On Drugs and Therapeutics

EDITOR: Mark Abramowicz, M.D.
DEPUTY EDITOR: Gianna Zuccotti, M.D., M.P.H., Weill Medical College of Cornell University
DIRECTOR OF DRUG INFORMATION: Jean-Marie Pflomm, Pharm.D.
ADVISORY BOARD:
Philip D. Hansten, Pharm. D., University of Washington
Jules Hirsch, M.D., Rockefeller University
James D. Kenney, M.D., Yale University School of Medicine
Richard B. Kim, M.D., Vanderbilt School of Medicine
Gerald L. Mandell, M.D., University of Virginia School of Medicine
Hans Meinertz, M.D., University Hospital, Copenhagen
Dan M. Roden, M.D., Vanderbilt School of Medicine
F. Estelle R. Simons, M.D., University of Manitoba
Neal H. Steigbigel, M.D., New York University School of Medicine
EDITORIAL FELLOWS:
Monika K. Shah, M.D., Columbia University College of Physicians and Surgeons, Jane Gagliardi, M.D., Duke University Medical Center
SENIOR ASSOCIATE EDITORS: Donna Goodstein, Amy Faucard
ASSISTANT EDITOR: Cynthia Macapagal Covey
MANAGING EDITOR: Susie Wong
PRODUCTION: Cheryl Brown
VP FINANCE & OPERATIONS: Yosef Wissner-Levy
Founded in 1959 by
Arthur Kallet and Harold Aaron, M.D.

Copyright and Disclaimer: The Medical Letter is an independent nonprofit organization that provides health care professionals with unbiased drug prescribing recommendations. The editorial process used for its publications relies on a review of published and unpublished literature, with an emphasis on controlled clinical trials, and on the opinions of its consultants. The Medical Letter is supported solely by subscription fees and accepts no advertising, grants or donations. The Editors, Publisher and author of the first draft declare no conflict of interest. The members of the Advisory Board are required to disclose any potential conflict of interest.

No part of the material may be reproduced or transmitted by any process in whole or in part without prior permission in writing. The editors and publisher do not warrant that all the material in this publication is accurate and complete in every respect. The editors and publisher shall not be held responsible for any damage resulting from any error, inaccuracy or omission.

Subscription Services

Mailing Address:
The Medical Letter, Inc.
1000 Main Street
New Rochelle, NY 10801-7537

Customer Service:
Call: 800-211-2769 or 914-235-0500
Fax: 914-632-1733
Web Site: www.medicalletter.org
E-mail: custserv@medicalletter.org

Permissions:
To reproduce any portion of this issue, please e-mail your request to: permissions@medicalletter.org

Subscriptions (US):
1 year - \$76; 2 years - \$129;
3 years - \$182. \$38.00 per year for students, interns, residents and fellows in the US and Canada.
CME: \$44 for 26 credits.

E-mail site license inquiries to:
info@medicalletter.org or call 800-211-2769 x315.
Special fees for bulk subscriptions. Special classroom rates are available. Back issues are \$5 each. Major credit cards accepted.

Copyright 2005. ISSN 1523-2859