Editorial

Insect Repellent: More Attractive to People, Less Attraction for Insects?

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Only 40% of people use any type of repellent, according to a survey by the Harvard School of Public Health.[1] With the US emergence of West Nile virus in 47 of 48 continental states and the District of Columbia, more people need to use insect repellent if infections from West Nile virus are to be prevented. According to the Center for Disease Control (CDC), 2539 cases of West Nile virus were recorded in 2004, down from 9862 in 2003. The number of deaths also dropped, from 264 in 2003 to 100 in 2004.[2,3] While this is an improvement, it still is a troubling statistic and avoidable outcome. It is important to note that people over the age of 50 are more vulnerable to the effects of West Nile virus.

The rate of use is not because insect repellents are ineffective. Diethyltoluamide (DEET) is the current mainstay ingredient of insect repellents, and it is highly effective. However, patients often resist using insect repellents containing DEET because of the odor, texture, harmful effect on some types of clothing, and concerns (almost totally without merit) regarding the link to cancer and neurological disease. Recently, the CDC reiterated that DEET is a highly effective ingredient.[4] Guidelines issued by the American Academy of Pediatrics suggest that using DEET no more than once daily at a concentration of no more than 30% for infants and children is safe and effective.[5] In 2002, Fradin and Day[6] and Pollack et al[7] noted that products with higher concentrations of DEET work longer than products with lower concentrations. A product containing 6.65% of DEET lasted about 2 hours, while a product with a 23.8% concentration of DEET lasted about 5 hours. The articles found that DEET provided complete protection for the longest duration compared with 12 non-DEET products.[6,7] Despite the evidence of the utility of DEET, patients remain uncomfortable using it.

The comfort level of patients using insect repellent is likely to increase because of new products that are now available. The CDC recently recommended 2 new ingredients as mosquito repellents: picaridin and oil of lemon eucalyptus. This marks the first time the CDC has approved any substance other than DEET for mosquito bite prevention.

Although oil of lemon eucalyptus (*Eucalyptus maculata citrodion)* is a natural and pleasant smelling substance, it will not be a panacea for the prevention of insect bites. Hadis et al[8] compared the efficacy of oil of lemon eucalyptus and DEET with other ingredients and found that oil of lemon eucalyptus and DEET performed significantly better ($P<.05$) at a 75% concentration than oleoresin of pyrethrum (*Chrysanthemum cinerariaefolium)* and neem (*Azadiracta indica)*.

Picaridin offers the first viable alternative to DEET and has been used in insect repellents throughout Europe and Australia for several years. Frances et al[9] found that 19.2% picaridin performed nearly as well as a gel containing 35% DEET at protecting against *Anopheles* mosquitoes for about one hour. Picaridin provided protection against *Annulirostris* mosquitoes for about 5 hours and 35% DEET provided protection for about 7 hours. This study was performed in the Northern Territory of Australia, an area whose climate and insect population resemble a South Pacific jungle where the mosquitoes are particularly difficult to control.[9] One US product, Cutter® Advanced™ insect repellent, contains 7% picaridin, is odorless, and can be easily

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applied. It is not likely that it will be as effective or long lasting as insect repellents with higher concentrations of DEET, but it is likely that it is as effective as DEET products at similar concentrations.[10]

In conclusion, it would be desirable for 19.2% picaridin to be available in the United States because it is comparable to high-strength DEET. More options, particularly in the form of picaridin, mean that more patients will consider using insect repellent. With increased public awareness, the health of patients will be enhanced through the prevention of mosquito bites and infection with arboviruses like West Nile.

REFERENCES

1. Duenwald M. Preventing West Nile infection could be just a spray away [*NY Times* Web site]. July 19, 2005. Available at: http://www.nytimes.com/2005/07/19/health/19cons.html?ex=1144814400&en=89032809589c2767&ei=5070. Accessed April 7, 2006.
2. Center for Disease Control. 2003 West Nile Virus Activity in the United States. Available at: http://www.cdc.gov/ncidod/dvbid/westnile/surv&controlCaseCount03_detailed.htm. Accessed April 6, 2006.
3. Center for Disease Control. 2004 West Nile Virus Activity in the United States. Available at: http://www.cdc.gov/ncidod/dvbid/westnile/surv&controlCaseCount04_detailed.htm. Accessed April 6, 2006.
4. CDC adopts new repellent guidance for upcoming mosquito season [press release]. Atlanta, Ga: Center for Disease Control; April 28, 2005.
5. Follow safety precautions when using DEET on children. *AAP News*. May 2003;22:200399.
6. Fradin MS, Day JF. Comparative efficacy of insect repellents against mosquito bites. *N Engl J Med*. 2002;347:13-18.
7. Pollack RJ, Kiszewski AE, Spielman A. Repelling mosquitoes. *N Engl J Med*. 2002;347:2-3.
8. Hadis M, Lulu M, Mekonnen Y, et al. Field trials on the repellent activity of four plant products against mainly Mansonia population in western Ethiopia. *Phytother Res*. 2003;17:202-205.
9. Frances SP, Waterson DG, Beebe NW, et al. Field evaluation of repellent formulations containing deet and picaridin against mosquitoes in Northern Territory, Australia. *J Med Entomol*. 2004;41:414-417.
10. Francis SP, Waterson DG, Beebe NW, et al. Field evaluation of commercial repellent formulations against mosquitoes (Diptera: Culicidae) in Northern Territory, Australia. *J Am Mosq Control Assoc*. 2005;21:480-482.