PICARIDIN: A DEEPER LOOK

Picaridin is perfect balance of efficacy, safety and user-friendliness. It repels a wide variety of pests including mosquitoes, ticks, biting flies, sand flies, gnats, chiggers, and midges. It is the longest lasting repellent with up to 14 hours of protection against mosquitoes and ticks and up to 8 hours against a variety of flies, chiggers and gnats. It’s non-greasy, has a pleasant low odor and won’t damage plastics of synthetic coatings. All these factors combined makes Picaridin the optimal topical repellent for the entire family.

Picaridin is also known as Saltidin®, KBR 3023, or Icaridin depending on the country in which it is referenced.

GLOBAL INFORMATION

The World Health Organization (WHO) recommends the active ingredient Icaridin as product of choice for malaria prophylaxis. It is registered in over 40 countries worldwide.

The results of this evaluation can be viewed online under: http://whqlibdoc.who.int/hq/2001/WHO_CDS_WHOPES_2001.2.pdf On page 28, WHO comes to the conclusion that KBR 3023 (= Saltidin® safe and effective insect repellent for human use”.

EFFECTIVENESS ON MOSQUITOES

The efficacy against Anopheles-species (Mosquitoes) was monitored over a time period of 10 h. The best protection was achieved with DEET and particularly with Saltidin®. Even after 10 h, the efficacy of the Saltidin®-solution was still at a level of 99 %. During this time frame, no loss of efficacy was observed for Saltidin®, in contrast especially to IR3535® (Fig. 1).

A superior performance of Saltidin® was also found when comparing the average repellency over all concentrations, which was 10 percentage points above that of DEET and nearly 20 percentage points above that of IR3535® (Fig. 2).

The anopheles mosquito is a common carrier of Malaria and Dengue Fever. This breed of mosquito is more prevalent in Central and South America.

![Fig. 1 Loss of efficacy against Anopheles gambiae (3).](image1)

![Fig. 2 Average protection against Anopheles gambiae (3).](image2)
Another laboratory study determined the efficacy of repellents against the lone star tick (Amblyomma americanum) (7). For this test a DEET-formulation, developed for the American military, was tested against Saltidin®- and IR3535®-formulations provided by the respective manufacturers of the repellents. Whilst the IR3535® product provided 94% protection (corresponding to 6% of ticks not repelled), a value of 98% and 99% percent was found for the Saltidin® formulations (which means only 2% and 1%, respectively of ticks were not repelled). Hence the most effective formulation containing Saltidin® showed the same efficacy as the DEET-formulation, however at a concentration 13 percentage points lower (Fig. 6).

KBR 3023 (Laboratory name for Picaridin) Superior Protection against the Aedes, Anopheles and Culex breed of Mosquitoes.

The report of the fourth WHOPES Working Group meeting in December, 2000 concluded that: “KBR 3023 was tested under temperate and tropical conditions against important disease vectors Aedes albopictus, Anopheles gambiae and Culex quinquefasciatus and several pest mosquitoes, demonstrating excellent repellent properties comparable to, and often superior to those of the ‘gold standard’ DEET. Collection of >49000 mosquitoes (approximately 95% belonging to the Anopheles gambiae complex) showed that after an exposure of 10h, KBR 3023 produced the highest protection against anophelines, followed by DEET, then IR3535.

EFFICACY ON MOSQUITOES Cont.

Field evaluation of the efficacy and persistence of insect repellents DEET, IR3535, and KBR 3023 against Anopheles gambiae complex and other Afrotropical vector mosquitoes. Costantini C1, Badolo A, Ilboudo-Sanogo E.

Abstract
Synthetic insect repellents, IR3535 and KBR 3023 (also known as picaridin, or by the trade name Bayrepel, were tested in Burkina Faso against mosquito vectors of disease to compare their relative efficacy and persistence profiles to those of the ‘gold standard’ DEET. Collection of >49000 mosquitoes (approximately 95% belonging to the Anopheles gambiae complex) showed that after an exposure of 10h, KBR 3023 produced the highest protection against anophelines, followed by DEET, then IR3535.

KBR 3023 can be recommended as the repellent of choice for malaria prevention.” (9)
Another study is of particular interest in which Saltidin® and DEET were compared at an identical concentration of 20% (8). These were tested in their efficacy against the deer tick (Ixodes scapularis). The persistence time of Saltidin® was found to be 2.5 h, which was more than five times greater than the persistence time of DEET, which was less than 30 min (Fig. 7).

![Graph showing protection time of 20% solutions of DEET and Saltidin® against the deer tick.]

**TOXICOLOGY**

“More than 800 substances were synthesized and screened for efficacy, cosmetic properties and safety. Picaridin (laboratory name KBR 3023) represented the best compromise of all the required properties for an ideal repellent. Picaridin showed the best performance regarding efficacy against a variety of arthropods (Boeckh et al., 1996) and had the most desired attributes regarding safety as well as compatibility with skin and plastic materials.

The toxicology and safety profile of Picaridin is well characterized. All toxicology data were developed by the dermal route of exposure, the most relevant route based on the use pattern of the product. Picaridin and Picaridin based products have low acute toxicity by all routes and are not skin sensitizers. Picaridin showed no neurological or developmental toxicity and there was no evidence of genotoxicity. Chronic dermal dosing in mice, rats, and dogs produced no evidence of adverse toxicity changes and it was not oncogenic in rats and mice. Additional subchronic toxicology studies were conducted by the oral route of exposure.

A conservative risk assessment conducted on the basis of relative bioavailability (rat/human ratio) shows that margins of safety are sufficient and acceptable. Based on favorable toxicology profile, low skin penetration, rapid excretion of the absorbed material along with high compatibility with skin, Picaridin-based repellents can be safely used by adults and children.” (9)

**Safe for Children**

“Icaridin is considered to be the repellent of first choice by the Public Health Agency of Canada’s Canadian Advisory Committee on Tropical Medicine and Travel for travelers six months to 12 years of age.” (10)

“In a recent article on personal protective measures to safely and effectively prevent mosquito and tick bites in Canada, the Canadian Pediatric Society, citing independent sources, notes that Icaridin is considered to be the repellent of first choice for travelers six months to 12 years of age. It also notes that products containing up to 20% Icaridin are considered to be safe and efficacious.” (11)
MATERIAL COMPATIBILITY

Picaridin will not harm or damage plastic or synthetic coatings. It won’t damage your fishing line, firearm finishes, sunglasses, watch or other outdoor products.

Effect on PVC plastic soaked in Picaridin and DEET then analyzed after 7 days. Control PVC at the top, Picaridin in the middle, and DEET at the bottom.

Picaridin material compatibility with polyester fiber (Nylon)

In comparison to DEET, Picaridin showed no influence on strength and strain with Polyester fiber.
SAWYER OFFERS THE FOLLOWING PICARIDIN BASED PRODUCTS:

NEW

20% Picaridin Lotion (4 oz)
Up to 14 hours of protection from mosquitoes and ticks, including mosquitoes carrying West Nile Virus. Repels biting flies, stable flies, black flies, gnats, chiggers, and sand flies for up to 8 hours.

20% Picaridin Spray
12 hour protection from mosquitoes and ticks, including mosquitoes carrying West Nile Virus. Repels biting flies, stable flies, black flies, gnats, chiggers, and sand flies for up to 8 hours.

WE KEEP YOU OUTDOORS℠

SAWYER.COM


(10) Public Health Agency of Canada, Committee to Advise on Tropical Medicine and Travel (CATMAT)

(11) Press Release: LANXESS Corporation’s Saltidin® (Icaridin, Picaridin) considered repellent of first choice for travelers age six months to 12 years. (2015)