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## Efficacy of three repellent products

MP1 = Repello,  
MP2 = Kikactive 30% DEET,  
MP3 = placebo

against *Aedes aegypti*

Laboratory Study

# Efficacy of three repellent products against *Aedes Aegypti*

## Laboratory study

### **Introduction**

This test was conducted in the laboratoire de Parasitologie de la Faculté de Médecine de Bobigny (France) from October 2004 to January 2005. The objective was to establish a preliminary evaluation of the efficacy of three Repello Labeled products in preventing mosquito bites: MP1 = Repello, MP2 = Kikactive 30% DEET, MP3 = placebo.

### **Material and Methods**

Breeding of the mosquitoes and repulsive tests were conducted inside Parasitology laboratory's insectarium.

Mosquitoes are raised under standard conditions at the average temperature of 26 degrees Celsius, and humidity between 70 and 80 per cent. Only one mosquito species was used, *Aedes Aegypti*, Bora strain, which the Institut de Recherche et Développement de Montpellier has provided for over the past years. Raising started on October 20<sup>th</sup> with a batch of eggs, laid between July 20<sup>th</sup> and August 20<sup>th</sup> 2004, being set in water. The first hatching were observed after 24 hours; larvae were fed finely powdered fish food. On hatching nymphs are removed and inserted into a glass container 10cm diameter and 7 cm deep. The container is placed inside a cube shaped breeding cage, all sides 40cm long, made of cloth. There fore Imagoes appear directly inside the breeding cage. Tests did not begin before 200 females over two weeks of age were present in the cage.

Repulsive tests were conducted with two subjects: subject B, a man and subject A, a woman. So as to avoid any interference, only one product was tested each day. For coherent and reproducible results, each product was tested 3 times.

Each test was conducted according to the following steps:

- before any product was tested, mosquito aggressiveness was assessed by the test subjects, by inserting their hand and forearm into the breeding cage. If at least 100 biting attempts were observed over 3 minutes, the test may take place.
- the subject prepares 2 white paper glove which cover hands and forearm, up to the elbow. Only a surface of 100cm<sup>2</sup> of skin was uncovered on the anterior side of the forearm.
- one of the tested products is applied on the entire anterior side of one forearm, using 1ml per 250 cm<sup>2</sup> of skin surface. Product is applied early in the morning. The other forearm, non treated, serve as a blank.
- the subject then inserts the untreated forearm with its protective glove (blank). Mosquitoes land on the entire surface but can only bite on the exposed 100cm<sup>2</sup> not protected by the glove. The subject is exposed to biting for 3 minutes. Biting attempts are recorded on a table.
- The same procedure goes on for the treated arm.
- The process is repeated every hour until the twelfth hour or until bites are seen on the treated arm.
- On test day, subjects limit the activities to the strict minimum. They especially avoid any washing of the forearm and any contact with objects or surfaces which could remove the product.

### **Results**

A total of eight tests were necessary to establish the efficacy of each product. Three were necessary for both MP1 and MP2. Only two tests were needed to establish the placebo role of MP3.

No bites were recorded on the skin treated with MP1 over the first 6 hours of observation on both subject A and subject B. ( Table 1)

The first bites were recorded on skin treated with MP2 , 6 hours after product was applied to skin on both subject A and B. ( Table 2)

Detailed results were compiled in the following tables.

## Discussion

Using a white paper glove allowed for good control of the tests. Mosquitoes unable to bite through the paper were forced to look for the unprotected skin surface. The latter being limited to 100 cm<sup>2</sup> allows for precise evaluation of biting attempts.

Furthermore, skin was treated over a total surface of 250 cm<sup>2</sup> below the glove and centered around the it's opening . This avoids errors due to bites on the limit between the treated surface and the untreated surface.

Using two identical gloves, one for the treated arm and one for the untreated arm, made comparing the number of biting attempts on each arm rather simple. This allowed for an accurate evaluation of the protecting effect of products on the same subject.

Having two subjects allowed for evaluation of the protective effect on both men and women.

Finally, the great number of bites observed on the test forearm leaves no doubt on how aggressive the mosquitoes were and thus on the efficacy of the product tested on the other forearm.\*

## Conclusion

Under this study's conditions, the MP1 product showed a protective effect for 6 hours against bites by *Aedes aegypti*. The product displayed total protection since not one bite was observed on the treated surface. MP2 showed it's protective effect lasted 5 hours and MP3 seemed to be a placebo.

## Results

Table 1  
MP1 Tests : biting attempts on treated and untreated skin

Hour	12/16/2004 subject A		12/19/2004 subject B		12/26/2004 subject A	
	treated	blank	treated	blank	treated	blank
1	0	>100	0	>100	0	>100
2	0	>100	0	>100	0	>100
3	0	>100	0	>100	0	>100
4	0	>100	0	>100	0	>100
5	0	>100	0	>100	0	>100
6	0	>100	0	>100	0	>100
7	0	>100	1	>100	2	>100
8	1	>100	0	>100	1	>100
9	1	>100	1	>100		
10			2	>100		
11						
12						

Table 2  
MP2 Tests: biting attempts on treated and untreated skin

Hour	12/17/2004 subject A		12/20/2004 subject B		12/27/2004 subject A	
	treated	blank	treated	blank	treated	blank
1	0	>100	0	>100	0	>100
2	0	>100	0	>100	0	>100
3	0	>100	0	>100	0	>100
4	0	>100	0	>100	0	>100
5	0	>100	0	>100	0	>100
6	3	>100	1	>100	0	>100
7	1	>100	5	>100	3	>100
8					6	>100
9						
10						
11						
12						

Table 3  
MP3 Tests : biting attempts on treated and untreated skin

Hour	11/18/2004 subject A		12/21/2004 subject B	
	treated	blank	treated	blank
1	0	>100	0	>100
2	>40	>100	>80	>100
3	>40	>100	>80	>100
4				
5				
6				
7				
8				
9				
10				
11				
12				