To DEET or not to DEET
(that is the question!)

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History

Since time began, man has searched for ways to repel pesky insects!
First there was Smoke!
Then there was MUD!
Some even tried Tars!
Finally man discovered and isolated individual chemical compounds!

- First truly effective active ingredient was citronella oil.
- Derived from citronella plant—actually an Asian grass.
- Repellence was discovered accidentally in 1901 when it was used as a fragrance in hairdressing.
- Does repel mosquitoes but it evaporates too quickly from surfaces to which it is applied—large amounts needed to be applied to be effective.
United States Military

- Many early attempts were made by U.S. military.
- Dimethyl phthalate in 1929 found to be effective on some insects but not others.
- Indalone in 1937 and Rutgers 612 (2-ethyl-1,3-hexane diol) shortly after had many limitations which prevented widespread usage.
- Jungle warfare during WWII and the diseases which occurred sped up the search for a viable alternative.
In 1946, after testing thousands of chemicals, the U. S. Army developed DEET (n-n-diethylnetatoluamide) for use by troops.

First tested as an insecticide on farm fields with little or no success.

In 1955 DEET was synthesized and released for public use in 1957.

Most widely used insect repellent in the world today.

Over 200 products from about 30 different companies use DEET in various formulations.

It is estimated that over 300 million people worldwide and at least 30% of the U.S. population use products containing DEET each year.
Mosquitoes have chemical receptors on their antennae that are particularly sensitive to lactic acid given off by warm-blooded animals.

As lactic acid evaporates, mosquitoes have the innate ability to follow the lactic acid to its source.

As DEET evaporates it is thought to inhibit the binding of lactic acid to those chemical receptors thus “hiding” the user from the mosquito.

More recent studies have shown that DEET may actually have a repellent value because it “smells bad” to mosquitoes.

Exact mode of action is still not 100% sure!
Dangers of DEET!

- Dangerous DEET - internet abounds with accusations
- Could cause------
- Possible damage----
- May contribute---
- Could interfere with---
- Problems when combined with---
Deet has been accused of:

- Causing Death!
- Killing brain cells!
- Damaging fetuses!
- Being unsafe for children!
- Causing neurological damage!
- Polluting the environment!
Since 1957 it is estimated that DEET has been used by over 8 billion people worldwide.

Deet is used by approximately 30% of the U.S. population each year.

The dangers of arthropod borne diseases are real and continue to spread.

Despite the substantial attention paid by the lay press every year to the safety of DEET, this repellent has been subjected to more scientific and toxicological data than any other repellent substance and has a remarkable safety profile.
DEET causes Deaths

• From 1961 until 2002, eight deaths were reported from exposure to DEET.
• Three of these resulted from the deliberate ingestion of DEET (possible suicide).
• Two were adults from dermal exposure and three were children under the age of 6. The children were exposed to “frequent, heavy or nightly applications” of DEET and at least one child had another condition which may have actually been the cause of death.
• During this same time period several billion people used DEET with no problems.
DEET kills brain cells!

- This and many other negative claims are based on one major study.
- The researcher conducted studies using DEET mixed with other known neurotoxins. The question is whether the results were caused by DEET or the other chemicals in the mixture.
- The research has been questioned by many and never replicated (too few animals, improper protocol, refusal to allow others to review study materials, etc.)
Deet damages fetuses!

- EPA – maternal DEET exposure during pregnancy resulted in no measureable reproductive, embryotoxic, teratogenic effects on offspring in DEET injected rats.
- Study in Thailand followed women who used DEET from second trimester of pregnancy onward found reduced instances of malaria in the women.
- Babies born to DEET group showed no differences to non-DEET group (weight, length, head circumference, and performance on neurological tests)
DEET CAUSES NEUROLOGICAL DAMAGE!

- There have only been 21 cases reported in the medical literature of neurological toxicity.
- Six of these cases resulted from deliberate ingestion.
- Twelve other cases resolved completely without any residual effects.
- EPA reviewed all available human and animal data in 1998 and concluded there was no evidence that DEET was a selective neurotoxin.
- Even if all reported cases ascribed to DEET were confirmed, the real life risk of neurological side effects would be less than one in one hundred million!
DEET IS UNSAFE FOR CHILDREN!

EPA continues to believe that the normal use of DEET does not present a health concern to the general population, including children. As always, consumers are advised to read and follow label directions in using any product, including insect repellents.

EPA-DEET is approved for use on children with no age restriction. There is no restriction on the percentage of DEET in the product for use on children, since data do not show any difference in effects between young animals and adult animals in tests done for product registration. There also are no data showing incidents that would lead EPA to believe there is a need to restrict the use of DEET.
DEET causes environmental damage!

- EPA-The Agency has not identified any risks of concern to human health, non-target species or the environment.
- EPA-Currently registered uses of DEET are also not expected to result in adverse effects for listed and non-listed endangered species, or critical habitat. As such, EPA concludes “no effect” for listed species and no adverse modification of designated critical habitat for all currently registered uses of DEET.
Facts!

From 1999-2013 there were 39,577 cases of West Nile Virus and 1,668 deaths in the U.S.

From 2004-2013 there were 82 deaths from EEE in the U. S.

The World Health Organization estimates that in 2012 malaria caused 207 million clinical episodes, and 627,000 deaths.

There have been 350,000 cases of chikungunya in the western hemisphere since 2013

During the period 1964-1998 [35 years] a total of 4478 confirmed cases of SLE were recorded in the United States.
Do you really want to take a chance?

- Given our findings, we cannot recommend the use of any currently available non-DEET repellent to provide complete protection from arthropod bites for any sustained outdoor activity. (New England Journal of Medicine)
If only------

• Mosquitoes sucked fat instead of blood!!!!