Malaria Essay, Research Paper

Malaria

Malaria parasites have been with us since the beginning of time, and

fossils of mosquitoes up to thirty million years old show that malaria?s vector

has existed for just as long. The parasites causing malaria are highly specific,

with man as the only host and mosquitoes as the only vector. Every year,

300,000,000 people are affected by malaria, and while less than one percent of

these people die, there are still an estimated 1,500,000 deaths per year. While

Malaria was one of the first infectious diseases to be treated successfully with

a drug, scientist are still looking for a cure or at least a vaccination today

(Cann, 1996). Though many people are aware that malaria is a disease, they are

unaware that it is life threatening, kills over a million people each year, and

is a very elusive target for antimalarial drugs (Treatment of Malaria, 1996).

Being a very specific disease, malaria is caused by only four protozoal

parasites: Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale, and

Plasmodium malariae. Not only is the disease specific, but the parasites are

too, with only 60 of 380 species of female Anopheles mosquitoes as vectors.

With the exception of Plasmodia Malariae which may affect other primates, all

parasites of malaria have only one host, Homo sapiens. Because some mosquitoes

contain substances toxic to Plasmodium in their cells, not all species of

mosquitoes are vectors of Plasmodium. Although very specific, malaria still

causes disruption of over three hundred million people worldwide each year (Cann,

1996).

The life cycle of the parasite causing malaria exists between two

organisms, humans and the Anopheles mosquito. When a female mosquito bites a

human, she injects an anticoagulant saliva which keeps the human bleeding and

ensures an even flowing meal for her. When the vector injects her saliva into

the human, it also injects ten percent of her sporozoite load. Once in the

bloodstream, the Plasmodium travel to the liver and reproduce by asexual

reproduction. These liver cells then burst releasing the parasites back into

the bloodstream where they then enter red blood cells. Here, the Plasmodium

feed on hemoglobin and reproduce again by asexual reproduction. Afterwards, the

red blood cells burst and release the parasites. Some of the parasites released

from red blood cells may be able to replicate by sexual reproduction. When the

host has been bitten by a mosquito again, infected blood inters the mosquito.

Here, sexual forms of the parasite develop in the stomach of the Anopheles

mosquito completing the parasites life cycle (Herman, 1996).

People infected malaria have several symptoms including fever, chills,

headaches, weakness, and an enlarged spleen (Herman, 1996). The amount of time

for symptoms to appear differs depending on the form of the parasite. Those

infected with Plasmodium falciparum experience symptoms after about twenty-four

hours, those infected with Plasmodium vivax and Plasmodium ovale produce

symptoms after a forty-eight hour interval, and after seventy-two hours

Plasmodium malariae begin causing fever and chills (Cann, 1996).

Most malaria cases seem to cluster in the tropical climate areas

extending into the subtropics, and malaria is especially endemic in Africa. In

1990 eighty percent of all reported cases were in Africa, while the remainder of

most cases came from nine countries: India, Brazil, Afghanistan, Sri-Lanka,

Thailand, Indonesia, Vietnam, Cambodia, and China. Globally, the disease

circulates in almost one hundred countries causing up to 1,500,000 deaths

annually (Cann, 1996).

Because there is no definite cure for malaria, scientists are trying

their hardest to contain the parasite to where it now exists. The range of a

vector from a suitable habitat is fortunately limited to a maximum of two miles

(Cann, 1996). If this were the only factor, scientist would have no problem

containing the disease. Humans migrate, however, and over time the disease has

slowly spread throughout the tropics. Major problems also exist when ignorant

tourists to Africa transfer the parasite to non malarious areas (Graham, 1996).

Biologists are also using control measures, such as spraying DDT to kill

mosquitoes, draining stagnant water, and using the widespread use of nets to

contain the mosquito itself (Herman, 1996). Because of the worsening situation,

the World Health Organization (WHO) declared malaria control to be a global

priority (Limited Imagination, 1996).

Although limiting the spread of malaria is not easy, finding a cure has

presented several problems in recent years. One main reason finding a cure for

malaria is so hard is that different strains in different parts of the world

require different drugs, all of which soon lose their effectiveness as the

parasite evolves resistance to them (Limited Imagination, 1996). Secondly, once

the parasite enters the human bloodstream, it changes form several times inside

the body, making it an elusive target for the immune system (Cann, 1996). Last,

while research and development is very expensive, Africa?s third world countries

don?t have the money to support such research (Graham, 1996).

Research in the field of malaria?s microbiology enables a search for

better vaccines and a possible cure for malaria (Atovaquone, 1996). In the past

several decades, scientists have developed many drugs that have all fallen

victim to the resistance of the Plasmodium parasites. Such drugs include

chloroquine, pyrimethamine, chloroguanide, desipramine, halofantrine, mefloquine,

and arteether (Herman, 1996). Scientists too often find their drugs

effectiveness wearing off as malarial parasites build tolerance to them (Graham,

1996).

Several drugs used to treat the disease have been around for centuries.

One such drug is quinine, a compound extracted from the bark of the cinchona

tree. This drug was a secret of the locals of the Amazon jungle for centuries

until European missionaries learned of its use. The trouble remains that

quinine is expensive to harvest, is extremely hard to synthesize, and fails to

prevent relapses (Limited Imagination, 1996). Another unique treatment of

malaria is the use of the herb Artemisia annua. This herb has been used for

centuries in traditional Chinese medicine to treat malaria and fever. Neither

of these drugs are one hundred percent effective (Herman, 1996).

While the need for malarial vaccines grows urgent, so does the number of

people affected each year. Although it is caused by a highly specific parasite,

malaria still seems to kill off between one to two million people annually. As

the Plasmodium parasites mutate more and more to resist the effect of

antimalarials, it becomes harder for scientist to find a cure (Treatment of

Malaria, 1996). Over forty percent of the world?s population still at risk from

this deadly disease, is yearning for a cheap, effective vaccine (Cann, 1996).

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