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The Race Against Time: The Story of the Brain-Eating Amoeba *Naegleria fowleri*
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Primary amoebic meningoencephalitis (PAM), a rare but quickly spreading and frequently lethal infection of the central nervous system, is caused by the thermophilic, free-living amoeba *Naegleria fowleri*. Warm freshwater habitats like lakes, hot springs, and unkempt swimming pools are ideal for the organism's growth. The amoeba usually migrates along the olfactory nerves into the brain, where it causes acute inflammation and tissue destruction, after contaminated water enters the nasal cavity. PAM has a startling over 95% fatality rate, mostly as a result of inadequate treatment effectiveness and delayed diagnosis. Although they are available, current diagnostic techniques such as microscopy, polymerase chain reaction (PCR), and neuroimaging are frequently used too late to enhance results. High-dose antibiotics like amphotericin B, miltefosine, and combination therapies are part of standard treatment, but survival is still very uncommon. Although studies on drug repurposing, drug delivery systems aided by nanotechnology, and immunotherapeutic strategies have shown promise recently, these developments are still in their infancy and need additional clinical validation. Prevention is still the best line of defence because of the disease's quick progression and poor response to treatment. Currently, the best ways to lower the incidence of PAM are through public health education and better water sanitation practices. The pathophysiology, diagnostic difficulties, treatment constraints, and urgent need for improved preventive measures are all highlighted in this review, which summarizes the state of knowledge regarding *N. fowleri*. It emphasizes how critical it is to develop diagnostic and treatment strategies quickly in order to fight this fatal pathogen.

Key words: *naegleria fowleri*, primary amoebic meningoencephalitis, polymerase chain reaction.