

Summer 2013

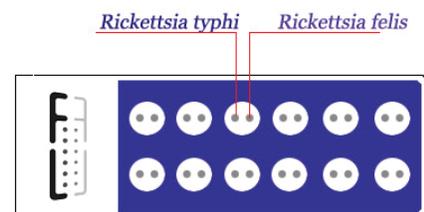
Flea-borne typhus, formerly called murine or endemic typhus, is a bacterial disease found primarily in the fleas that live on opossums and cats and is transmitted by an infective flea bite. It is caused by the bacteria, *Rickettsia typhi* and *Rickettsia felis*, found in infected fleas and their feces.

Once a person is infected, flea-borne typhus normally has an incubation period of 6-14 days before symptoms appear. Typical symptoms consist of:

- * Severe headache
- * Sustained high fever (104° F) for many days
- * Body aches
- * Weakness
- * Confusion
- * Avoidance of light
- * A rash on the chest, back, arms and/or legs appears in approximately 50% of patients.

Flea-borne typhus shares symptoms with other fevers of unknown origin (FUO) and can be incorrectly diagnosed if specific blood tests are not performed. Correct diagnosis and prompt treatment with the proper antibiotic (doxycycline) can efficiently resolve these infections.

Specific serologic assays for *Rickettsia typhi* and *Rickettsia felis* antibody have been developed by Fuller Laboratories and are commercially available. These include both micro-IFA (MIF) and ELISA formats. The MIF assay utilizes purified bacteria in a contrasting background matrix, with both antigens in each slide well, as seen in this representation:



The ELISA assays can be run individually or in tandem for *R. typhi* and *R. felis* specificities. The *Rickettsia typhi* coating antigen is an optimized mix of typhus group lipopolysaccharide (LPS) and native OmpB protein. Both antigens are necessary for the high sensitivity and specificity required. Although the LPS antigen is dominant, approximately 50% of positive sera are reactive with either the OmpB or the LPS.

It should be noted, however, that assay specificity does not yet distinguish between *Rickettsia typhi* and *Rickettsia prowazekii*, the agent of epidemic typhus. This assay must rely on differentiating between the OmpB proteins of these closely related species and is under development.

In contrast, *Rickettsia felis* is classified as a spotted fever group transition species. Although both OmpA and OmpB proteins characteristic of this group are encoded in the genome, only OmpB is fully translated and transported through the outer membrane. Also the LPS moiety is truncated to a point that it no longer serves as a reactive antigen. Serum reactivity, then, is directed toward the native OmpB and this reactivity strongly correlates (99.5%) with reactivity to the whole organism, as seen in the MIF assay.