

Infections with
Typhus, Spotted Fever and
Scrub Typhus Group Rickettsiae
among US Military Personnel
Deployed to the
Republic of Korea

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Rickettsioses in ROK

- **Scrub Typhus (*Orientia tsutsugamusi*)**
 - in ROK soldiers and civilians
 - In US soldiers and civilians
 - In the environment (rodents and arthropods)
- **Typhus Group Rickettsioses**
 - **Murine Typhus (*Rickettsia typhi*)**
 - in ROK soldiers and civilians
 - In US soldiers and civilians
 - **Epidemic Typhus (*Rickettsia prowazekii*)**
 - Not since . . .
- **Spotted Fever Group Rickettsioses**
 - *R. japonica*, *R. conorii*, . . .
 - in ROK soldiers and civilians
 - In US soldiers and civilians
- **Anaplasmosis, Ehrlichioses, Bartonellosis, Q Fever**
 - Not addressed in this project

Purpose of this Study

- **There is little data on risk for rickettsioses in USFK**
 - there are no published epidemiologic studies
 - information derived from passive surveillance may not provide reliable risk estimates because these diseases often cause symptoms that while debilitating are non-specific thus impairing diagnosis.
 - Previous studies have looked at Korean patients with acute febrile illness (AFI).
 - However, no study has looked at a cross section of apparently healthy individuals in Korea.
 - This study has looked at approximately 9,000 individual sera for evidence of SFG, TG and ST rickettsioses. This is by far the largest serosurvey of a healthy population in Korea, military or civilian, for these three rickettsioses.

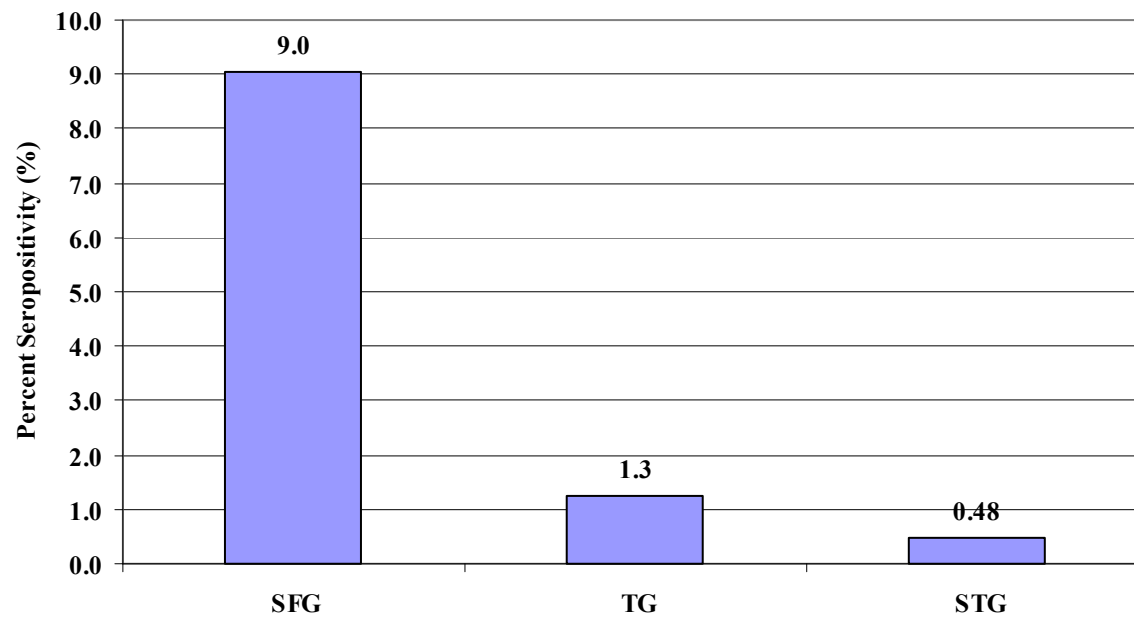
M & M

- Serum
 - DoD SR
 - From type of military personnel
 - » Year of deployments (1992 to 1995?)
 - ~10,000 post-deployment sera
 - ~ 2,000 pre-deployment sera
- Serology – Group Specific:
 - ELISA-IgG
 - STG (*O. tsutsugamushi* WCA from Karp, Kato, Gm)
 - TG (*R. typhi* Wilmington WCA)
 - SFG (*R. conorii* Moroccan or Malish 7 WCA)
 - Screen all post-deployment sera
 - 1:100 (OD of 0.500 or greater positive)
 - Titer all screen positive of post-deployment sera alongside of pre-deployment paired serum sample
 - 1:100 to 1:6,400
 - Pre-existing antibodies (pre- and post-deployment titer the same)
 - Evidence of rickettsioses during deployment
 - Seroconversion (<100 to \geq 400?)
 - 4-fold rise in titer

Results: post-deployment screen

- Scrub typhus
 - So many of so many screen positive
- Typhus Group
 - So many of so many screen positive
- Spotted Fever Group
 - So many of so many screen positive

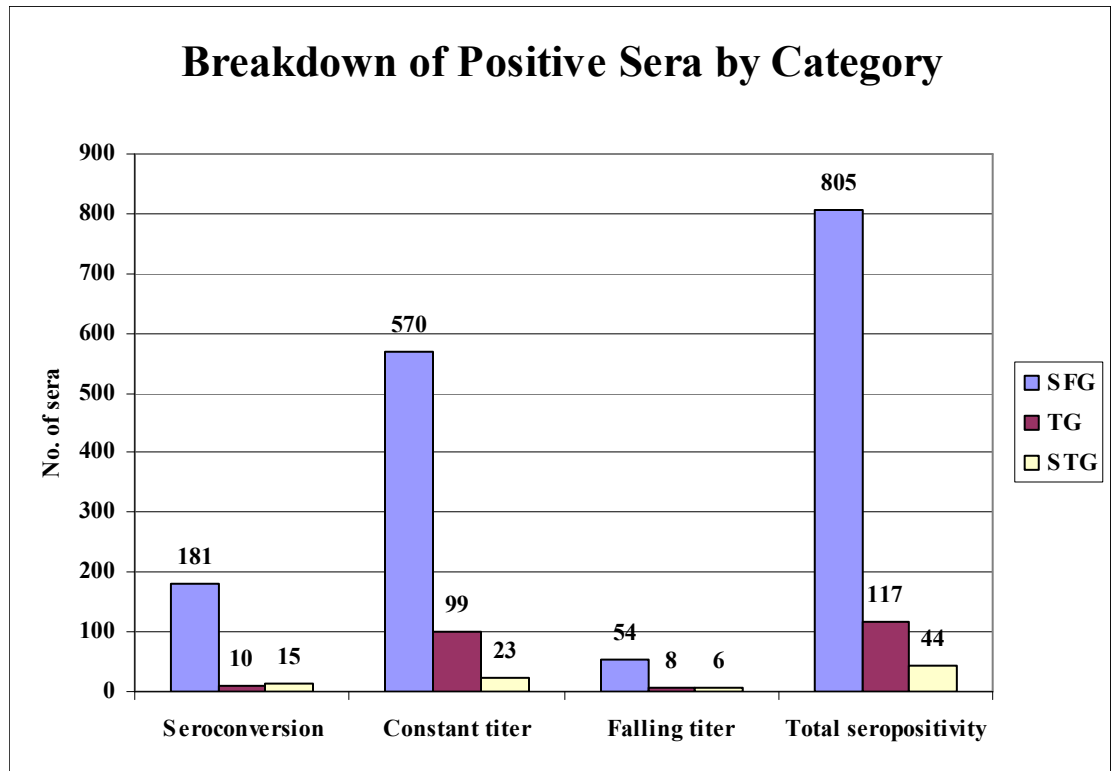
Seropositivity to Rickettsial Antigens



Pre- and Post-Deployment Titers

- Scrub typhus
 - Seroconversions/4-fold increase in titer
 - So many of so many (___%)
- Typhus Group
 - Seroconversions/4-fold increase in titer
 - So many of so many (___%)
- Spotted Fever Group
 - Seroconversions/4-fold increase in titer
 - So many of so many (___%)

Breakdown of Positive Sera by Category



Demographics & Positivity

- Seropositivity and demographics
- ROK infection and demographics

Conclusions

- Pre-existing evidence of rickettsioses
 - ST was ___% wh/ is high maybe due to previous tour to Asia (known if true?)
 - MT was ___% wh/ maybe due to infection in US (e.g. Texas, LA) or previous deployment world wide endemic region; most likely not due to epidemic typhus
 - SFG was ___% wh/ is similar to what is seen in previous studies among US military (___ to ___%) and civilians (___ to ___%).
 - Demographics associations?

Conclusions (cont)

- Rickettsioses among USFK
 - Scrub Typhus (___%) suggests that risk is such especially for the folks that . . .
 - Typhus Group (___%) suggests that risk is such especially for the folks that . . .
 - Spotted Fever (___%) suggests that risk is such especially for the folks that . . .

Future Studies

- Follow-up on rickettsioses among USFK
 - Passive case detection
 - Using case definition febrile disease without known diagnosis
 - Questionnaire
 - Serology (acute and convalescent sample)
 - qPCR of blood; biopsy of eschar/rash when available
 - Evaluate small mammal and arthropod vectors in location of rickettsial patient
 - Blood from mammal (serology)
 - Spleen (or ear) qPCR
 - Vectors (ID) and qPCR

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