

## **The Effects of a Single Cervical Inoculation of *Chlamydia trachomatis* on the Female Reproductive Tract of the Baboon (*Papio anubis*)**

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### **Abstract**

**Background.** The baboon (*Papio hamadryas anubis*) can be transcervically instrumented, facilitating studies of intrauterine contraception and reproductive tract infection. We sought to determine if the baboon could become infected with a single cervical inoculation of *Chlamydia trachomatis*. **Methods.** Ten female baboons were randomized and inoculated cervically with *C. trachomatis* serovar E (or buffer alone). Animals underwent weekly clinical and laparoscopic evaluations for four weeks and at post-inoculation week 8, to monitor upper tract infection. Cervical culture and nucleic acid amplification testing (NAAT) were completed weekly throughout the study. Animals were euthanized at week 16 and the reproductive tracts were examined histologically. **Results.** All inoculated animals developed cervical infection. The average duration of positive NAAT results was 6.8 weeks (range 2–16). Two of eight (25%) animals tested positive from fallopian tube samples. Infected animals showed histological findings consistent with chlamydial infection, such as germinal centers. Five of ten animals seroconverted to *C. trachomatis*. **Conclusions.** Baboons cervically inoculated once with *C. trachomatis* develop infection similar to humans, with a low incidence of upper tract infection. This novel model of *Chlamydia* infection closely resembles human disease and opens new avenues for studying the pathogenesis of sexually transmitted infections and contraceptive safety. Pelvic inflammatory disease (PID) describes an infectious disease of the upper female reproductive tract that affects nearly 800,000 women annually in the United States [1]. It is an important cause of infertility, ectopic pregnancy, chronic pelvic pain, and tuboovarian abscess [1]. *Chlamydia trachomatis* is the most common sexually transmitted infection (STI) in the United States and is one of the most common pathogens associated with PID [2]. A better understanding of the mechanisms whereby bacterial pathogens cause PID and its sequelae is necessary to develop novel preventive and therapeutic measures. Concerns regarding an increased risk for PID have been associated with intrauterine contraception (IUC), limiting the application of this form of contraception in the United States [3]. Investigating the association between IUC and PID in humans is difficult due to an inability to control for confounders, difficulty in defining PID, lack of (or inappropriate) comparison groups, and the inability to follow infection prospectively [3–5]. The use of an animal model might allow a systematic evaluation of PID and IUC use. Baboons have been previously used in IUC trials [6, 7]. However, while the male baboon is susceptible to infection with *C. trachomatis* [8], this has not been studied in the female reproductive tract. The objective of this study was to establish a baboon (*Papio hamadryas anubis*) PID model using *C. trachomatis*. Other than the great apes, the baboon is most similar to *Homo sapiens* in reproductive tract anatomy, physiology, and biochemistry, including hormonal fluctuations and cycling, and has a rectilinear cervical canal that allows for ease of transcervical procedures [9, 10]. Establishing the infective dose, clinical features, and pathological effects of *C. trachomatis* are key first steps in establishing the use of

this animal model for future use in the study of PID. Herein, we tested the hypothesis that baboons undergoing a single cervical inoculation of *C. trachomatis* will develop reproductive tract infection analogous to that observed in humans.