Seals as the Original Source of Tuberculosis in the Americas


It was long believed that Mycobacterium tuberculosis (MtB) evolved from Mycobacterium bovis after transfer from a domesticated zoonotic source until genomic analyses indicated that the reverse was true—that is, cattle and other animals were not the source of human infection with MtB. The great genomic diversity of MtB in Africa is consistent with its origin and expansion on that continent with subsequent dispersal together with movement of human populations.

Because MtB strains currently prevalent in the Americas are most closely related to European strains, it has been suggested that the organism arrived in the New World as a consequence of contact with traders or early settlers. This scenario is, however, inconsistent with evidence of the existence of tuberculosis in the New World prior to the earliest known contact with Europeans.

Bos and colleagues screened 68 skeletal samples with abnormalities consistent with infection with MtB from both pre- and postcontact New World sites and identified 3 with adequately preserved MtB DNA. These 3 were from excavations in Peru and radiocarbon dating placed them, with ≥98.5% probability, from 1028 to 1280 A.D., well before European contact.

Surprisingly, phylogenetic analysis found that these MtB genomes shared a common ancestor with strains seen only in seals and sea lions. Thus, the investigators surmised that pinnipeds were infected by contact with a host infected with an African strain of MtB and carried the infection to coastal South America, infecting humans. This pinniped-derived strain was, however, subsequently replaced by European strains.

Staphylococcal Small-Colony Variants and Prosthetic Joint Infections


Small-colony variants (SCVs) of staphylococci occur within larger populations of the organism and differ phenotypically from the others in a variety of ways. Besides smaller colony size, these include slower growth, increased adherence to fibrinogen and fibronectin, enhanced intracellular persistence, and expression of genes that are associated with formation of biofilm. SCVs are auxotrophs for thymidine or for 1 of 2 molecules necessary for electron transport, menadione, or hemin [1]. SCVs have frequently been identified in osteomyelitis and in prosthetic joint infections (PJIs), as well as in respiratory secretions of patients with cystic fibrosis. They have frequently been reported to be associated with persistence, antibiotic resistance, and failure of antibiotic therapy.

Tande and colleagues at the Mayo Clinic in Rochester, Minnesota, examined the role of SCVs in patients with PJI due to staphylococci. All but 12 patients underwent a 2-stage exchange and received intravenously administered antibiotics. SCVs were recovered from sonicate fluid of removed prostheses (almost two-thirds were knee prostheses) in 38 of 113 (33.6%) patients. The median interval from initial joint implantation to last implantation was 1295 days in those with SCV isolated and 646 days (P = .007) in those without, while the median intervals from most recent to last joint surgery were 743 days and 306 days (P < .0001), respectively. Patients with SCVs detected had a longer duration of symptoms (491 days) than did those from whom SCVs were not recovered (165 days; P = .0003). SCV patients were more likely to have received chronic antimicrobial therapy before final surgery (42.1% vs 22.7%; P = .048).

The species distribution did not differ significantly between patients with and those without SCV. Staphylococcus epidermidis accounted for 57.9% and 53.3% of isolates while Staphylococcus aureus accounted for 26.3% and 33.3% in the 2 groups, respectively. The remaining isolates were comprised of small numbers of other coagulase-negative staphylococci. Overall, approximately 40% of each group were reported by the hospital clinical microbiology laboratory to be susceptible to oxacillin, while both susceptible and resistant isolates were simultaneously present in approximately one-tenth of individuals. Susceptibility testing was also performed (sheep blood was added to the Mueller-Hinton agar because of slow growth on the latter in 11 cases) with SCV isolates by the investigators as part of this study. Discrepancies between the 2 sets of results were noted in almost
one-third of isolates for at least 1 of the antibiotics tested.

Patients were managed with 2-stage arthroplasty and antibiotic therapy and were followed for a median of 30.6 months. Treatment failure (defined as subsequent revision surgery for any reason, PJI after the index surgery, prosthesis nonreim-plantation due to ongoing infection, or amputation of the affected limb) occurred in 9 subjects (24%) with SCVs and 23 (32%) without (P = .51). While the presence of SCV was not associated with an increased risk of treatment failure, the species of the isolated pathogen was. Thus, infection with *S. aureus* was more often associated with failure than was *S. epidermidis* infection (hazard ratio, 4.03 [95% confidence interval, 1.80–9.04]).

As the authors conclude, although SCVs are associated with a longer duration of symptoms and more prior antibiotic exposure, they are not associated with an increased risk of treatment failure after a 2-stage exchange procedure followed by appropriate antibiotic therapy. The discrepancy noted between the results of routine antimicrobial susceptibility testing performed in the clinical laboratory and those in a research laboratory deserves further exploration.

**Reference**


**Case Vignette: White Urine—Albinuria**


Bladder catheterization of a febrile 75-year-old woman yielded milky white urine. Noncontrast computed tomography demonstrated that the bladder urine was hyperdense. Culture of urine, which was alkaline, yielded *Morganella morganii*, and microscopic examination revealed amorphous phosphate granules and crystals resembling magnesium ammonium phosphate, which was confirmed by chemical analysis. The administration of antibiotics to the patient was followed by clearance of her urine.

The causes of albinuria include chyluria, intense pyuria, and high concentrations of minerals as in patients with hypercalciuria or hyperphosphaturia. It has also been reported during propofol anesthesia. The ability of *M. morganii* to split urea and thereby raise the urine pH likely accounted for the precipitation of magnesium ammonium phosphate in this patient’s urine. The role of pH was demonstrated in this case by the fact that the patient’s urine cleared with the direct addition of hydrochloride acid to it.

**Case Vignette: Malaria: Monkey to Human**


A 34-year-old woman who lived in a modern housing area in Malaysia adjacent to a small forested area containing long-tailed macaques developed fever and chills and was found to have malaria parasites. The organisms were thought to be morphologically consistent with asexual stages of *Plasmodium malariae* or *Plasmodium knowlesi* and were present at a density of 0.024% (1200 parasites/µL). Blood smears became negative after receipt of chloroquine. Morphological examination and polymerase chain reaction (PCR) testing at a reference laboratory led to the conclusion that the organism was actually *Plasmodium vivax*. However, sequencing of the products obtained with a different PCR at another reference laboratory identified the organism as *Plasmodium cynomolgi*, an organism that had never been known to have been present in that laboratory, indicating that contamination was highly unlikely. Seven species of monkey malaria have been experimentally transmitted by mosquito bite to humans, but only *P. knowlesi* and now, *P. cynomolgi*, has been demonstrated to be naturally acquired.

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