Sporotrichosis is a fungal infection caused by *Sporothrix schenckii sensu lato* usually acquired after a penetrating injury with contaminated material\(^1\). The infection may establish at the site of the injury, potentially disseminate along the lymphatics, or rarely cause systemic infections including occasional primary pulmonary sporotrichosis\(^3\). New knowledge of the organism reveals a diverse infection with regard to its epidemiology, geographical distribution, and species characteristics.

*S. schenckii sensu lato* is a thermally dimorphic fungus characterised by its ability to grow as a yeast-like organism at 35°C (i.e. at body temperatures, Figure 1\(a\)). However at temperatures <30°C it grows as a mould (Figure 1\(b\)) demonstrating both clavate/subglobe conidia on denticles arranged in clusters on a short conidiophore (Figure 2\(a\)), and larger pigmented sessile conidia which may proliferate with age to appear like sleeves along the hyphae (Figure 2\(b\)).

Despite its dimorphic characteristics, \(^1\)8S rDNA sequencing indicates *S. schenckii sensu lato* is related to the environmental saprophyte *Ophiostma stenoceras* rather than other clinically relevant dimorphic fungi\(^1\). In the environment *S. schenckii sensu lato* is mostly associated with a variety of dead organic substrates, with growth accelerated by warmth and humidity. The environmental mycelia produce abundant conidia that may establish areas of endemcity, but when implanted into the body may cause infection in a variety of warm blooded animals. Zoonotic transmission has

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**Figure 1.** Culture of *S. schenckii sensu stricto* grown on blood agar at 36°C (**a**), and SDA at 26°C (**b**).
been recorded amongst armadillo hunters and from other animals, but cat-to-cat and cat-human transmission is notable.

Patients with sporotrichosis outside of endemic areas may go undiagnosed having undergone unsuccessful treatment with antibacterial agents. Despite the organism growing on a wide range of laboratory media, diagnosis may be hampered by the lack of extended incubation of microbiological cultures or a lack of recognition of the organism particularly if the yeast phase is disregarded as a non-albicans Candida.

At least as early as 1979, differences in the virulence and morphology of clinical isolates were noted. Now supported by epidemiological, morphological and molecular data, the species are considered members of a species complex with the main clinically relevant species being S. schenckii sensu stricto, S. brasiliensis, S. globosa and S. iturii.

Outbreaks have been reported in geographical localities on all continents other than Europe usually associated with specific organic substrates (e.g. hay/Australia, wood/South Africa, sphagnum moss/USA, etc.). Any age/gender bias is predominantly driven by the source of transmission (e.g. male miners in South Africa acquiring the infection from contaminated timbers).

The exception to this global pattern occurs in Brazil where both S. schenckii sensu stricto and S. brasiliensis have been recorded. S. schenckii sensu stricto infection follows the classical sporotrichosis epidemiology across different regions of the country. However, since the early 1990s S. brasiliensis has been the agent of an expanding outbreak radiating out from Rio de Janeiro and affecting many thousands of people. Remarkably this outbreak is primarily an urban zoonosis perpetuated by feline sporotrichosis. Cats not only carry the organism but they are also susceptible to infection which is transmitted via scratches from infected animals or from the environment. Given the low level of available medical and veterinary care in these poor socio-economic areas, it seems inevitable the infection will continue to spread across an increasing geographical area affecting many more individuals.

Consistent with epidemiological pattern of these species, it has been demonstrated in a separate report that S. brasiliensis is the most virulent of the species in a murine model followed by S. schenckii sensu stricto and then S. globosa, while S. mexicana and S. albicans show little or no virulence in this model of infection. Thus expanding knowledge of the different species within the species complex gives understanding of the different epidemiology in different geographical areas, but may also indicate somewhat different susceptibility profiles of the organism.

Sporotrichosis in Australia

The infection has variously been reported in areas of eastern Australia. In a review of sporotrichosis from NSW, Sivagnanam et al. described 31 cases between 2000–2010 around the Port Macquarie area. Sporotrichosis has also been reported from Queensland including a case cluster in 1998 of 16 patients reported in the Darling Downs district of south-east Queensland. In an earlier review 37 cases were described from the Royal Brisbane Hospital between 1965–1975.

In Western Australia (WA), sporadic cases have occurred at least since 1975, mostly in certain districts of the ‘wheat belt’ in the south-west. However between 2000-2006 a cluster of 33 laboratory confirmed cases was reported from the Margaret River region where sporotrichosis had not previously been reported. A further cluster of 29 cases were identified from 2011–2014 in the same region. Following investigations of the 2000 outbreak, a local media information campaign was instigated by local health authorities and a ‘clean up’ of an implicated hay supplier resulted in a reduction in incidence cases. A similar community education programme instituted in 2013 seems to also have resulted in a reduction in the incidence of infection (Figure 3).

Then in 2014 the first cases of sporotrichosis were reported in the Northern Territory. Again, hay was implicated as the infection source, following a remarkably similar pattern to the Margaret River infections.

The species distribution in Australia has only been studied to a limited degree. In a poster presented at the 17th ISHAM Congress in Tokyo from a small sample of isolates, all WA isolates were identified as S. schenckii sensu stricto, in comparison to isolates from eastern Australia identified as S. schenckii sensu stricto (but a separate clade to those in WA) or S. globosa.
Clinical S. schenckii isolates at PathWest, QEII (to Jan 2015)

Figure 3. Number of clinical isolates of S. schenckii sensu lato recorded at PathWest, QEII, WA, recorded July–June annually to January 2015. MR, Margaret River region.

Conclusion

Sporotrichosis in Australia occurs as sporadic cases in certain geographical regions, with the occasional case cluster often associated with contact with hay. Distribution of organic substrates may spread the organism to new geographical areas. However, the species distribution and susceptibility pattern of the organisms have yet to be systematically studied in Australia.

References


Biographies

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