

## Sporotrichosis: from a neglected subcutaneous mycosis in public health to an emerging notifiable zoonosis

### *Esporotricose: de micose negligenciada em saúde pública à zoonose emergente de notificação compulsória*

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Sporotrichosis is a subcutaneous mycosis caused by thermodimorphic fungi of the genus *Sporothrix*, traditionally associated with traumatic skin inoculation through contaminated plant fragments, characterizing it as a classic sapronoses in rural environments. However, since the late 20th century, particularly in Brazil, a significant shift in the disease's epidemiological profile has been observed, marked by the emergence of an urban zoonotic form, in which direct contact with infected domestic cats became the primary transmission route. This epidemiological transition is driven by *Sporothrix brasiliensis*, an emerging species of high virulence, strongly adapted to feline hosts and capable of causing hyperendemic outbreaks in urban centers.

Advancements in fungal taxonomy and classification, driven by molecular techniques such as sequencing of ITS regions, calmodulin gene analysis, and the use of MALDI-TOF mass spectrometry, have enabled the redefinition of the etiological agent of sporotrichosis. What was once recognized as *Sporothrix schenckii* is now understood as a complex of cryptic species, each with distinct epidemiological, clinical, morphophysiological, and virulence profiles. Among these species, *S. schenckii sensu stricto*, *S. globosa*, *S. luriei*, and particularly *S. brasiliensis* stand out, the latter being responsible for most human and animal cases in Brazil in recent decades. Inter-species differentiation is essential, as these species exhibit distinct therapeutic responses and dissemination patterns.

In the Brazilian context, the state of Rio de Janeiro has emerged as the main epicenter of zoonotic sporotrichosis, with more than 10,000 human cases and approximately 8,500 feline cases documented between 1998 and 2020. Transmission predominantly occurs through bites, scratches, or direct contact with the secretions of infected cats, whose lesions exhibit a high fungal load. This form of direct interspecies transmission, previously uncommon among subcutaneous mycoses, is facilitated by factors such as high feline population density, lack of reproductive control, parasitic co-infections, and poor socio-environmental conditions. In felines, the infection often takes a severe course, with extensive ulcerative lesions, systemic fungal dissemination, and a high fatality rate.

In the human clinical spectrum, the lymphocutaneous form remains the most prevalent presentation, followed by fixed cutaneous, extracutaneous, and disseminated forms, the latter being more frequent in immunocompromised patients, including those co-infected with HIV. Immunoreactive manifestations, such as erythema nodosum and reactive arthritis, have also been described, particularly in infections caused by *S. brasiliensis*. The remarkable adaptation of this species to the feline oral mucosa and claws, combined with

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its low intraspecific genetic diversity (evidence of recent clonal expansion), contributes to its high transmissibility and environmental persistence in urban centers.

The psychosocial impact of sporotrichosis is also significant. Visible ulcerative lesions, prolonged and costly treatments, loss of productive capacity, and social stigmatization are among the most common effects observed in affected patients. In hyperendemic areas, these consequences are exacerbated by poverty, low educational levels, and limited access to healthcare services, creating a cycle of epidemiological invisibility, therapeutic abandonment, and sustained transmission.

Laboratory diagnosis of sporotrichosis still relies primarily on mycological culture of clinical samples, a method considered the gold standard. However, its low sensitivity, particularly in subacute or chronic forms, limits diagnostic accuracy. Complementary methods, such as histopathology, serology, and, more recently, conventional and real-time PCR, have been successfully employed in reference centers, enabling faster identification of the species involved and more targeted therapeutic approaches. In felines, the high fungal load facilitates the direct observation of yeast cells, simplifying diagnosis.

Pharmacological treatment is preferably based on the use of itraconazole, the antifungal of choice for cutaneous cases. Severe, refractory, or disseminated forms require more aggressive therapies with amphotericin B or, alternatively, posaconazole. The emergence of resistant strains, particularly of *Sporothrix brasiliensis*, has prompted studies on new antifungal agents, such as miltefosine and specific enzyme inhibitors, as well as adjuvant therapies. Treatment in felines is particularly challenging, requiring prolonged regimens and rigorous monitoring, which often results in animal abandonment and perpetuation of the transmission chain.

The high zoonotic burden and rapid geographic expansion of sporotrichosis in Brazil strategically position this mycosis among emerging and neglected infectious diseases. For many years, the absence of compulsory national notification hindered the consolidation of reliable epidemiological data, compromising the planning and implementation of effective surveillance and control measures. However, in 2025, human sporotrichosis was officially included in the National Compulsory Notification List of diseases by the Ministry of Health, following an agreement by the Brazilian Tripartite Commission (CIT - Comissão Intergestores Tripartite). With this inclusion, cases shall be recorded in the Notifiable Diseases Information System (SINAN), which will enable more accurate mapping of the disease's distribution across the national territory, support public policies, and allow for more coordinated responses.

the proposed strategies are the development of specific notification and investigation forms, the formulation of surveillance protocols with workflows adapted to human sporotrichosis, technical training for healthcare professionals, the structuring of LACENs (Central Public Health Laboratories), and the improvement of medication supply logistics, considering the potential increase in demand resulting from the enhanced sensitivity of the surveillance system. In this regard, the initiative also aims to reinforce the diagnostic and therapeutic network within the Unified Health System (SUS), ensuring effective treatment access.

To address this new public health context, it is essential to adopt an integrated and multidisciplinary approach based on the "One Health" concept, which simultaneously

encompasses actions in human health, veterinary medicine, and environmental surveillance. Effective control of zoonotic sporotrichosis requires structured measures, including feline sterilization and population control programs, health education for the public, and the development of immunopreventive vaccines, particularly targeting feline hosts, the central link in the transmission chain.

It is also worth noting that sporotrichosis, especially in its zoonotic form caused by *Sporothrix brasiliensis*, represents a paradigmatic model of an emerging mycosis with a significant impact on public health, challenging traditional surveillance, diagnostic, and control systems. Effectively addressing this disease, therefore, demands not only scientific and technological innovation but also political commitment, institutional investment, and equity in access to care.

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