



## Deep dermatophytosis caused by *Trichophyton rubrum*

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A man aged 30 years, born to non-consanguineous parents, presented to our clinic with a large erythematous plaque with a clear boundary on his left groin and scrotum area, with some ulcers on the surface (figure), which had been present for 6 years. At age 24 years, he noted several red papules on his left groin, with occasional itching but without pain. Further physical examination showed nail hyperkeratosis and onycholysis. A skin biopsy from his left groin was obtained and showed pseudoepitheliomatous hyperplasia of the epidermis, and dermal infiltration consisting of lymphocytes, histocytes, neutrophils, eosinophils, and multinucleated giant cells. The presence of septate hyphae was noted with periodic acid–Schiff staining. Tissue culture from the biopsy and scraping cultures from multiple sites (ie, groin, toes, and toenails) all yielded *Trichophyton rubrum* and it was confirmed by internal transcribed spacer sequence. And in vitro susceptibility test according to the Clinical and Laboratory Standards Institute M38-A2 method suggested that all

isolates were sensitive to most first-line antifungal agents, including itraconazole, terbinafine, amphotericin B, fluconazole, voriconazole, caspofungin, and micafungin. Deep dermatophytosis caused by *T rubrum* was diagnosed, and terbinafine 250 mg per day was given orally for 4 months (August to December 2018). The lesion showed some improvement after 4 months' treatment, but did not disappear entirely. The patient is still under treatment and follow-up.

Considering the unusual manifestation of this infection, its chronic and recalcitrant characters, and previous reports, we sequenced the gene *CARD9* and found a new homozygous Ala586Gly mutation in exon 4. We used peripheral blood mononuclear cells from the patient and three healthy donors as controls to confirm that the mutation impaired the expression of pro-inflammatory cytokines and T-helper 17 cell responses on fungus-specific stimulations (data not shown). We therefore suggest that patients with chronic deep dermatophytosis in the absence of known immunodeficiencies should be tested for *CARD9* mutations, to verify their genetic susceptibility to fungal infection and prolong the course of treatment.

### Contributors

CH and YZ mainly completed the immunological and molecular biology experiments. ZW contributed to the mycological examination. YP and RL contributed to patient care and therapy. CH, XW, and YP contributed to the writing and reviewing of the Clinical Picture. All authors approved the final version.

### Declaration of interests

We declare no competing interests.

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**Figure:** Clinical manifestation of deep dermatophytosis caused by *Trichophyton rubrum*

A large patch of erythematous plaque with clear boundary on his left groin and scrotum area, with some ulcers on the surface.