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Scientific letters

Onychomycosis caused by algae without chlorophyll☆

Onicomicosis por alga sin clorofila

Dear Editor,

The genus *Prototheca* are algae without chlorophyll, and are found ubiquitously in environmental sources such as plants, waters and animals.[1] The species most commonly isolated is *Prototheca wickerhamii*.

P. wickerhamii rarely causes infections in humans. Infections have been reported mainly in nails,[2] skin and subcutaneous tissues,[3] although cases of peritonitis[4] and meningitis[5] have also been described. They particularly affect patients with diabetes,[6] patients with HIV[7] and transplant patients.[8] Treatment usually involves a medical and surgical approach,[2] but debate surrounds the drug treatment. There are no published prospective clinical studies comparing specific treatments for protothecosis and, although various regimens have been tried, there has been no consistency in clinical responses. The most commonly used antifungals are azoles, itraconazole and amphotericin B in particular, with amphotericin B displaying the best activity.[9] The *Prototheca* spp. cell wall is rich in ergosterol, and it is thought that the efficacy of these antifungals lies in their ability to inhibit ergosterol.[9,10] However, no cut-off points have been established for the interpretation of in vitro sensitivity. As the minimum inhibitory concentration (MIC) determination tests are not always reproducible, and the results are not always correlated with clinical success, performing sensitivity tests is only recommended in cases of treatment failure, not routinely.[1]

We present the case of a 57-year-old male patient with a history of hypertension, dyslipidaemia, obesity, venous insufficiency, lymphoedema and allergy to mites, under follow-up since 2014 due to repeated outbreaks of stasis eczema in the lower limbs, where he has also had venous ulcers for years which have been become infected on multiple occasions. The patient had suffered severe flare-ups of atopic dermatitis in its atopic context which at the time of presentation were well controlled with azathioprine 100 mg/day, after previously requiring repeated courses of oral and topical corticosteroids. He attended the clinic with a 2–3 week history of a slightly pruritic lesion on the back of his right hand. Examination revealed an annular-shaped, scaly plaque with a maximum diameter of about 3 cm, with centrifugal growth, central clearance with erythematous edges, and peripheral pustules. It did not give the impression of a staphylococcal infection as it lacked suppuration or characteristic impetiginised scabs. We did not consider it to be tuberculosis of the skin, as it does not present in this way and is usually accompanied by lymphadenopathy (moreover QuantiFERON® and Mantoux were negative). We also ruled out atypical mycobacteriosis, as it develops with nodular lesions or erythematous-desquamative plaques that grow progressively without central clearance. Coccidioidomycosis was excluded as it consists of an ulcerated, indurated nodule, often accompanied by secondary nodules. Sporotrichosis and leishmaniasis were ruled out due to no history of trauma or being stung respectively. The clinical diagnosis of non-inflammatory dermatomycosis was based on the shape of the lesion and its recent onset. This circinate shape is a result of the depletion of keratin from the centre of the lesion and its peripheral spread. Once the differential diagnosis was made, flakes were taken for mycological culture and we prescribed terbinafine 250 mg/24 h and ciclopirox cream every 12 h for one month.

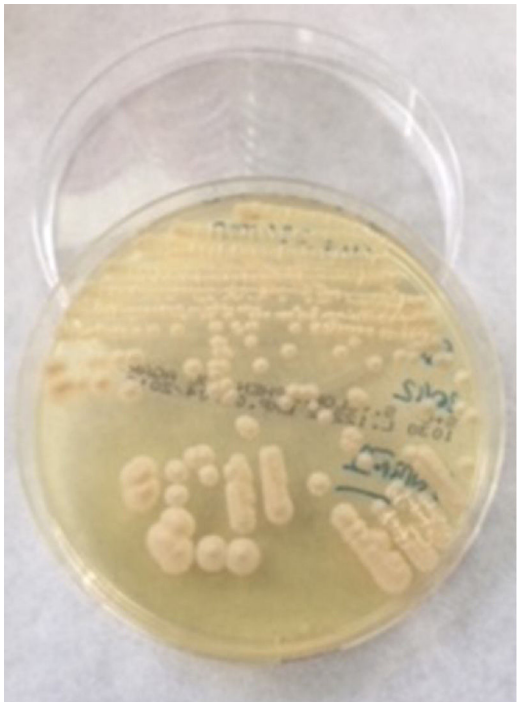

Fig. 1. *Prototheca wickerhamii*. Rough, beige colonies with a yeast-like appearance.

The flakes were seeded on Sabouraud-chloramphenicol agar (bioMérieux) and on a home-made medium of malt extract agar and incubated at 30 °C for 30 days. Three weeks later rough, beige colonies with a yeast-like appearance were observed (Fig. 1). They were identified by VITEK® 2 System (bioMérieux) and MALDI-TOF VITEK® MS (bioMérieux) with both obtaining the result of *P. wickerhamii*. One month later there were no signs of lesion when the patient attended for follow-up. Although the treatment prescribed for this case was not that of choice (due to the treatment with

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lipid-lowering agents and azathioprine, azoles were avoided to reduce the risk of interactions), the tinea was eradicated. Like azoles or amphotericin B, terbinafine causes a decrease in ergosterol; in this case, by inhibiting squalene epoxidase in the cell membrane.[10]

The lack of literature and of cut-off points for the sensitivity of antifungals underline the need for further studies to investigate treatments for this type of infection.

The *Prototheca* species cause a wide range of infections in humans. These infections can occur in both immunocompetent and immunosuppressed patients, although the most severe and widespread infections usually occur in immunocompromised individuals. In view of their similar appearance to yeasts in routine media, but with very different implications for prognosis and treatment, both clinicians and microbiologists have to be aware of these organisms and work together to ensure that they are correctly diagnosed and the proper treatment provided.

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Cryptosporidium hominis IbA12G3: First report of a rare sub-genotype in Spain

Cryptosporidium hominis *IbA12G3: primera descripción de un subgenotipo infrecuente en España*

Members of the genus *Cryptosporidium* are major contributors to the burden of diarrhoeal disease globally.[1] Cryptosporidiosis primarily affect children in resource-poor settings with unsafe drinking water and inadequate sanitary facilities, but also represents a significant health concern in developed nations.[2] *Cryptosporidium hominis* and *Cryptosporidium parvum*, particularly the former, are the two major causative species of human cryptosporidiosis. To date, at least nine subtype families (Ia, Ib, Id, Ie, If, Ig, Ih, Ii, Ik) have been identified within *C. hominis* by sequence analysis of the 60-kDa glycoprotein (*gp60*) gene.[3] Among them, Ia (1.7%), Ib (92.2%), Id (5.1%), and Ie (0.9%) were the subtype families found ($n = 529$) in the four largest molecular epidemiological surveys conducted so far in Spain.[4–7] In these studies, all the Ib samples ($n = 152$) molecularly characterized at the sub-genotype level were assigned to IbA10G2.

In December 2017 an 18-month-old male infant complaining of gastrointestinal symptoms including altered intestinal transit, distended abdomen, cramps, and acute, non-bloody watery diarrhoea associated to weigh loss (below 25th percentile) and anaemia (serum iron: 24 μg/dL) was admitted to the outpatient clinic of the University Hospital Puerta de Hierro Majadahonda (Madrid) for routine coproparasitological examination. The patient had a normal immune status, no contact with pet animals, and no relevant record of recent travelling abroad, although his father reported travelling to Romania during the same period. A single, concentrated stool sample tested positive for the presence of *Cryptosporidium* oocysts by a rapid immunochomatographic test (Cer Test Biotec S.L., Zaragoza, Spain) and by microscopic examination of a fresh faecal smear stained with the modified Ziehl–Neelsen method. As part of an ongoing research project, a new, fresh aliquot of the faecal material was sent to the National Centre for Microbiology at Majadahonda (Madrid) for genotyping analyses. Total DNA was extracted and purified using the QIAamp® DNA stool mini test kit (Qiagen, Hilden, Germany). Molecular characterization of the sample was achieved by PCR amplification of the *gp60* marker.[8] Amplicons of the expected size (~870 bp) were directly submitted for sequencing. Subsequent sequence analyses confirmed the presence of *C. hominis* 1bA12G3, a sub-genotype not previously identified in Spain. A representative nucleotide sequence of the sub-genotype obtained was submitted to the GenBank® public repository under the accession number MH161561.

Remarkably, a search using the BLAST tool of the National Centre for Biotechnology Information (NCBI) revealed that only six additional IbA12G3 sequences have been previously deposited in GenBank®. This particular *C. hominis* sub-genotype was initially described in a human specimen from UK in 2010.[9] Further molecular research conducted in the Sonora state (Mexico) allowed the identification of IbA12G3 in four children attending hospital settings, three of them presenting with gastrointestinal and/or nutritional disorders and the remaining one asymptomatic at the moment of diagnosis.[10] Finally, IbA12G3 has also been reported in seven rhesus macaques (*Macaca mulatta*) housed on monkey farms in China, a finding that may be indicative of potential zoonotic transmission.[11] Fig. 1 shows the phylogenetic relationships among the IbA12G3 sequences generated in the present study and those reported in the surveys mentioned above. Appropriated reference sequences and representative sequences of the most frequent *C. hominis* family subtypes circulating in Spanish human populations were retrieved from NCBI and included in the analysis for comparative purposes. As expected, sequences belonging to the family subtype Ib grouped together in a well-defined cluster. Within this group, the IbA12G3 sequence of non-human primate origin was