Laboratory diagnosis of human ciliate protozoan parasites: Balantidium coli and beyond

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Correspondence
Alireza Abdolrasouli
Department of Medical Microbiology, Charing Cross Hospital, Imperial College Healthcare National Health Service Trust, Fulham Palace Road, London W6 8RF, UK

References

I read with interest an article recently published in the Journal of Medical Microbiology Case Reports describing a rare case of urinary tract infection due to Balantidium coli in a female patient from Iran (Soleimanpour et al., 2016). I agree with the authors that balantidiasis is considered a neglected disease and that extra-intestinal infections, in particular, are uncommon in humans despite the high prevalence of B. coli in tropical and subtropical areas (Schuster & Ramirez-Avila, 2008). Recently, more extra-intestinal cases of ‘balantidiasis’, mainly in the urinary tract, have been reported in the medical literature (Bandyopadhyay et al., 2013; Karuna & Khadanga, 2014; Khanduri et al., 2014), perhaps reflecting the role of ciliate protozoan parasites in immunocompromised hosts. One very important missing feature in almost all published cases is molecular confirmation of B. coli. Identifications were solely based on the morphological characteristics of ciliate trophozoites seen in direct microscopic examination of urine samples (Bandyopadhyay et al., 2013; Karuna & Khadanga, 2014; Khanduri et al., 2014).

Microscopic images provided in the published report (Soleimanpour et al., 2016) demonstrate a high similarity to Balantidium species. However, careful examination of Fig. 1 in the report also provides another vital piece of information on the structure of observed trophozoites: length of cilia. Although lack of a scale bar makes precise measurement impossible, the elongated and profound cilia with uneven distribution captured in Fig. 1 (Soleimanpour et al., 2016) are in sharp contrast to the classic ‘short’ and ‘fine’ cilia ‘covering the entire body’ of Balantidium spp. (Garcia, 2007) and those clearly depicted in the Atlas of Human Parasitology (Ash & Orihel, 2007). Notably, due to the delicate nature of cilia in B. coli, they can even be missed on light microscopic examination and techniques such as phase-contrast may be required to enhance their visualization. Moreover, from a taxonomy point of view, the nomenclature ‘Balantioides coli’ is neither formally approved nor commonly applied by parasitologists and hence should be avoided to prevent further confusion.

More importantly, a different ciliate soil protozoan with a wide distribution in nature, namely Colpoda species, has previously been observed in human urinary samples (Costache et al., 2011). In the absence of DNA-based confirmatory methods, morphological similarities between Balantidium and Colpoda, in addition to their characteristic motility, make their accurate identification troublesome. Recently, an extensive evaluation of genetic diversity in B. coli based on the polymorphism of small subunit rDNA sequences confirmed the diversity of cyst-forming ciliates among non-human primates. The presence of novel Buxtonella-like ciliates in primates raises the question about the possible occurrence of these pathogens in humans and highlights the need for the application of broad molecular-based diagnostics for ciliate infections in man (Pomajbiková et al., 2013).

Currently, very few Balantidium sequences are available in GenBank and most represent the small subunit rDNA or internal transcribed spacer regions of B. coli (Verweij & Stensvold, 2013). The application of general, broad-specificity primers targeting non-human eukaryotic small subunit rDNA may be of significant utility in efforts to correctly identify ciliate protozoa detected in human and animal clinical samples. This, in turn, will provide a better understanding of the epidemiology, pathophysiology and genetic diversity of these micro-organisms.


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