

## *Cryptococcus neoformans* Species Complex Isolated for the First Time from the Environment in Croatia

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### DESCRIPTION

*Cryptococcus species* is opportunistic yeast of increasing global importance that causes different life-threatening conditions in patients suffering from weak immunity. Numerous studies documented the presence of *C.neoformans* species complex in environmental samples from different geographic locations in the world, while there is lack of data in relation to the presence of *C.neoformans* species complex in Croatia in environmental samples [1-4].

In our previous article we described the presence of this pathogen in different cities of Croatia from two different sources [5]. Although the epidemiology of *C.neoformans* species complex has been studied effectively in western and Mediterranean Europe, still there has been a lack of studies in Eastern Europe. From an extensive survey by Cogliati et al., in year 2015 with different states being part of it, including Croatia with 18 samples, we were informed about the existence of this pathogen in different states like Spain, Italy, Turkey, Greece and Libya, but not Croatia [6]. In the same year, 2015, a retrospective study by Mlinaric-Missoni described the epidemiology and in vitro antifungal susceptibility profiles of sequentially isolated *C.neoformans* strains from 15 Croatian patients during a five year period [7].

This illustrated our hypothesis about the circumstances and occurrence of this pathogen inhabiting plants and or bird excreta with the risk for certain group of people inside community. Our aspiration was on identifying the existence of *C.neoformans* species complex in different places and cities along Croatia, places frequented from people like parks, hospital and school playgrounds. In total there were 509 samples collected, 472 (92.73%) from different tree species and 37 (7.27%) from bird excreta [5]. We achieved to integrate Croatia as part of Europe along other countries that have the evidence for this pathogen. The number of samples collected from bird excreta was much lower because we believe that streets cleaning restricted the number. Lack of this pathogen in continental area remains open to further question.

Therefore, these play an important role on identifying the potential risk among these places. The result of these work demonstrate that tree hollows may be capable of disseminating these fungi in the environment and also responds to human cryptococcosis documented in Croatia in clinical cases. Concerning the periodic changes in the occurrence of *C.neoformans* species complex, the largest number of samples was collected during the spring and summer, although we have collected samples through four season of the year.

However, the effects of the climatic factors across the season on the prevalence of *C.neoformans* species complex remain unknown due some publication about highest prevalence found during autumn [8]. A comprehensive prospective study including both environmental and clinical data would be needed to define the potential health of periodic change in the pathogenicity and occurrence of *C.neoformans* species complex in Croatia. Our investigation is the first off to determine antifungal susceptibility of environmental isolates of *C.neoformans* species complex in Croatia with the evidence of high in vitro activity against environmental *C.neoformans* species complex isolates.

It is conform earlier results from clinical isolates in which all tested antifungals also showed high in vitro activity against *C.neoformans* species complex isolates. These facts were reinforced by the hypothesis that there is a tough relation among clinical and environmental isolates of *C.neoformans* species complex. In 2012, Cogliati presented an atlas of the molecular types of *C.neoformans* and *C.gattii* species complex globally [9].

### DISCUSSION

This article shows the molecular type of these two species in different parts of the world. It is 'a cosmopolitan on the move', as Hagen named the book [10]. In our study, molecular data obtained from all environmental isolates of *C.neoformans* species complex recovered here, revealed that they were of different serotypes and different mating types. Based on molecular typing, all *C.neoformans* species complex isolates were defined into two different molecular types, VNI and VNIV. Serotype A (genotype AFLP 1) and serotype D (AFLP 2) were both found in clinical

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and environmental isolates of *C.neoformans* species complex in Croatia [6]. It is interesting that both serotypes were found in same city, isolated from the same tree species, *Olea europea*. Mating type alpha (MAT<sup>α</sup>) was predominant in all isolates of *C.neoformans* species complex [5].

## CONCLUSION

In the future, new study dedicated the interaction and relationship among molecular type of clinical outcome and antifungal susceptibility are required. Our study present the potentiality risk of exposure for inhabitants, especially on the Croatian coast, to certain molecular types, particularly VNI and VNIV, which can be expected in clinical cases of cryptococcosis.

## REFERENCES

1. Chowdhary A, Randhawa SH, Prakash A, Meis JF. Environmental prevalence of *Cryptococcus neoformans* and *Cryptococcus gattii* in India: An update. *Crit Rev Microbiol*. 2012;38(1):1-16.
2. Chee YH, Kim YK. Isolation of *Cryptococcus neoformans var grubii* (serotype A) from pigeon droppings in Korea. *Mycobiology*. 2003;31(3):162-165.
3. Cermeno RJ, Hernandez I, Cabello I, Orellan Y, Cermeno JJ, Alboroz R, et al. *Cryptococcus neoformans* and *Histoplasma capsulatum* in dove's (*Columbia live*) excreta in Bolivar State, Venezuela. *Microbiologia*. 2006;48(1):6-9.
4. Casali KA, Goulart L, Rosa Silva KL, Ribeiro MA, Amaral AA, Alves HS, et al. Molecular typing of clinical and environmental *Cryptococcus neoformans* isolates in the Brazilian state Rio Grande do Sul. *FEMS Yeast Res*. 2003;3(4):405-415.
5. Hajdari PD, Cogliati M, Cimak L, Plesko S, Missoni ME, Marekovic I. First Isolation, antifungal susceptibility and molecular characterization of *Cryptococcus neoformans* from environment in Croatia. *Journal of Fungi*. 2019;10:5(99).
6. Cogliati M, D'Amicis R, Zani A, Montagna MT, Caggiano G, de Giglio O, et al. Environmental distribution of *Cryptococcus neoformans* and *C. gattii* around the Mediterranean basin. *FEMS Yeast Res*. 2016;16(4):45
7. Mlinarić-Missoni E, Hagen F, Chew WH, Važić-Babić V, Boekhout T, Begovac J. In vitro antifungal susceptibilities and molecular typing of sequentially isolated clinical *Cryptococcus neoformans* strains from Croatia. *J Med Microbiol*. 2011;60:1487-1495.
8. Randhawa HS, Kowshi T, Chowdhary A, Prakash A, Khan ZU, Xu J. Seasonal variations in the prevalence of *Cryptococcus neoformans var grubii* and *Cryptococcus gattii* in decayed wood inside trunk hollows of diverse tree species in north-western India: A retrospective study. *Med Mycol*. 2011;49(3):320-323.
9. Cogliati M. Global molecular epidemiology of *Cryptococcus neoformans* and *Cryptococcus gattii*: An atlas of the molecular types. *Scientifica*. 2013;2013:1-23.
10. Hagen F, Khayhan K, Theelen B, Kolecka A, Polacke I, Sionov E, et al. Recognition of seven species in the *Cryptococcus gattii*/*sCryptococcus neoformans* species complex. *Fungal Genet Biol*. 2015;78:16-48.