Phenotypic switch *Candidozyma auris* (*Candida auris*) modulates biofilm formation and virulence genes *SAP5* and *ALS5* in mono- and co-culture environments with *Staphylococcus aureus*

By

Are you this author?

Zainal, M (Zainal, Mukarramah) [1] , [2] , [3] ; Ibrahim, MJ (Ibrahim Mohammad Johari) [4] ; Sarmin, NIM (Mohd Sarmin, Nurul Izzah) [2] , [5] ; Ismail, S (Ismail, Soraya) [6] ; Cirillo, N (Cirillo, Nicola) [7] ; Dashper, SG (Dashper, Stuart G.) [8] ; Arzmi, MH (Arzmi, Mohd Hafiz) [1] , [3] , [8]

View Web of Science ResearcherID and ORCID (provided by Clarivate)

Source BIOFOULING

View Journal Impact

Volume: 42 Issue: 6 Page: 633-647

DOI: 10.1080/08927014.2026.2688203

Published JUL 3 2026

Early Access JUN 2026

Indexed 2026-06-21

Document Type Article

Abstract Candidozyma auris (formerly Candida auris) (C. auris), an emerging multidrug-resistant fungal pathogen, forms biofilms as a virulence factor. This study aimed to determine the effect of phenotypic switch on C. auris biofilm formation and virulence gene expression in mono- and co-culture with Staphylococcus aureus. Phenotypic switching was induced by prolonged incubation, and biofilms were developed in RPMI-1640, YEPD, SDB, and BHIYE. The biofilm biomass and total cell count were measured. SAP5 and ALS5 gene expression was quantified using qPCR. The 4th switched generation mono-culture biofilm in BHIYE produced the highest biomass (3.34 +/- 0.08) and total cell count (5.66 +/- 0.03 log(10) cells mL(-1)). In addition, SAP5 and ALS5 expression peaked in the 2nd switched generation mono-culture by 10.43 +/- 0.44-fold and 4.764 +/- 0.01-fold, respectively. Co-culture biofilms exhibited significantly higher ALS5 expression in selected switched generations compared to unswitched C. auris ($p < 0.05$). In conclusion, phenotypic switching enhanced biofilm formation and modulated the expression of SAP5 and ALS5 in C. auris.

Keywords **Author Keywords:** Candida auris; biofilm; phenotype switch; Staphylococcus aureus; SAP5; ALS5

Keywords Plus: ALBICANS; COLONIZATION

Author Information

Corresponding Address: Zainal, Mukarramah; Arzmi, Mohd Hafiz (corresponding author)

- Int Islamic Univ Malaysia, Dept Fundamental Dent & Med Sci, Kulliyyah Dent, Kuantan, Malaysia

Corresponding Address: Zainal, Mukarramah (corresponding author)

- Univ Teknol MARA, Fac Dent, Pathol Unit, Preclin Sci Study, Jalan Hosp, Sungai Buloh, Malaysia

Corresponding Address: Zainal, Mukarramah; Arzmi, Mohd Hafiz (corresponding author)

Int Islamic Univ Malaysia, Cluster Canc Res Initiat IIUM COCRII, Kuantan, Malaysia

Corresponding Address : Arzmi, Mohd Hafiz (corresponding author)

Univ Melbourne, Melbourne Dent Sch, Melbourne, Vic, Australia

E-mail Addresses : mukarramah@uitm.edu.my; hafizarzmi@iium.edu.my

Addresses :

1 Int Islamic Univ Malaysia, Dept Fundamental Dent & Med Sci, Kulliyyah Dent, Kuantan, Malaysia

2 Univ Teknol MARA, Fac Dent, Pathol Unit, Preclin Sci Study, Jalan Hosp, Sungai Buloh, Malaysia

3 Int Islamic Univ Malaysia, Cluster Canc Res Initiat IIUM COCRII, Kuantan, Malaysia

4 Univ Teknol MARA, Fac Med, Jalan Hosp, Sungai Buloh, Malaysia

5 Univ Teknol MARA, Atta Ur Rahman Inst Nat Prod Discovery AuRIns, Bandar Puncak Alam 42300, Malaysia

...more addresses

E-mail Addresses : mukarramah@uitm.edu.my; hafizarzmi@iium.edu.my

Categories/ Classification Research Areas: Biotechnology & Applied Microbiology; Marine & Freshwater Biology

Web of Science Categories Biotechnology & Applied Microbiology; Marine & Freshwater Biology

MeSH Terms *From MEDLINE®* **Search terms found**

Chemical *From MEDLINE®* **Search terms found**

Funding