Aspergillus fumigatus is an airborne fungal pathogen and a leading cause of invasive aspergillosis in immunocompromised patients. The G-protein coupled receptor (GPCR) is a cell surface receptor that receives external signals and activates them to transmit intracellular signals. NopA is assumed to be a bacterial rhodopsin family GPCR, and its exact function is unknown in fungi. In this study, we characterized the role of ΔAf_nopA through the analyses of deletion mutant strain. ΔnopA strain of A. fumigatus showed in increased colony size and had lower hyphae density at the colony edge compared to wild type strain. The mutant down-regulated the germination rate and conidiation. In addition, the mutant strain showed decreased tolerance to UV light stress compared to the wild type strain. The key regulator genes of asexual development (brlA, abaA, wetA and vosA) were lower expressed in ΔAf_nopA deletion mutant compared to wild type. These results indicates that ΔAf_nopA is involved in the asexual development and plays a positive role in spore germination. The filamentous fungus, Aspergillus fumigatus is found worldwide and inhabited organism in compost and soil. A. fumigatus plays an important role in the circulation of carbon and nitrogen in the ecosystem and is a pathogenic fungus that is infected through the air. The conidia of this fungus are continuously inhaled through the respiratory tract of humans, but the spores are destroyed by a natural immune response. However, patients with impaired immune systems can cause aspergillosis by infection with this fungal spore, and the mortality rate of infected patients is more than 50%. On the other hand, A. fumigatus also has a G protein signaling system that responds to or recognizes a variety of external stimuli. G proteins are typically heterotrimers composed of α, β and γ subunits. Sensitization of a G protein coupled receptor (GPCR) by a ligand results in the exchange of GTP for GDP on the Gα subunit, leading to its dissociation from the Gβγ dimeric subunit, and both can subsequently interact with effector proteins that regulate downstream signaling. In fungi, GPCR-regulated signaling pathways include the cAMP-dependent protein kinase and the mitogen-activated protein kinase system. GPCRs in fungi are classified into rhodopsin family GPCRs, and their exact function is unknown in fungi. In this study, we characterized the role of nopA (Afu7g01430) in A. fumigatus through the analysis of deletion mutant strain.

### RESULT

Figure 1. The gene structure to make deletion cassette of ΔnopA by DJ-PCR and confirmation by electrophoresis. When performed the next PCR, Wild type size was 3.9 kb and knock out mutant size was 4.4 kb. For the double check mutant confirmation, used the restriction enzyme.

Figure 2. Colony photographs, diameters and conidia number of the designated strains. (A) Colony photographs of WT (CEA10) and ΔnopA. Strains were point inoculated on solid MMG at 37°C, 3 days and took pictures at edge and center regions using microscopy. (B) Colony diameters of WT and ΔnopA strain. (C) Conidia numbers produced by WT, ΔnopA and ΔnopAstrains (per ㎝²).

Figure 3. Quantitative real time PCR (qRT-PCR) analysis for asexual developmental regulator genes in WT and ΔnopA. Total RNA sampling was performed after 0, 6, 12, 24 and 48 h asexual induction. Data normalized to EF-1α.

Figure 4. Photomicrographs of the conidiophore of WT and ΔnopA. Strains were grown in liquid MMG at 37°C in the presence or absence of glucose.

Figure 5. Kinetics of conidial germ tube formation of WT and ΔnopA. Both strains were inoculated in liquid MMG at 37°C in the presence or absence (dashed line) of glucose.

Figure 6. Tolerance of conidia and hyphae against ultraviolet (UV) irradiation. (A) Conidia were spreading on MMG medium and incubated at 37°C for 24 hours under UV light stress. The number of colonies were calculated. (B) Conidia were spreading on MMG medium and cultured for 14 hours. Hyphae was irradiated with UV light. The cut agar block was placed on MMG medium for 24 hours under UV light stress. The number of colonies were calculated.

### CONCLUSION

These results indicates that nopA of A. fumigatus is involved in hyphal growth and conidiation and has a positive regulatory role in germination of conidia. In addition, NopA may be involved in UV radiation stress response.