

Antibacterial effects of the essential oil from flower buds of *Magnolia biondii* Pamp

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Flower buds of *Magnolia biondii* Pamp (family *Magnoliaceae*) is known as Xin-Yi in the Chinese Pharmacopoeia, and is widely used for the treatment of allergic rhinitis, rhinosinusitis, nasal congestion, and headache.¹ Bacterial infection caused by *Staphylococcus aureus* in the-nasal-sinus mucosa is one of key factors which could cause rhinosinusitis,² thus it is important to evaluate the antibacterial effect of the extracts from *M. biondii*, which may provide scientific evidence of using Xin-Yi for the treatment of rhinosinusitis. In this study, the essential oil and lignan-rich extract isolated from the flower buds of *Magnolia biondii* Pamp (Xin-Yi) were investigated for their chemical compositions and *in vitro* antibacterial activities. GC-MS analysis of the *Magnolia* essential oil disclosed the presence of 56 compounds including camphor (10.6 %), eucalyptol (25.0 %), linalool (5.8 %), terpine-4-ol (8.4 %), alpha-terpineol (19.8 %), alpha-cadinol (3.3 %), citronellol (2.9 %), geraniol (2.3 %), and trans-farnesol (8.7 %). Both GC-MS and NMR analyses of the chloroform extract disclosed the presence of 7 tetrahydrofurofuran lignans that were demethoxyaschantin, fargesin, epiudesmin, eudesmin, aschantin, magnolin, and yangambin. The essential oil showed stronger antibacterial activities than the lignan-rich extract against five bacteria including pathogenic *Staphylococcus aureus* and *S. epidermidis* with MICs ranging from 250 to 500 $\mu\text{g ml}^{-1}$ using microplate Alamar blue assay. Time-kill kinetics was used to monitor the survival characteristics of *S. aureus* and *Escherichia coli* in the presence of the essential oil over 24 hours, which indicated rapidly bactericidal effects. Scanning electron microscopy (Figure 1) showed the change of morphological appearance of *S. aureus* through destruction its cell wall and membrane by the *Magnolia* oil.

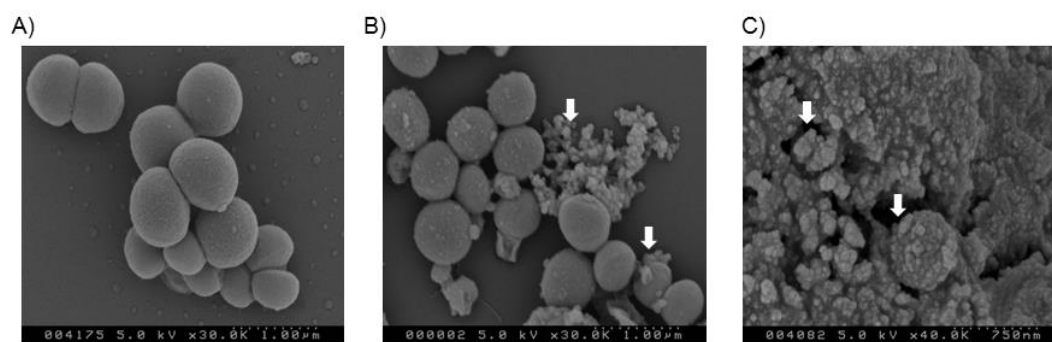


Figure 1. Scanning electron micrograph of control *S. aureus* at 1 hour of incubation at 37°C (A). Scanning electron micrograph of *S. aureus* after exposure to *Magnolia* oil (2 MIC) for 1h (B). Scanning electron micrograph of *S. aureus* after exposure to *Magnolia* oil (2 MIC) for 24h (C). Arrows show lysis of cells and leakage of cellular contents.

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Keywords: *Magnolia biondii* Pamp, essential oils, GC-MS, time-kill assay, scanning electron microscopy, *Staphylococcus aureus*

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