牙醫學系「大學生暑期研究計畫」

中文題目:矽酸鈣析出離子抑制檳榔鹼誘導纖維化的機制探討

英文題目: Investigation of the mechanism of calcium silicate-released ions inhibit arecoline-induced fibrosis

申請人:王彦雄老師

摘要

Oral submucous fibrosis (OSF) is a potentially malignant precancerous condition that may lead to oral cancer. OSF patients experience symptoms such as oral ulcers and restricted mouth opening, which affect their quality of life. However, there is currently no effective clinical treatment. Previous studies by other researchers and our preliminary research have found that calcium silicate (CS) materials, commonly used in bone and pulp treatments, release ions that can effectively reduce the production of inflammatory factors induced by IL-1. Some studies have even shown that the ions released by CS materials can inhibit fibrosis in various organs. However, the effect of these ions on arecoline-induced fibrosis has not yet been reported. We hypothesize that **the ions released by CS materials can inhibit inflammation and arecoline-induced fibrosis.** The aims of this study include:

- Investigate whether the ions released by CS materials can effectively inhibit inflammation and fibrosis responses, with inflammatory factors including IL-1 and LPS, and fibrotic factors including TGF-β and arecoline.
- 2. Explore the molecular mechanisms by which ions released by CS materials inhibit inflammation and fibrosis. This will involve examining the expression of inflammation-related molecules, such as NF-κB, TNF-α, ROS,

and ERK, as well as fibrosis-related molecules, such as Smad and CTGF.

3. Investigate how ions released by CS materials can be utilized in treatment. This will involve cellular experiments to test the effects of pretreatment, concurrent treatment, and post-treatment with CS material-released ions on inhibiting inflammation and fibrosis responses.

The results of this project will not only establish the application of ions released by CS materials in oral tissue to combat inflammation and reduce arecoline-induced fibrosis for the first time, but also help to understand the molecular mechanisms by which these ions regulate inflammation and fibrosis. This knowledge could be applied in the future to develop treatments or preventive measures for OSF.