# ABSTRACT

Matrix metalloproteinase (MMP) is an enzyme known to be responsible for cancer progression. The results of cancer research with 2D culture involving MMP have not been reflected in the clinical trials. Multicellular tumor spheroid (MCTS) culture is a 3D-based technique that offers *in vivo*-like environment in the *in vitro* laboratory setting. In this project, HT-1080 fibrosarcoma cell line is used as a spheroid model for the detection of MMP-2 and -9. The optimization of MCTS culture involves the determination of cell seeding density, coating substrate, substrate concentration, spheroid formation technique, and media. The overexpression of MMP on spheroid formation is also observed by using PMA, an inducer of MMP. The established spheroid culture was tested by using the leaf and stem extracts of *Simarouba glauca*. It can be concluded that HT-1080 spheroids can form by using 1.5% agarose with liquid overlay technique. For MMP-2 and -9 detection, the use of SFM during culture is recommended, whilst PMA is not. The overexpression of MMP can distort the spheroids. The leaf and stem extracts of *Simarouba glauca* have the potential to inhibit MMP-2 and -9 of HT-1080 spheroids, but the results vary, especially if compared to the previous 2D experiments. Further optimization and experiments are needed to improve both the procedure and the quality of the results.