ABSTRACT

Cellular senescence, one of the hallmarks of aging, is an irreversible growth arrest caused by different senescence-inducing stimuli. Senescent cells accumulate in aging tissues and at pre-neoplastic lesions. The study of cellular senescence is crucial in aging and cancer research yet the quantification and identification of cellular senescence has been hindered by the lack of exclusive senescence biomarkers that can be used *in vitro* and *in vivo*. This project aims to characterize HMGB1 and LMNB1 as senescence biomarkers both *in vitro* and *in vivo*. Here I demonstrate that loss of HMGB1 and LMNB1 are specific to senescence and can be seen during replicative senescence, p53- and $p16^{INK4a}$-induced senescence and also during oncogene-induced senescence by overexpression of $BRAF^{V600E}$ in fibroblasts through immunoblotting and immunofluorescence. The loss of HMGB1 is shown to be more consistent towards the different senescence inducing stimuli compared to LMNB1 in primary human dermal fibroblasts hence HMGB1 might be a superior choice when using fibroblast. In addition to the *in vitro* results, loss of LMNB1 could be identified and quantified in human hair scalp tissue. In conclusion, loss of HMGB1 and LMNB1 can be utilized as markers to detect and quantify senescent cells in skin cell types both *in vitro* and *in vivo*.