

Matrix metalloproteinases in crosstalk between cancer cells and osteoblasts in the bone invasion of oral squamous cell carcinoma

Jin Gao, Jingjing Quan, Chuanxiang Zhou and Glenn Francis

School of Dentistry, Griffith University and James Cook University, Australia

This study aims to detect whether matrix metalloproteinases (MMPs) play a role in bone invasion of oral squamous cell carcinoma (OSCC). Condition medium (CM) was collected from osteoblasts (hFOB or OB) and OSCC cells, and used in the indirect co-culture. Gelatine and protein forms of MMP-2/9 were detected by Gelatine Zymograph and Western Blotting. Bone markers, Twist1, Runx2, RANKL and OPG were also analysed using immunohistochemistry. Real-time PCR was utilized to determine the mRNA levels of these genes in OB and OSCC cells following the co-cultures. The Archival OSCC samples of bone invasion were used to confirm the localisation of those molecules in vivo. Results showed that gelatine forms of MMP-2/9 were increased in OSCC cells after co-cultured with hFOB. MMP-2 was also increased at the protein levels. Twist1 was increased, but not for Runx2. The RANKL/OPG ratio in hFOB was increased. Real-time PCR showed a similar expression patterns in co-cultured OB and OSCC cells to that at protein levels by Western blots and in clinical samples by immunohistochemistry. In conclusion: Cell co-culture is a useful model and has effectiveness on changes of MMP expression in OSCC cells in vitro. In addition, an increased RANKL/OPG ratio indicates the recruitment of osteoclasts and osteoblasts in the bone micro-environment of bone invasion of oral cancer cells. This study suggests roles of MMP-2/-9 in regulating the invasion of OSCC into bone.

Biography

Dr. Jin Gao was originally trained as a Dentist in China in 1980s, completed his PhD in late 1990s from the University of Queensland School of Dentistry and postdoctoral studies at the University of Sydney School of Medicine. He was awarded Australian NHMRC Peter Doherty Fellowship to carry out his cancer research career at Queensland University of Technology in 2001. Jin returned to his Academic Dentistry in 2005 at Griffith University, and is now a full Professor in Oral Biology & Oral Pathology at James Cook University.