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YOU ARE INVITED TO ATTEND THE DEFENSE OF THE DOCTORAL DISSERTATION

"DENTAL PULP STEM CELL-MEDIATED SUPPORT OF LEUKEMIA IN THE ORAL CAVITY"

by
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Thursday, September 5th, 2024
8:00 AM
Rutgers School of Dental Medicine, C986

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ABSTRACT

The oral cavity is a site of hematopoietic activity, and metastatic hematological and solid tumors. This thesis used models to recapitulate hematological malignancies in the oral cavity, focusing on acute myeloid leukemia (AML), and a triple negative breast cancer (BC). Despite extensive documentation on the clinical presentation of AML in the gingiva with histologic confirmation, it is unclear how AML, other leukemia, and solid tumors survive in the oral tissue. This thesis tested the hypothesis that dental pulp stem cells (DPSCs) support AML and BC to influence current treatments. The thesis showed that DPSCs support the proliferation and adherence of AML through a complex mechanism that include intercellular communication by gap junction, tunneling nanotube, and extracellular vesicles. These interactions offer chemoprotection to AML and BC. More importantly, the evidence suggested that DPSCs induce dedifferentiation of BC cells to a phenotype consistent with cancer stem cells. Use of lipopolysaccharide and DPSCs from patients with periodontal disease indicated that oral inflammation could influence AML and BC behavior. Overall, the results indicate similar mechanisms by which DPSCs support BC and AML. DPSCs differentiated $CD34^{+}CD38^{-}$ cells from myelodysplastic syndrome (MDS) in $CD38^{+}$ cells that are generally highly proliferative. This pilot study with MDS was important since these patients can covert to AML, which addresses the question of whether the oral cavity can have a role in such transition. In summary, this thesis indicates that DPSCs in the oral cavity can support solid and hematological tumors. The behavior of the cells in the presence of hematopoiesis supporting cells, as well as overt chemoresistance, suggest that the current treatments might not be effective in the oral cavity.