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Maria Cristina Franco-Arellanes 1, Perla Xóchitl Toledo-Valdes1, Cynthia Días-Hernández 1, Risk Días-Castillejos 1, Eunice Daysi García-Reyes 2, Saira Karina Ramirez-Thomé 2, Beatriz Xóchilt Ávila-Curiel 2, María Cristina Castañeda-Patlan 3, Edgar Zenteno 3, Carlos Josué Solorzano Mata 1,2

1Faculty of Medicine and Surgery, Universidad Autónoma Benito Juárez de Oaxaca, Oaxaca, México. 2Faculty of Dentistry, Universidad Autónoma Benito Juárez de Oaxaca, Oaxaca, México. 3Faculty of Medicine, Universidad Nacional Autónoma de México, Mexico City, México

Expression of O-GlcNAcylation in pulp tissue and dental pulp stem cells of healthy dental organs

Abstract: O-GlcNAcylation is a reversible post-translational modification in which a molecule of N-acetyl-D-glucosamine is added to a serine or threonine residue. It is regulated by O-N-acetylglucosaminyltransferase (OGT) and N-acetyl- β -D-glucosaminidase (OGA). This modification has already been reported in various tissues and cell types; however, it has not been reported in healthy pulp tissues nor in dental pulp stem cells (DPSC). The main objective of this research was to identify O-GlcNAc and its enzymes in different regions of healthy pulp tissues and in DPSCs both in situ and in vitro, respectively.

Materials and Methods: Twenty-four pulp tissue samples were obtained, and the expression of O-GlcNAc, OGT, and OGA was analyzed by immunofluorescence using specific antibodies, exploring their presence in different regions of the dental pulp. DPSCs were isolated from healthy dental organs and identified in vitro using the anti-STRO-1 antibody. O-GlcNAc expression in DPSCs was confirmed in vitro by Western blot.

Results: O-GlcNAc and its enzymes were expressed in different regions of the pulp tissue and in DPSCs. OGT and O-GlcNAc were more abundantly expressed in the odontoblastic zone, the cell-rich zone, and the central pulp zone. OGA was distributed throughout the different zones of the pulp tissue with lower intensity compared to OGT.

Conclusions: Our results suggest that O-GlcNAcylation could be relevant to the homeostasis of human dental pulp and DPSCs. Our results suggest that O-GlycNAcylation could be relevant for the homeostasis of human dental pulp and DPSCs and could have a role in future regenerative treatments in the teeth and oral cavity.

Keywords: Dental Pulp, Dental pulp stem cells (DPSC), O-GlcNAcylation, OGT, OGA, IHC.