Ariadne Letra, DDS, MS, PhD, is an Associate Professor in the Department of Endodontics who joined the faculty of The University of Texas School of Dentistry at Houston on August 1, 2011. She also holds adjunct appointments at the Center for Craniofacial Research, School of Dentistry, and the Pediatric Research Center, Medical School.

Dr. Letra is a dentist and specializes in Endodontics, and her duties include teaching Endodontics to dental students and residents while being the Director of Research in her Department.

The main focus of Dr. Letra’s research is to understand the molecular mechanisms underlying human complex birth defects, particularly cleft lip/palate and dental anomalies. Both cleft lip/palate and dental anomalies cause great distress to affected patients and families and are a significant health care burden. Using sophisticated genetic analysis, Dr. Letra’s studies aim to identify gene variants that may contribute to each of these conditions in humans. Moreover, Dr. Letra’s lab uses functional assays to investigate the biological effects underlying these gene variants in vivo and in vitro, in an attempt to further understand a given gene’s role in the aforementioned conditions.

Previous work from Dr. Letra’s lab showed that variants in the promoter of the matrix metalloproteinase-3 (MMP3) gene are associated with predisposition to cleft lip/palate in humans, and that the presence of specific alleles resulted in functional consequences with a decrease in MMP3 gene transcription in human palatal cell lines. Others have shown that MMP3 expression during palatal shelf fusion is critical, and the absence or downregulation of MMP3 prevents palatal fusion, supporting Dr. Letra’s results. This work was supported by a K99R00 award from NIDCR.

Another aspect of Dr. Letra’s research is to investigate the potential correlation between dental anomalies and cancer, based on previous reports showing the segregation of these two conditions in affected individuals or families thus suggesting a common genetic etiology. Funded by the UT CCTS, Dr. Letra used whole exome sequencing to identify gene variants segregating in a three-generation family characterized by autosomal dominant tooth agenesis (the congenital absence of one or more permanent teeth) and various cancer types. Although still ongoing, preliminary results show several cancer-related genes segregating in the family members affected by tooth agenesis alone and the ones affected by both tooth agenesis and cancer. Validation experiments are currently under way.

Just recently, Dr. Letra was awarded a R03 from NIDCR to study the genetic mechanisms underlying a combined phenotype of tooth agenesis and colon cancer. Using the resources of the NIH Colorectal Cancer Family Registry, Dr. Letra verified that many individuals with colon cancer also presented with tooth agenesis while some family members presented with tooth agenesis only. She will now perform next-generation sequencing experiments and bioinformatic prediction analysis to identify the causal variants underlying the combined phenotype. The results are expected to have a significant impact in elucidating if these two different conditions have a common genetic etiology, and provide insights into future preventative and diagnostic measures. As a dentist, understanding if a common dental anomaly is possibly linked to malignancy is of utmost importance.