

The genetic architecture of modern human dental and face morphology: new insights from admixed Latin American

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The CANDELA consortium has been focused on the genetic underpinnings of physical appearance in Latin American people for nearly 10 years. We have performed GWAS, admixture mapping, etc., using ~700,000 SNPs from ~7000 individuals using both quantitative and qualitative methods to assess the facial and dental phenotypes. First, we reported four genomic regions showing associations (P -value $<5 \times 10^{-8}$) with three traits related to nose morphology. Furthermore, we detected an association of SNPs in the *EDAR* gene with chin protrusion, and we also documented alterations of mandible length in mice with modified *Edar* function. Recently, we reported a GWAS using 2D facial landmarks in profile images, and we found nine newly genomic regions associated with different facial traits, and the association between lip thickness and 1p12 genomic region involves SNPs in a region with evidence of adaptive introgression from archaic hominins (Denisovan). Subsequently, we investigate shovel-shaped incisors (UI1, UI2) and performed the first dental size GWAS in humans using 3D images from dental casts from >1,000 Latin Americans. We implemented automatic procedures for image segmentation, teeth orientation and measurement of buccolingual and mesiodistal diameters, height, and 3D mesh attributes. We detected significant association for 456 SNPs at 11 genome regions. The most robust association was observed between mesiodistal diameters of several teeth and *EDAR* gene. Several association signals detected are novel and many involve genes previously implicated in dental development. Our results provide novel biological insights into the genetic architecture of human facial and dental morphology with remarkable evolutionary implications.