A Lifelong "Dental Identity": New Opportunities in the Era of Digital Dentistry

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Dental appearance significantly influences how we present ourselves and perceive our own identity. Our smiles and unique dental characteristics, such as a diastema, can become personal trademarks. Technical limitations, time constraints, or lack of expertise may result in more generic dental restorations. The aspiration for stereotyped, "perfect" smiles or reliance on generic dental designs can strip away personalized dental identity, making the results feel less authentic and unique. Prefabricated denture teeth present a lower potential to imitate the natural dentition given the limited choice of size, shape, and shade, with few technicians and clinicians mastering the art of fully individualizing prosthodontic teeth. Yet, most people would prefer restorations that mimic their natural dental features to maintain what John Besford called "prosthetic privacy," which helps them conceal their dental work and preserve their "dental identity," allowing them to continue looking and feeling like themselves.[1]

Beyond appearance, the "dental identity" comprises a neurophysiologic dimension. Afferent input from oral cavity permanently feeds the brain with information from the oral cavity. This information is translated to customized mandibular motor patterns to perform various oral functions. Only when blocking this afferent input (ie, by anesthesia) does the importance of oral perception becomes obvious. Any handcrafted dental restoration will inevitably differ in shape and occlusion from what the central nervous system is used to. Removable prostheses also introduce additional volume within the mouth. Fortunately, the brain's neuroplasticity enables it to adapt to these changes, restoring patients' oral function and overall satisfaction.[2]

With people retaining their natural teeth well into older age, today's restorative treatments increasingly cater to older adults with a lower neuroplasticity.[3] In a clinical context, providing these older patients with a dental arch that is narrower than the previous one may lead to accidental tongue injury; if the arch is wider, the patients may bite their cheek because the brain struggles with modifying long-learnt movement patterns. Duplication techniques have widely been recommended to avoid substantial changes in replacement dentures, but the procedure is cumbersome and unpopular. Reduced neuroplasticity is not the only problem in old age; autonomous handling of the prosthesis and its cleaning can also become a challenge when visual acuity and manual dexterity deteriorate. The back-off strategy accompanies the functional decline by simplifying the restoration to maintain patient autonomy for as long as possible.[4]

Contemporary digital dentistry has opened a new chapter in prosthodontics, allowing us a vision of preserving "dental identity" for life. By proactively scanning and storing patients' natural dentition as digital files, future restorations can precisely replicate original tooth shape and positioning. Algorithms can even account for age-related changes, allowing patients to recognize themselves in the mirror and affirm, "Yes, that's me; this is my smile." The greatest potential lies in accompanying patients transitioning into dependency and in enabling the clinician to provide a prosthetic plan

that allows independent oral health care. The reduced neuroplasticity in these patients, along with their impaired vision, tactile sensitivity, and manual dexterity, requires a restoration that does not exceed their ability to adapt and enables them to independently handle and clean the prosthesis. In these cases, the task is to simplify an existing complex restoration, while major changes in tooth morphology, occlusion, and the shape of the dental arch are maintained thanks to digital techniques whilst selected features may be functionally improved where needed. Digital prosthodontics also enables the dental professional to reproduce the features of a failing natural dentition. It fosters a smoother transition from a no longer appropriate fixed restoration, whether on teeth or on implants, into its "removable version." And when the notorious call from the nursing home comes saying that the denture went missing, with digital prosthodontics we can swiftly provide an identical replacement, maintaining both function and familiarity.

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