Article: Balancing esthetics and strength in multilayer zirconia: design and in vitro evaluation of UPCERA DUO. Liu, Li, Han. page 6

1. *What role does Uniform Particle Dispersion (UPD) technology play in modifying the raw material characteristics of UPCERA DUO zirconia during processing?*

a. Pure mechanical forces (such as bruxism) are the primary drivers of structural loss, while chemical acids play a negligible role.
b. Chemical acid exposure is a necessary component because it softens the tooth surface, making it substantially more vulnerable to mechanical stress.
c. Intrinsic mechanical factors (clenching) must precede extrinsic chemical factors

2. *During CAD/CAM milling validation using four-merlon test geometries, what edge-stability boundary distinguished UPCERA DUO from the control material (Product A)?*

a. At a thickness of 0.4 mm, Product A maintained structural stability while UPCERA DUO experienced edge chipping.
b. Both dental materials fractured completely across all evaluated wall thicknesses of 0.2, 0.3, and 0.4 mm.
c. UPCERA DUO maintained edge and wall stability down to 0.2 mm and 0.3 mm, whereas the thin-walled sections of Product A fractured.

3. *How does the regional structural composition of UPCERA DUO balance esthetic translucency with mechanical resilience across its layers according to ISO 6872-2024?*

a. It exhibits an inversion of traditional properties, creating a soft cervical base layer to match the young modulus of unmineralised dentin.
b. It completely eliminates the standard multilayer property gradient, generating a purely isotropic block lacking strength variations.
c. It consistently achieves a baseline flexural strength above 850 MPa, providing enhanced incisal strength while preserving exceptionally high cervical strength.

4. *What did the artificial aging evaluation (1,200,000 chewing cycles at 49 N and 0.72 Hz) reveal regarding the structural fatigue profile of full-contour mandibular molar restorations?*

a. Zero crowns fractured during the simulation, and post-fatigue fracture load values showed no statistically significant reduction compared to non-aged controls.
b. The mechanical loading sequence completely converted the tetragonal crystalline structure into an amorphous glass matrix.
c. The crowns demonstrated severe hydrolytic degradation, triggering premature fracture in over 50% of the specimens during simulation.

5. *In the 3-point bending formula $s = \frac{3FL}{2bh^2}$ specified for regional testing, which mathematical relationship dictates the influence of geometric changes on final flexural calculations?*

a. Changes to the vertical fracture load (F) share an inverse relationship with the resulting flexural strength (s).
b. Modifying the support span length (L) has zero overall impact on the flexural strength calculation values.
c. The thickness (h) of the specimen behaves as a quadratic function, meaning even slight variations significantly alter calculated flexural strength results.

Article: Managing Tooth Wear: Why awareness and pragmatism matter. Loomans, page 24

6. *According to data from the Radboud Tooth Wear Project, what is the modern understanding of the relationship between chemical and mechanical etiological factors in severe tooth wear?*

a. Pure mechanical forces (such as bruxism) are the primary drivers of structural loss, while chemical acids play a negligible role.
b. Chemical acid exposure is a necessary component because it softens the tooth surface, making it substantially more vulnerable to mechanical stress.
c. Intrinsic mechanical factors (clenching) must precede extrinsic chemical factors (acidic beverages) for clinically significant wear to manifest.

7. *Which of the following statements best describes the relationship between the clinical severity of tooth wear and patient-reported pain or dentinal sensitivity?*

a. Pain severity scales linearly with tissue loss; patients with severe enamel and dentin exposure always report the highest pain scores.
b. Patients with less advanced wear may report more severe pain, particularly when active chemical erosion exposes open dentinal tubules.
c. Tooth wear is entirely asymptomatic because chronic pulp recession completely obliterates the dentinal tubules ahead of the wear front.

8. *When restorative intervention becomes necessary, Prof. Loomans states that "tooth survival is more important than restoration survival." How does this principle dictate the choice of materials and techniques, especially in younger cohorts?*

a It favors indirect restorations because their lower initial failure rates preserve more tooth structure over a lifetime.
b It prioritizes minimally invasive direct composite restorations because they preserve natural tooth structure and allow simpler, more conservative repairs if failure occurs.
c It mandates the use of full-coverage crowns because they completely seal the remaining tooth structure from future acid challenges.

9. *What communication strategy does Prof. Loomans advocate to ensure long-term patient compliance and meaningful preventive behavior change?*

a Adopting an authoritative approach that dictates exact dietary restrictions and enforces mandatory nightguard compliance.
b Shifting the responsibility entirely to undergraduate training programs, bypassing direct chairside communication.
c Drawing attention to potential contributing habits (such as diet or brushing techniques) to encourage reflection, allowing the patient to gain insight and take ownership.

10. *Which of the following best characterizes the pragmatic school of thought regarding occlusal design during the restoration of worn dentitions?*

a Achieving a textbook-perfect occlusion—such as cusp-fossa relationships and strict canine guidance—is mandatory to prevent early material failure.
b Restorations must always force the patient's dentition into an idealized gnathological model, regardless of their current clinical reality.
c Group guidance must be entirely avoided because it creates harmful balancing-side interferences that accelerate composite wear.

Article: Follow-up of periapical inflammation after root canal retreatment and surgical endodontic treatment using dental-dedicated magnetic resonance imaging: a case report. Christensen, Spin-Neto, Kirkevang, p34

11. *What is a primary clinical advantage of dental-dedicated MRI (ddMRI) over conventional periapical radiography and CBCT in endodontic diagnosis?*

a. It utilizes high-dose ionizing radiation to yield superior cortical bone micro-fracture resolution.
b. It allows direct visualization of periapical inflammatory soft tissue and granulation tissue without ionizing radiation.
c. It replaces the need for pulp vitality testing by measuring blood flow directly within the enamel.

12. *Which of the following best describes a major limitation of conventional periapical radiography when detecting early periapical periodontitis?*

a. It severely overestimates the size of the lesion due to continuous soft-tissue magnification.
b. It exposes the patient to higher effective radiation doses than a full-mouth multislice CT scan.
c. It cannot detect periapical bone demineralization until the pathological process involves or erodes the cortical plate.

13. *Following effective root canal debridement and obturation, what is the typical chronological sequence of biological events during periapical bone healing?*

a. Immediate cortical plate ossification followed by central liquefaction necrosis of the granulation tissue.
b. Rapid replacement of the periapical lesion by hyperplastic root cementum and periodontal ligament scar tissue exclusively.
c. Replacement of inflammatory granulation tissue by fibrovascular connective tissue, followed by osteoid deposition and eventual remodeling into lamellar bone.

14. *During non-surgical retreatment, a bioceramic sealer is frequently utilized alongside gutta-percha. What is a primary biological or handling characteristic of bioceramic sealers that influences subsequent surgical or non-surgical endodontic management?*

a. They are highly biocompatible and form hydroxyapatite upon setting, but can be highly resistant to standard chemical solvents if non-surgical re-retreatment is required.
b. They exhibit severe volumetric shrinkage upon setting, requiring a warm vertical compaction technique to minimize voids.
c. They lack radiopacity and must always be mixed with zinc oxide powder before clinical delivery.

15. *In the provided case report, the ddMRI acquired in December 2023 revealed a remaining hyperintense signal around the mesial apex, suggesting exacerbation. How did this finding correlate with the radiographic timeline and the ultimate histopathological outcome?*

a. The ddMRI findings directly contradicted the panoramic image from January 2024, which showed complete bony healing.
b The hyperintense signal on ddMRI was an artifact of the composite restoration and carried no clinical diagnostic value.
c The ddMRI accurately predicted active inflammation, which was definitively confirmed by the presence of active inflammatory cells in the surgical biopsy tissue.

Article: Follow-up of periapical inflammation after root canal retreatment and surgical endodontic treatment using dental-dedicated magnetic resonance imaging: a case report. Christensen, Spin-Neto, Kirkevang, p34 (contd)

16. Following the extraction of tooth 36, a vertical root fracture (VRF) was identified in the mesial root. Which of the following is a classic clinical presentation or diagnostic hallmark that strongly suggests the pre-existence of a VRF in an endodontically treated tooth?

a. A generalized, shallow 2mm horizontal bone loss across the entire dental arch.
b A deep, isolated periodontal pocket matching a localized vestibular fistula and sudden angular bone loss.
c Increased thermal sensitivity to cold liquids that lingers for more than 30 seconds.

17. According to the discussion, the implementation of dental-dedicated MRI (ddMRI) is evaluated against the Fryback and Thornbury (F&T) evidence hierarchy. What is the next essential phase required to advance ddMRI beyond its current Level 1 standing for endodontic applications?

a. Conducting Level 2 diagnostic accuracy studies to verify ddMRI findings against a gold standard reference like histopathology for specific tasks like apical periodontitis.
b Executing immediate Level 4 therapeutic efficacy assessments to modify root canal obturation protocols using ddMRI guidelines.
c Abandoning hard-tissue evaluation entirely to focus on Level 1 technical feasibility parameters of the 0.55T magnetic field.

18. A hyperintense signal in the periapical region on a ddMRI scan indicates an excess of fluid and increased cell concentration. Which of the following pairs of conditions represents the most significant diagnostic challenge due to their overlapping hyperintense presentation on ddMRI?

a. Fully mineralized lamellar bone and an unmineralized benign fibrous scar.
b Titanium implant susceptibility artifacts and root canal sealer extrusion.
c Active persistent periapical inflammation and active ongoing tissue wound healing.

19. The text notes that dentists must maintain diagnostic caution when evaluating persistent or unexpected hyperintense periapical signals on ddMRI, even in the absence of traditional clinical signs of endodontic infection. Which systemic or malignant conditions must be included in the differential diagnosis for such a presentation?

a. Hypothyroidism and osteomalacia.
b Multiple myeloma and leukemia.
c Amelogenesis imperfecta and fluorosis.

20. How does the potential ability of ddMRI to distinguish between active inflammation and a benign periapical scar impact clinical decision-making for medically compromised or pre-surgical patients?

a. It proves that asymptomatic apical periodontitis has no relationship with systemic health, eliminating the need for pre-surgical dental screenings.
b It dictates that all teeth with radiographic radiolucencies must be extracted immediately before any major surgery to completely bypass the healing phase.
c It provides a non-invasive risk assessment tool to determine which radiologically apparent lesions are truly active inflammatory risks versus harmless scar tissue, potentially preventing unnecessary extractions.