

Dental Insights – Will saliva tests become the new diagnostic weapon in the dental clinic?

1. Personalized medicine in the dental office

As human beings, we differ from each other both biologically and behaviorally, also called:

- Biological heterogeneity
- Behavioral heterogeneity

Personalized medicine is whole-person, individually tailored patient-centered care and treatment.

Personalized medicine = patient centered health, in:

- Prevention
- Diagnosis
- Treatment

Precision medicine = treatment and bespoke care provision specific to the individual patient.

Digital tools for personalized medicine in the dental clinic:

- Risk assessment as biofeedback tool for behavior change in perio care
 - Results: Showing and giving the patient feedback on their individual risk score is a powerful communication and behavior change tool.
- Saliva biomarker analysis for perio risk assessment in non-dental settings (fx pharmacies).
 - Results: Integrated medical and dental care is still developing. We need to understand each other's fields much better. Integration may also encourage shared responsibility across the health care system. Only 50-60% of the population attend dental care regularly. Saliva in a non-dental setting could therefore be valuable.
 - Saliva biomarkers: MMP9 + A1AGP + PK + S100A8 + age
 - Periodontal health and disease states can be predicted with the 4 saliva biomarkers + age.
- Risk prediction tools for early case detection of type 2 diabetes in dental practice.
 - Results: Dentists are for healthy patients for check-ups, doctors are for sick patients. We see different patients, and at different disease stages.

Yonel et al 2020, BMC Public Health: "Patient acceptability of targeted risk-based detection of non-communicable diseases in a dental and pharmacy setting"

By only referring those to the general physician (GP) who score positive on both tests it would reduce referrals with 90%!

Accuracy of point-of-care HbA1C devices: 81-88%. Dental Diabetes Score (DDS) (Yonel et al, submitted to JDR)

Digital risk prediction is key.

Personalized biofeedback can improve behavior change.

2. Saliva diagnostics for screening of periodontitis and other conditions in the dental office

Saliva = the body's mirror! We take the fluid for granted. Saliva is actually whole saliva/oral fluid with many components.

Saliva:

- 0,5-1,5 liter/day saliva
- 99% water
- Proteins and peptides
- Inorganic and organic compounds

Non-salivary components

- Oral mucosal cells
- Oral microbiota and viruses
- Blood
- Gingival crevicular fluid
- Food

Saliva collecting is inexpensive, non-invasive, fast, easy, large cohorts, gives overall information, suitable for all patients types fx children, elderly etc.

Saliva biomarkers:

- MMP8
- IL-6
- IL-1beta
- TIMP-1
- ICTP
- MIP-1alfa
- Albumin

Challenges with saliva sampling:

- Sample collection unstimulated, stimulated, whole, local site
- Circadian rhythm
- Age differences
- External influences (food eaten before)
- Storage

Omics (big data):

- Epigenome
- Transcriptome
- Salivaomics
- Microbiome
- Proteome
- Metabolome
- Lifestyle data

It's not the single biomarker that give us the good results, it has to be combination of biomarkers.

The oral microbiome consists of 770 different microorganisms.

3. Future of saliva diagnostics in the dental clinic

Saliva tests in the dental office:

- Sialometry and hyposalivation screening (unstimulated, stimulated, viscosity, pH, buffer capacity) (Laine et al 2020)
- Saliva diagnostics (oral fluids collection, sample processing, biomarkers) (Gaudin et al 2020)
- Saliva point-of-care tests (PerioSafe, ARKRAY Sill-Ha, Oral Fluid Nanosensor Test (OFNASET), Sars-CoV-2 can be detected)

In the future:

Remote real-time monitoring fx using an intelligent toothbrush or wearable intraoral sensor (just like a smartwatch or -ring).

Audience debate:

We have to integrate food as medicine too! Nutrition is very important and overlooked in patient treatment. We have to think personalized health, not just personalized medicine.

In UK they want to involve dental professionals in screening for other systemic diseases than oral diseases.

Top 3 Dental Insights – Key take aways

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- Risk prediction tools for early case detection of type 2 diabetes in dental practice.

2. Saliva = the body's mirror! We take the fluid for granted. Saliva collecting is inexpensive, non-invasive, fast, easy, large cohorts, gives overall information, suitable for all patients types fx children, elderly etc. It's not the single biomarker that give us the good results, it has to be combination of biomarkers.

3. Saliva tests in the dental office:

- Sialometry and hyposalivation screening
- Saliva diagnostics
- Saliva point-of-care tests

In the future we will see remote real-time monitoring fx using an intelligent toothbrush or wearable intraoral sensor (just like a smartwatch or -ring). Dental professionals could in the future be involved in screening for other systemic diseases than oral diseases.

Sources

EuroPerio10, 2022, European Federation of Periodontology (EFP)

That was Dental Insights. Thank you for being here. ♥

Dental love, Anne Mette