Center for Innovation & Precision Dentistry

Penn Dental Medicine University of Pennsylvania

Penn Engineering University of Pennsylvania

NATIONAL ACADEMIES Sciences Engineering Medicine

Engineering Technologies to Advance Oral Health Innovations

Flavia Teles DDS, MS, DMSc

Department of Basic & Translational Sciences, School of Dental Medicine, University of Pennsylvania
Center for Innovation and Precision Dentistry (CiPD), University of Pennsylvania

Advancing Oral Health Across the Lifespan: A Workshop

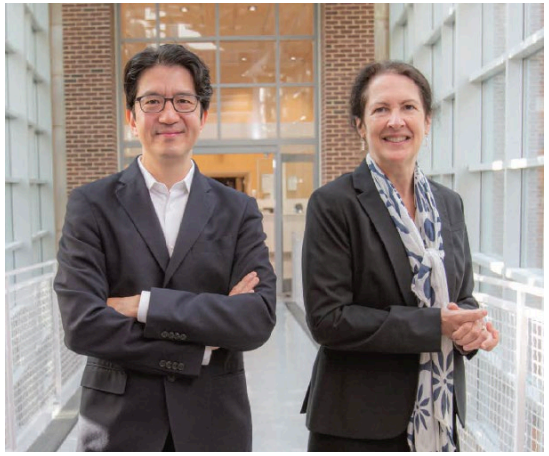
November 19, 2024

Inter-School Partnership

Center *for* Innovation & Precision Dentistry

Penn Dental Medicine
University of Pennsylvania

Penn Engineering
University of Pennsylvania



DENTISTS, SCIENTISTS & ENGINEERS TRANSFORMING ORAL HEALTH

Founders
Hyun (Michel) Koo, DDS, PhD (Dental Medicine)
Kate Stebe, PhD (Engineering)

Associate Directors
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Anh Le (Clinical & Translation)
Markus Blatz (AI & Digital Dentistry)

Assistant Director
Zhi Ren (Research and Training)

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- Esra Sahingur (PDM)
- David Cormode (PSOM/SEAS)
- Andrew Tsourkas (SEAS/CT3N)

Managing Director
Linda Donoho

Advisory Board
Anne Koch
Ronen Israel
Chris Fox
Peter Quinn


>30 faculty members

Training Next-Generation

National Institute of Dental and Craniofacial Research

T90/R90 Training Grant

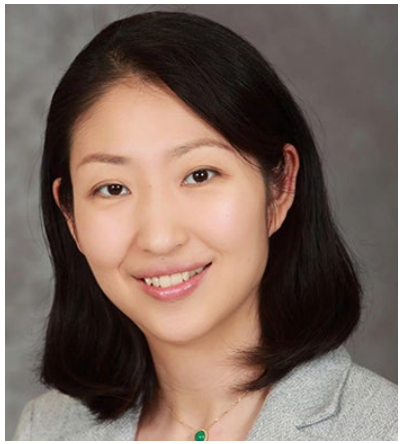
Advanced Training at the Interface of Engineering & Oral-Craniofacial Sciences

CiPD-Colgate Fellow

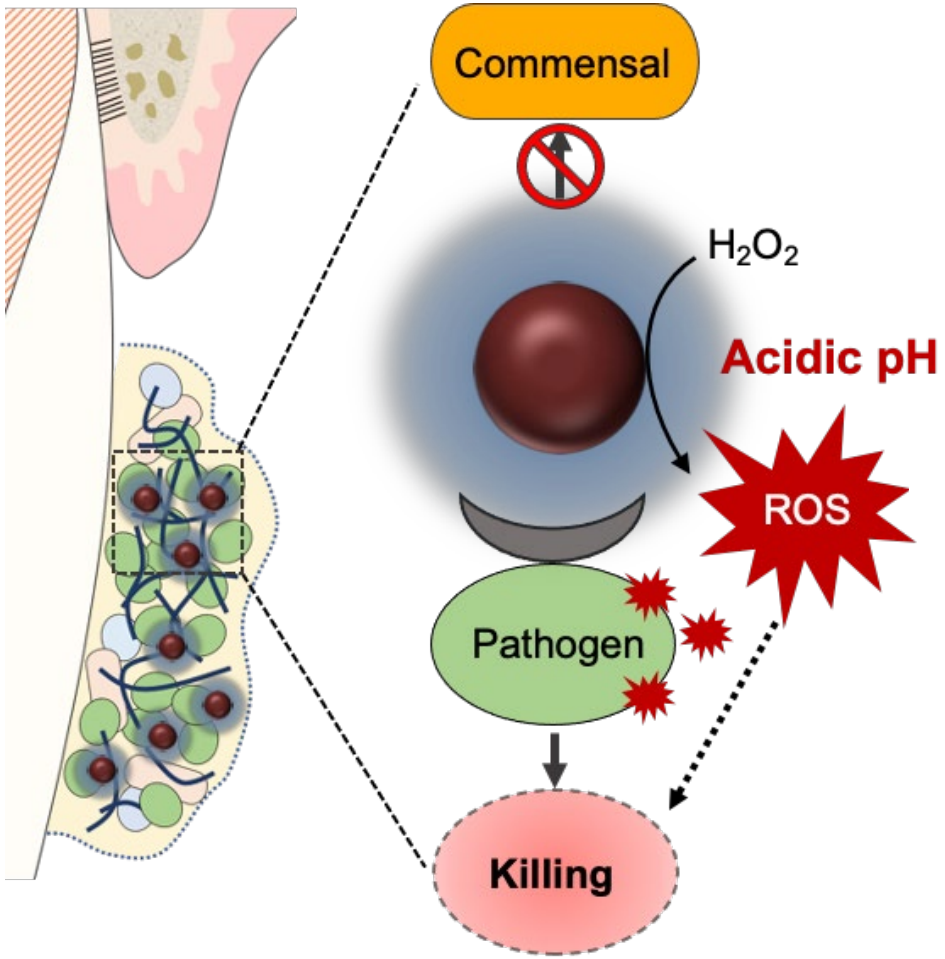
NIDCR Diversity Fellow

Affordable Nanotechnology: Dual Impact

A low-cost, FDA-approved nanomedicine (iron deficiency anemia) for caries prevention in high-risk population



Yuan Liu, DDS, PhD
NIDCR K23 Fellow
Assist. Prof. at Temple



- FDA-approved as food coloring (edible) iron-deficiency therapy (oral/injectable)
- Low cost ($0.17/g) and GMP-scalable
- Multi-use: caries, perio, and endo
- IND exemption for clinical trial

Liu et al, *Nature Communications*, 2018
Huang, Liu et al., *Nature Communications,* 2023

Accessible Artificial Intelligence

Center *for* Innovation & Precision Dentistry

Penn Dental Medicine
University of Pennsylvania

Penn Engineering
University of Pennsylvania

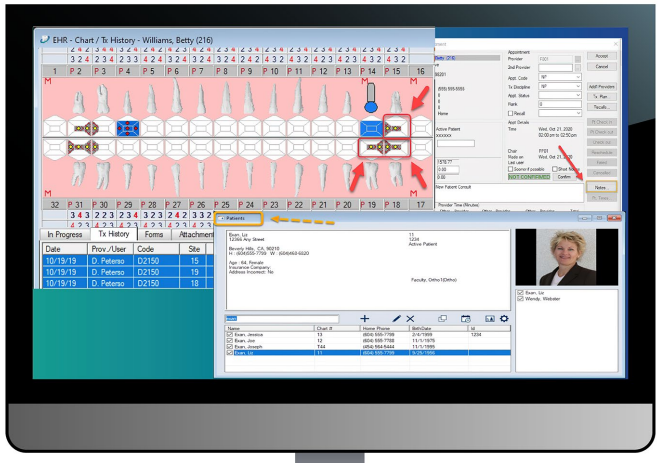
Institute for Biomedical Informatics

CiPD-IBI Artificial Intelligence in Oral Health Innovation Award

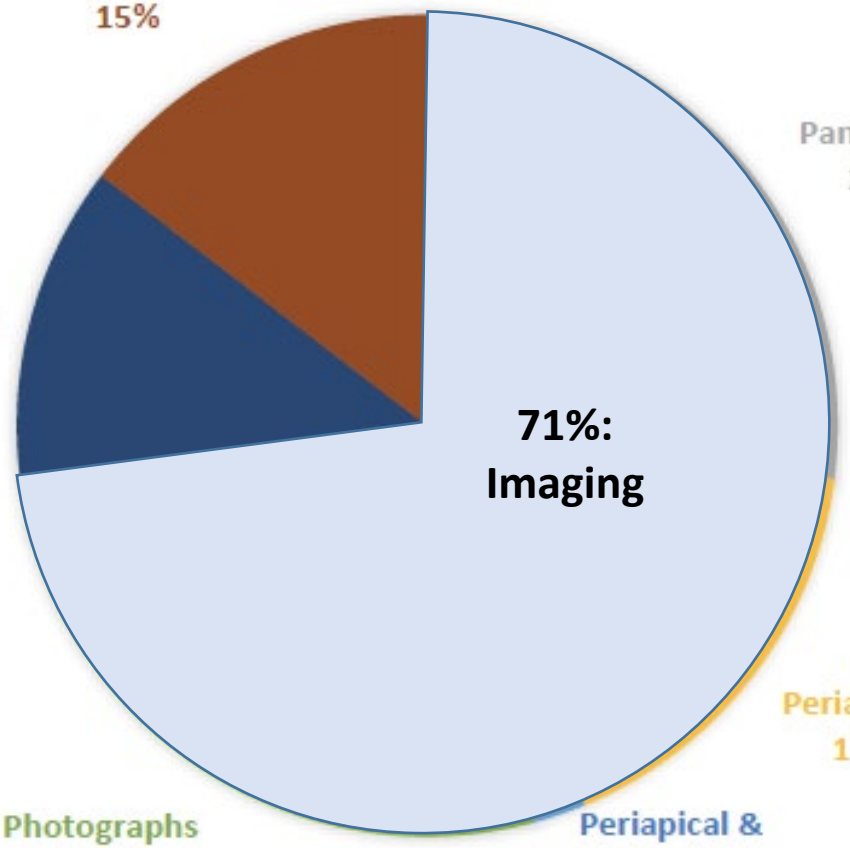
Promoting application of artificial intelligence and machine learning in oral and craniofacial sciences

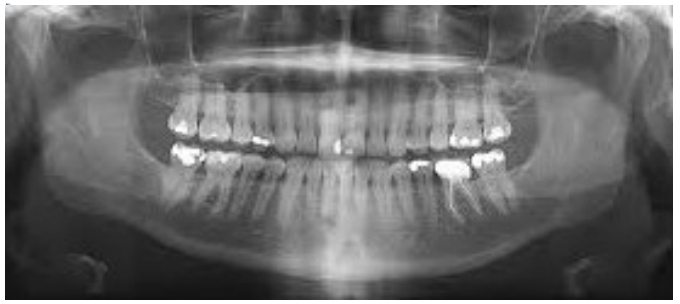
Shefali S. Verma, PhD

Flavia Teles, DDS, MS, DMSc



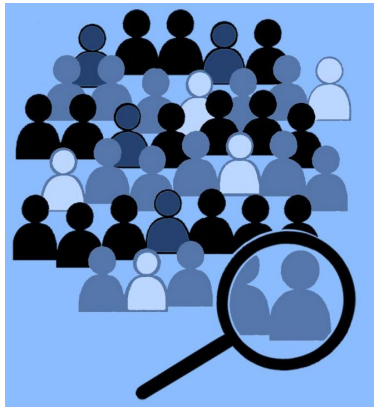
1 School
2 Departm
Oral Biome
14%
* Corresp



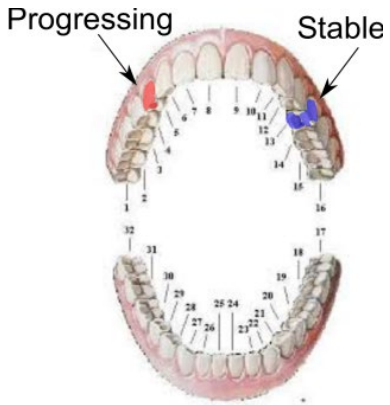


Accessible Artificial Intelligence

Demographics



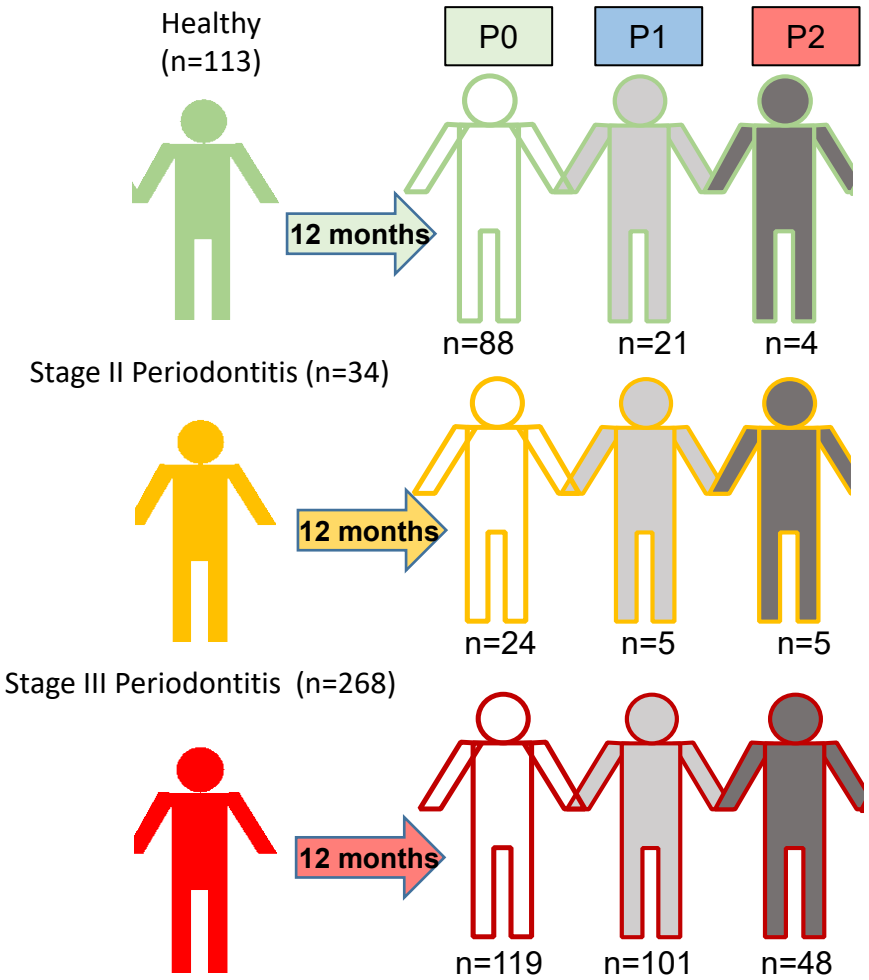
Clinical



Teles et al, *J Clin Periodontol* 2018, 2024a, 2024b

Baseline Diagnosis

Clinical Outcome: Periodontitis Progression



Saliva

MCP1
IFN-g
IL6
VEGF
IL8
IL1-b
MMP8
IL10
OPG
MMP9

Serum

CRP
HSA
MPO
MMP8
MMP9

Infinium Global Screening Array-24 Kit

Blood DNA

Teles…Divaris , *J Periodontol*, 2024 (Under Review)

Developing Predictive Models for Periodontitis Progression Using Artificial Intelligence: A Longitudinal Cohort Study

Camila Furquim[1,2], Lannawill Caruth[3,4], Ganesh Chandrasekaran[5], Andrew Cucchiara[5], Michael J Kallan[6], Lynn Martin[1], Magda Feres[7], Kyle Bittinger[8], Kimon Divaris[9], Joseph Glessner[8], Alpdogan Kantarci[7,10], William Giannobile[7], Shefali Setia Verma[3,4], Flavia Teles[1,11]

Lannawill Caruth
Biostatistician

Camila Furquim DDS, MS
PhD Candidate
Department of Periodontology and Oral Implantology,
University of Guarulhos, SP, Brazil.

Furquim …Teles 2024 (in preparation)

Furquim …Teles 2024 (in preparation)

AI-Driven Data Integration Can Optimize Patient Care Delivery

	Traditional Approach		
Population of Individuals			
Classify by Risk			
Surveillance for Preclinical Disease	FU at every 6 months (PD, SRP) 		
Signs or Symptoms			
Treat with	PD, SRP, surgery, antibiotic tx		
Strategy	**"One Size Fits All" Leads to Overall Mixed Results**		
			
Outcome	 **Benefit**	 **No Effect**	 **Adverse**

Cholerton et al, *Am J of Path*, 2016

And ultimately improve oral and systemic health and optimize the allocation of resources for disease diagnosis, treatment, and prevention.

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Transforming oral health innovations with engineering solutions

Learn more: