

BENEDIKT SAGL, PHD

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EDUCATION

Medical University of Vienna, Austria Venia Docendi Exposé Title: "Computer-aided biomechanics of the masticatory organ"	submitted
Medical University of Vienna, Austria Doctor of Philosophy <i>Academic Focus: Biomechanical Simulation, Medical Imaging</i> Thesis Title: "Novel in-silico approaches for the investigation of the human masticatory system"	2016-2020
University of Saskatchewan, Canada Master's degree program in Computer Science <i>Academic Focus: Biomechanical Simulation, Medical Image Processing</i> Thesis Title: „Biomechanical Modeling of the Masticatory Region“	2014 - 2016
Technical University of Vienna, Austria Master's degree program in Biomedical Engineering	2012 - 2014
University of Applied Science Technikum Vienna, Austria Bachelor's degree program in Biomedical Engineering <i>Academic Focus: Medical Image Processing, Computer Simulation</i> Thesis Title: „Development of a Workflow for Segmentation of the Cranial Region“	2009 - 2012

WORK EXPERIENCE

Medical University of Vienna Research Associate <i>Projects focused on computational biomechanics of the masticatory region</i>	since 2017
Ludwig-Boltzmann-Institute for experimental and clinical traumatology - Karl Donath Laboratory Research Assistant <i>Processing and analysis of medical image data for various research projects</i>	2019
University of Saskatchewan, Canada Visiting Researcher <i>Development of a FEM TMJ model</i> <i>Development of a new optimization method for forward-dynamics tracking simulations</i>	2017
University of Saskatchewan, Canada Research Assistant <i>Computer simulations of the masticatory region</i>	2014 - 2016

Medical University of Vienna Intern <i>Development of a simple implementation of the Feldkamp CBCT-reconstruction algorithm</i>	2012
A.E.R.S Dental Medicine Organisations Research Assistant <i>Projects in the area of image processing and computational biomechanics of the jaw region</i>	2011 - 2017

RESEARCH INTERESTS

Computer Simulation, Biomechanics, Medical Imaging

PUBLICATIONS

h-index: 5

(senior/corresponding author starred; IF at time of acceptance)

Journal of Anatomy **2019**

Sagl B.*, Schmid-Schwab M., Piehslinger E., Kronnerwetter C., Kundi M., Trattng S., Stavness I.
"In Vivo Prediction of Temporomandibular Joint Disc Thickness and Position Changes for different Jaw Positions"
Impact Factor: 2.638; Rank: 4/21

IEEE Transactions on Biomedical Engineering **2019**

Sagl B., Dickerson C., Stavness I.
"Fast Forward-Dynamics Tracking Simulation: Application to Upper Limb and Shoulder Modeling"
Impact Factor: 4.288; Rank: 9/78

Frontiers in Physiology **2019**

A Dynamic Jaw Model with Finite-Element Temporomandibular Joint
Sagl B.*, Schmid-Schwab M., Piehslinger E., Kundi M., Stavness I.
Impact Factor: 3.367; Rank: 20/81

Frontiers in Human Neuroscience **2020**

Learning to Masticate with Soft Actor-Critic
Abdi A., **Sagl B.**, Srungarapu, V., Stavness, I., Prisman, E. Abolmaesumi, P., Fels, S.
Impact Factor: 2.673; Rank: 24/78

Clinical Oral Implants Research **2021**

Bone healing around titanium implants in a preclinical model of bile duct ligation-induced liver injury
Talebian R., Kamleitner C., **Sagl B.**, Kuchler U., Dehpour A.R., Gruber R.
Impact Factor: 5.977; Rank: 6/92

Diagnostics **2021**

A novel quantitative method for tooth grinding surface assessment using 3D scanning
Sagl B.*, Besirevic-Bulic F., Schmid-Schwab M., Laky B., Janjić K., Piehslinger E., Rausch-Fan X.
Impact Factor: 3.706; Rank: 45/169

- Journal of the Mechanical Behavior of Biomedical Materials** **2021**
An in silico investigation of the effect of bolus properties on TMJ loading during mastication
Sagl B.*, Schmid-Schwap M., Piehslinger E., Rausch-Fan X., Stavness I.
 Impact Factor: 3.902; Rank: 22/41
- Journal of Advanced Research** **2022**
Effect of facet inclination and location on TMJ loading during bruxism: An in-silico study
Sagl B.*, Schmid-Schwap M., Piehslinger E., Kundi M., Stavness I.
 Impact Factor: 10.479; Rank: 9/72
- Journal of the Mechanical Behavior of Biomedical Materials** **2022**
Experimental validation of a micro-CT finite element model of a human cadaveric mandible rehabilitated with short-implant-supported partial dentures
 Zupancic-Cepic L., Frank M., Reisinger A.G., **Sagl B.**, Pahr D.H., Zechner W., Schedle A.
 Impact Factor: 3.902; Rank: 22/41
- Frontiers in Physiology** **2022**
The effect of tooth cusp morphology and grinding direction on TMJ loading during bruxism
Sagl B.*, Schmid-Schwap M., Piehslinger E., Rausch-Fan X., Stavness I.
 Impact Factor: 4.755; Rang: 20/81
- Diagnostics** **2023**
Wear Management of Colored Foils for the Assessment of Sleep Bruxism Patterns—A Prospective, Randomized Crossover Study
 Besirevic-Bulic F., Schmid-Schwap M., Kundi M., **Sagl B.**, Piehslinger E.
 Impact Factor: 3.992; Rang: 60/172
- bioRxiv** **2023**
The effect of bolus properties on muscle activation patterns and TMJ loading during unilateral chewing
Sagl B.*, Schmid-Schwap M., Piehslinger E., Yao H., Rausch-Fan X., Stavness I.
 preprint
- European Journal of Cell Biology** **2023**
Differential gene expression and protein-protein interaction networks of human periodontal ligament stromal cells under mechanical tension
 Janjić K., Nemeč M., Maase J.L., **Sagl B.**, Jonke E., Andrukhov O.
 Impact Factor: 6.02; Rang: 70/195
- International Journal of Oral & Maxillofacial Surgery** **2023**
Functional reconstruction of the masseter muscle by microvascular free gracilis muscle transfer: technique and outcome
 Gaggl A., Battita Bottini G., **Sagl B.**, Rasse M.
 Impact Factor: 2.986; Rang: 76/213

 AWARDS & GRANTS

- Rudolf Slavicek Paper Award of the Austrian Society of Dentistry – Charter Vienna** **2020**

Poster Presentation Award – YSA Symposium 2019	2019
Medical-Scientific Fund of the Mayor of Vienna (Co-I, PI: Prof. Piehslinger) <i>Funding amount: 15,000 €</i>	2017
Student scholarship, Medical University of Vienna <i>Funding amount: 1,000 €</i>	2016
Best Technical Demonstration Award, OpenSim Advanced User Workshop, Stanford University	2015
Travel Grant, OpenSim Advanced User Workshop, Stanford University <i>Funding amount: 3,000 USD</i>	2015
Travel Grant, Summerschool on Biomedical Imaging, ETH Zürich <i>Funding amount: 500 CHF</i>	2013
Performance scholarship, Technikum Vienna <i>Funding amount: 762.72 € each</i>	2011 – 2012
Grant submissions currently pending:	
Austrian Science Fund – FWF <i>Personalized modeling of TMJ sexual dimorphism biomechanics</i> Stand-Alone Project. Role: PI	under review
Austrian Science Fund – FWF <i>Using machine learning to identify new MRI image markers for TMD</i> Stand-Alone Project. Role: PI	in preparation
National Institute of Health – NIH <i>TMJ SYMPHONY: Systems-integrated model and mechanisms of patient-centered holistic outcomes and network-supported training and therapy.</i> RFA-DE-23-014 TMD IMPACT planning grant; Role: Co-I (PI: Prof. Hai Yao, Clemson University)	under review

 INVITED TALKS

ESB Webinar Series- No.15 <i>ArtiSynth: A Platform for Combined MultiBody and Finite Element Simulation</i>	2023
AnthropologyCA: Anthropology meets Dentistry <i>Methods for the analysis of TMJ biomechanics and evaluation of occlusal forces</i>	2023
6th SfN Satellite symposium on Craniofacial Neuroscience <i>Biomechanical effect of grinding facet inclination and position</i>	2021
17th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering <i>Computational investigation of the effect of bolus stiffness on TMJ loading during chewing</i>	2021
FE ZURICH 2021 Workshop <i>Using a combined rigid-body FEM model to investigate human jaw function</i>	2021
CAMS Knee Workshop <i>Investigating meniscus forces using a combined multibody-FEM model</i>	2020

CAMS Knee Workshop <i>ArtiSynth Tutorial</i>	2020
Clinic of Masticatory Disorders, University of Zurich, Switzerland <i>Invited Talk on the topic of biomechanical Simulation of the masticatory region</i>	2018
Media and Graphic Interdisciplinary Centre, University of British Columbia, Canada <i>Invited Talk on the topic of TMJ imaging and biomechanics</i>	2018

PROFESSIONAL SERVICE

Reviewer for various international journals including the International Journal of Oral Science, Journal of Oral Rehabilitation and Journal of Biomechanics

Member of Scientific Committee for the European Society of Biomechanics Congress 2022 and 2023

CONFERENCE PROCEEDINGS

AAOMS 105th Annual Meeting Sun S., Ahmadi F., Hill C., Almpanti K., Jani P., Damon B., Sagl B. , Wu Y., Lee J.S., Yao H. <i>Bite Force Control Capacity Differs Between Dentofacial Differences and Improves With Orthognathic Surgery</i>	2023
2023 AADOCR/CADR Annual Meeting Sun S., Ahmadi F., Hill C., Almpanti K., Jani P., Damon B., Sagl B. , Wu Y., Lee J.S., Yao H. <i>Evaluating Bite Force Control Capacity Before And After Orthognathic Surgery</i>	2023
European Society of Biomechanics Congress 2022 Sagl B. , Schmid-Schwap M., Piehslinger E., Rausch-Fan X., Stavness I. <i>Differences in TMJ Loading between Mediotrusive And Laterotrusive Tooth Grinding</i>	2022
European Society of Biomechanics Congress 2022 Holzinger T., Martinek J., Cazzola D., Sagl B. <i>Simulating Head-First Impact in Sport: A Hybrid Multibody And Finite Element Head And Neck Model</i>	2022
TMJ Bioengineering Conference 7 Sagl B. , Schmid-Schwap M., Piehslinger E., Rausch-Fan X., Stavness I. <i>The effect of bolus stiffness on TMJ loading and muscle excitation during unilateral chewing</i>	2022
XXVIII Congress of the International Society of Biomechanics Sagl B. , Smith C.R., Lloyd J.E., Stavness I. <i>A forward-dynamics tracking simulation using a combined rigid body - FEM model to predict knee meniscus loading</i>	2021
Viesid Summerschool 2021 Sagl B. , Schmid-Schwap M., Piehslinger E., Kundi M., Stavness I. <i>Effect of facet inclination and location on TMJ loading during bruxism: An in-silico study</i>	2021
International Association for Dental Research Genereal Session 2020	2020

- Sagl B.**, Hager B., Eder J., Schmid-Schwab M., Dworan J., Traxler H., Piehslinger E, Trattnig S.
Examining TMJ Morphology using 7T-MR Microscopy: A Preliminary Investigation
- 52. Jahrestagung der Gesellschaft für Funktionsdiagnostik und -therapie** **2019**
Sagl B., Schmid-Schwab M., Piehslinger E., Kundi M., Trattnig S., Stavness I.
Ein detailliertes Computermodell der Kauregion basierend auf hochaufgelösten MRT Bilddaten
- XXVII Congress of the International Society of Biomechanics** **2019**
Sagl B., Schmid-Schwab M., Piehslinger E., Kundi M., Stavness I.
A Dynamic Jaw Model with a Finite-Element Temporomandibular Joint
- XVII International Symposium on Computer Simulation in Biomechanics** **2019**
Sagl B., Smith C, Schmid-Schwab M., Piehslinger E., Kundi M., Lloyd J., Stavness I.
A Novel Contact Model for the Computational Investigation of Synovial Joints with a Cartilaginous Disc
- European Society of Biomechanics Conference 2019** **2019**
Sagl B., Schmid-Schwab M., Piehslinger E., Kundi M., Stavness I.
A forward-dynamics tracking approach for the investigation of tooth grinding using a combined rigid body - FEM model
- 15th YSA PhD Symposium** **2019**
Sagl B., Schmid-Schwab M., Piehslinger E., Kundi M., Stavness I.
A Dynamic Jaw Model with a Finite-Element Temporomandibular Joint
- MIC Festival 2019 - Digital Revolution in Medical Imaging** **2019**
Sagl B., Schmid-Schwab M., Piehslinger E., Kundi M., Stavness I., Trattnig S.
A detailed computer model of the masticatory region built from high-resolution MRI data
- Gesellschaft für Medizinische Ausbildung Jahrestagung** **2018**
Sagl B., Schmid-Schwab M., Piehslinger E., Kundi M., Stavness I.
Ein dreidimensionales, interaktives Computermodell der Kauregion und seine potentielle Anwendung in der medizinischen Lehre
- Viesid Summerschool 2018** **2018**
Sagl B., Schmid-Schwab M., Piehslinger E., Kundi M., Stavness I.
Development of a detailed Computational Model of the Masticatory Region
- TMJ Bioengineering Conference 6** **2018**
Sagl B., Schmid-Schwab M., Piehslinger E., Kundi M., Stavness I.
A Novel Combined Rigid Body – Finite Element Model for the Investigation of Temporomandibular Joint Loads
- 15th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering** **2018**
Sagl B., Schmid-Schwab M., Piehslinger E., Kundi M., Stavness I.
Towards Development of a Combined Rigid Body – Finite Element Model for the Investigation of Temporomandibular Joint Loads
- 40th Annual Meeting of the American Society of Biomechanics** **2016**

Stavness, I., **Sagl, B.**, Cooper, J., Dickerson, C
Real-Time Forward-Dynamics Tracking Simulation with Joint Stability Constraints

Viesid Summerschool 2015 **2015**

Sagl, B., Stavness, I., Slavicek, R.
Inverse Modeling of the Masticatory System

XXV Congress of the International Society of Biomechanics **2015**

Sagl, B., Stavness, I., Slavicek, R.
Forward-Dynamics Tracking with Reaction Force Targets

IAAID International Congress on Bruxism **2015**

Sagl, B., Stavness, I., Slavicek, R.
Biomechanical Simulation of Bruxism using Movement and Force Targets

Viesid Summerschool 2013 **2013**

Sagl, B., Slavicek, R.
Finite Element Analysis of Human Dentition

TEACHING ACTIVITIES

SE "SSM 2 - Three-dimensional studies of relevant variations **since SS 2023**

in dental arch morphology"
 Medical University of Vienna

SE "SSM 1 - Computational biomechanics of the musculoskeletal system" **since WS 2021**

Medical University of Vienna

VO "Biomechanics of the craniomandibular system" - **since SS 2021**

M Z-7 Removable prosthodontics
 Medical University of Vienna
Lecture on biomechanics of the masticatory system with focus on TMJ

JC "Jawbone regeneration and oral tissue engineering", 850.033 **since SS 2019**

Medical University of Vienna
Preparing and chairing of a part of the journal club in the Doctoral Programme of Applied Medical Science

„Senior Mentoring, 800.000“ **since WS 2019**

Medical University of Vienna
Organisation of a mentoring environment for a group of medical students, discussion of relevant topics and support with study related problems

Supervision of Master and Diploma Thesis at the **since 2019**
Medical University of Vienna and the FH Technikum Vienna

Mentoring/ Co-Supervision of PhD students at the **since 2023**
Medical University of Vienna and the Clemson University