

# MATTHIAS WALLE (he/him)

(BSc., MSc., PhD., E.I.T.)

Dr. sc. ETH Zürich — McCaig Institute, University of Calgary, Canada

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## IMPACT SUMMARY

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<b>Funding</b>	3 major fellowships · 3 Grants
<b>Publications</b>	19 peer-reviewed · 9 first-author · <i>Science Advances</i> (IF 11.7), <i>Giga Science</i> (IF 11.8)
<b>Conferences</b>	22 international presentations · 7 oral podiums personally delivered · 2 invited talks
<b>Open Science</b>	7 GitHub repositories · >70% of first-author papers with open code · 3 Zenodo datasets
<b>Teaching</b>	1 course developed · 3 delivered · 11 graduate students supervised · 5 TA supervisions
<b>Outreach</b>	10+ outreach/media contributions · 2 radio, 4 interviews, 2 videos, 1 article · 2 live events
<b>Service</b>	7 committee roles · <b>Chair</b> , ISBM YI Committee · Peer reviewer (Nature Comm., Bone)
<b>Awards</b>	<b>ETH Medal</b> (Top 8%) · 2 Young Investigator Awards · 1 Poster Award

## PERSONAL INFORMATION

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### Language Certificates

German: C2. Abitur (native)	07/13
English: C1. German Academic Exchange Service (DAAD)	07/19
French: B1. Diplôme d'études en langue française (DELFF)	06/11

### ORCID

0000-0003-3250-8143

## EDUCATION

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### ETH Zürich

Doctoral studies (Dr. sc. ETH Zürich) Department of Health Sciences and Technology supervised by Prof. Dr. Ralph Müller. 03/20 – 09/23

### Technical University Munich

Master of Science (M.Sc., Dipl.-Ing.) Mechanical Engineering. 08/17 – 02/20  
Bachelor of Science (B.Sc.) Mechanical Engineering. 10/13 – 07/17

### Research and industry stays abroad

University of Sheffield, Mellanby Centre for Musculoskeletal Research. 11/22 – 11/22  
IBM Research Zurich, Artificial Intelligence and Automation. 08/21 – 12/21  
Harvard Medical School, Beth Israel Deaconess Medical Center. 08/19 – 01/20  
University of Technology Sydney, Faculty of Science. 03/19 – 07/19

### Leaves and Sabbaticals

Parental Leave (Primary Caregiver). 07/25 – 02/26

## RESEARCH EXPERIENCES

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- Postdoctoral Fellowship, McCaig Institute, University of Calgary.** 10/23 – 05/28  
*Artificial Intelligence for Opportunistic CT:*  
I develop machine learning pipelines for vertebral segmentation and quality control from opportunistic CT scans using 3D U-Nets implemented in nnU-Net and MONAI, enabling large-scale vertebral strength prediction for osteoporosis screening.
- Spaceflight & Bone Remodeling:*  
I investigate bone remodeling and recovery after spaceflight and disuse using time-lapsed HR-pQCT and computational modeling.
- Doctoral Studies, Institute for Biomechanics, ETH Zürich.** 03/20 – 09/23  
*Mechanoregulation of bone remodelling in diabetes using HR-pQCT in vivo patient data.*  
I developed bone imaging and computational methods for mechanobiological bone remodelling studies that can be run on desktop computers in the hospital/laboratory environment.
- Master's Thesis, Beth Israel Deaconess Medical Center, Harvard Medical School.** 08/19 – 01/20  
*Effects of microscopic spatial complexity and heterogeneity on trabecular bone modulus.*  
I conducted this project to describe continuity within the trabecular bone network, to possibly further the understanding of the intrinsic material properties of trabecular bone, by combining local morphology and micro-finite element analysis.
- Bachelor's Thesis, Institute for Medical Device Technology, TU Munich.** 11/17 – 02/18  
*A relational database for medical device certification.*  
I developed a database tool to guide small to medium businesses through the medical device approval process, ensuring compliance with international and national regulations.

## PROFESSIONAL INDUSTRY EXPERIENCES

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- Intern at Aesculap AG, Front End Innovation.** 04/17 – 10/17  
Worked on a sterile technology system including prototype design, testing, and negotiations with suppliers.
- Software Engineer at MathWorks, Technical Support.** 10/16 – 03/17  
Advertised internal and external clients on the development of software solutions and applications using the computing software MATLAB and Simulink.

## GRANTS, FELLOWSHIPS, AWARDS

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### Grants

- 1. Planning and Dissemination Grant – Institute Community Support, Canadian Institutes of Health Research.** 08/24  
\$20000  
Title: *Advancing bone and joint research with an open-source image analysis toolkit.*  
Role: Co-applicant.  
Team: Sarah Mankse, Danielle Whittier, Andrew Burghardt, Kathryn Stok, Michael Kuczynski, Serena Bonaretti, Steven Boyd.  
Status: **Funded.**
- 2. A-MEDICO, University of Calgary.** 04/23 – 08/23  
\$77200  
Title: *Developing a novel tool for non-invasive vertebral strength assessment at the*

*spine based on computed tomography.*

Role: Grant writing.

Team: Steven Boyd.

Status: **Funded.**

3. **Alberta Spine Foundation Grant, University of Calgary.** 01/25 – 12/26  
*Developing a machine learning model of the spine for clinical applications from computed tomography.* \$75000  
Role: Grant writing.  
Team: Steven Boyd, Ganesh Swamy, Fred Nicholls, Peter Salat, Carrie Ye, Michael Monument.  
Status: **Funded.**

### Scholarships and fellowships

1. **Achievers in Medical Science Postdoctoral Fellowship, University of Calgary.** 05/26 – 04/28  
*Developing CT-based Radiomics and Finite Element Analysis for Metastatic Bone Disease in Advanced Cancer Patients Treated with Immune Checkpoint Inhibitors.* \$140000
2. **Alberta Innovates Postdoctoral Fellowship, University of Calgary.** 10/23 – 05/26  
Title: *Enhanced digital analysis of bone remodelling to understand the effects of high-dose vitamin D supplementation.* \$140000
3. **Marie Skłodowska-Curie Action (MSCA) Horizon 2020, ETH Zürich.** 01/20 – 10/23  
Title: *Innovative training network for research into bone fragility in diabetes in Europe – towards a personalised medicine approach.* FIDELIO (EU 860989). €187000
4. **Swiss-European mobility programme SEMP Erasmus+, ETH Zürich.** 08/18 – 12/18  
Title: *Development of an in vivo mouse model of vertebral defects combined with time-lapsed micro-CT imaging and real-time micro-finite element analysis.* CHF 2200
5. **MATLAB Student Ambassador scholarship, MathWorks Germany.** 04/18 – 07/19  
MATLAB student ambassador scholarship honouring leadership of the student group *STUDLab.* € 3600

### Awards

1. **Bridging Overseas Networking and Exchange (B.O.N.E) Program, ANZBMS 2025.** 11/25  
*Bone Health in Microgravity: Tracking Bone Remodelling in Spaceflight and Recovery* AUD-\$ 5000
2. **ETH Medal for outstanding doctoral thesis, 2024.** 11/2024  
Awarded to the top 8% of graduates at ETH Zurich. CHF 2000
3. **Young investigator award, ASBMR 2024.** 09/24  
Investigating the Time-Dependent Recovery of Spaceflight-Induced Bone Resorption in Astronauts. US-\$ 1000
4. **Hartmut H. Malluche early career investigator award, ISBM 2024.** 10/24  
Investigating the Time-Dependent Recovery of Spaceflight-Induced Bone Resorption in Astronauts. US-\$ 1500
5. **Special training opportunities fund, McCaig Institute, University of Calgary.** 08/23  
*Workshop on open data in musculoskeletal imaging.* Role: awardee C-\$1000
6. **Best poster award, 26th congress of the European Society of Biomechanics.** 07/20  
*Plate and Rod networks describe load transfer in trabecular bone.* €300

**Original articles**

1. B.E. Matheson, **M. Walle**, A.R. Bugbird, M. Rosenberg, J. Mateus, S.K. Boyd. *Early skeletal deteriorations following short-duration spaceflight*. npj Microgravity, 2026.
2. S. Ziolkowski, B.E. Matheson, S.K. Boyd, **M. Walle**, J. Gill, J. Walker, T. Salopek, J.F. Baker, A. Fettahoglu, C. Ye. *Association of immune checkpoint inhibitors with muscle mass and density in patients with melanoma*. Journal for Immuno-Therapy of Cancer (submitted, 2025).
3. **M. Walle**, B.E. Matheson, S.K. Boyd, *Comparing linear and nonlinear finite element models of vertebral strength across the thoracolumbar spine: a benchmark from density-calibrated computed tomography*. GigaScience, 14:giaf094, 2025.
4. B.E. Matheson, **M. Walle**, L. Gabel, D.E. Whittier, A. Liphardt, P.A. Hulme, M. Heer, S.R. Zwart, S.M. Smith, J.D. Sibonga, S.K. Boyd. *Recovery of bone microarchitecture and density four years after spaceflight: two case studies*. npj Microgravity, 2025.
5. V.B. Kassey, **M. Walle**, J. Egan, D. Yeritsyan, I. Beeram, Y. Wu , B.D. Snyder, E.K. Rodriguez, J.L. Ackerman, A. Nazarian. *Using solid-state MRI and a double-tuned RF coil to quantify bone matrix and mineral densities in rat bones*. Journal of Magnetic Resonance, 2025.
6. A.R. Bugbird, B.E. Matheson, **M. Walle**, N.J. Neeteson, N. Pavlovic, C.E. Stirling, D.E. Whittier, and S.K. Boyd. *Quantifying Localized Bone Loss in Clinical Computed Tomography using Void Spaces*. JBMR, 2025.
7. D.E. Whittier, **M. Walle**, P.R. Atkins, C.J. Collins, M.A. Zumstein, P. Christen, K. Lippuner, R. Müller. *Structural alterations during fracture healing lead to void spaces developing in surrounding bone microarchitecture*. JBMR, 2025.
8. **M. Walle**, L. Gabel, D.E. Whittier, A. Liphardt, P.A. Hulme, M. Heer, S.R. Zwart, S.M. Smith, J.D. Sibonga, S.K. Boyd. *Tracking of spaceflight-induced bone remodeling reveals a limited time frame for recovery of resorption sites in humans*. Science Advances.
9. **M. Walle**, D. Yeritsyan, M. Abbasian, R. Oftadeh, R. Müller, A. Nazarian. *A graph model to describe the network connectivity of trabecular plates and rods*. Front. Bioeng. Biotechnol., 2024.
10. **M. Walle**, A. Duseja, D.E. Whittier, T. Vilaca, M. Paggiosi, R. Eastell, R. Müller, C.J. Collins. *Bone remodeling and responsiveness to mechanical stimuli in individuals with type 1 diabetes mellitus*. JBMR, 2024.
11. V. B. Kassey, **M. Walle**, J. Egan, D. Yeritsyan, I. Beeram, Y. Wu , B.D. Snyder, E.K. Rodriguez, J.L. Ackerman, A. Nazarian. *Quantitative 1H magnetic resonance imaging on pathologic rat bones by solid-state 1H ZTE sequence with water and fat suppression*. Journal of Magnetic Resonance Imaging, JMRI, 2024.
12. V.B. Kassey, **M. Walle**, J. Egan, D. Yeritsyan, I. Beeram, Y. Wu , B.D. Snyder, E.K. Rodriguez, J.L. Ackerman, A. Nazarian. *Quantitative 31P Magnetic resonance imaging on pathologic rat bones by ZTE sequence at 7T*. Bone, 2024.
13. D.E. Whittier\*, **M. Walle**\*, D. Schenk, P.R. Atkins, C.J. Collins, P. Zysset, K. Lippuner, R. Müller. *A multi-stackregistration technique to improve measurement accuracy and precision across longitudinal HR-pQCT scans*. Bone, 2023. (\*equal contribution).
14. **M. Walle**, D.E. Whittier, D. Schenk, P.R. Atkins, P. Christen, M. Blauth, P. Zysset, K. Lippuner, R. Müller, C.J. Collins. *Precision of bone mechanoregulation assessment using longitudinal HR-pQCT*. Bone, 2023.
15. F.C. Marques, D. Boaretti, **M. Walle**, A.C. Scheuren, F.A. Schulte, R. Müller. *Mechanostat parameters estimated from time-lapsed in vivo micro-computed tomography data of mechanically driven bone adaptation are logarithmically dependent on loading frequency*. Front. Bioeng. Biotechnol, 2023.
16. **M. Walle**, D. Eggemann, P.R. Atkins, J.J. Kendall, K. Stock, R. Müller, C.J. Collins. *Motion grading of high-resolution quantitative computed tomography supported by deep convolutional neural networks*. Bone, 2022.
17. **M. Walle**, D.E. Whittier, M. Frost, R. Müller, C.J. Collins. *Meta-analysis of diabetes mellitus-associated differences in bone structure assessed by high-resolution peripheral quantitative computed tomography*. Curr. Ost. Rep., 2022.
18. **M. Walle**, F.C. Marques, N. Ohs, M. Blauth, R. Müller and C.J. Collins. *Bone mechanoregulation allows subject-specific load estimation based on time-lapsed micro-CT and HR-pQCT in Vivo*. Front. Bioeng. Biotechnol., 2021.

19. A. Malhotra, **M. Walle**, G.R. Paul, G.A. Kuhn and R. Müller. *Application of subject-specific adaptive mechanical loading for bone healing in a mouse tail vertebral defect*. Sci. Rep., 2021.

### Book chapters

1. **M. Walle**, B.E. Matheson, S.K. Boyd, *Quantitative outcomes from computed tomography: Technical challenges and clinical advances*. In L. Cardoso, J.-F. Ganghoffer, & M.B. Schaffler (Eds.), *Biomechanics and mechanobiology of bone: From model to patient* (Chapter 5.4). Springer. (in submission).

### Original articles in submission (manuscripts can be provided on request)

1. V.B. Kasse, **M. Walle**, J. Egan, D. Yeritsyan, I. Beeram, Y. Wu, B.D. Snyder, E.K. Rodriguez, J.L. Ackerman, A. Nazarian. *A MATLAB-based post-processing algorithm for 1H and 31P MRI data analysis*. *Magnetic Resonance in Medical Sciences* (submitted, 2025).

### INVITED RESEARCH TALKS

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1. **M. Walle**. *Bone Health in Microgravity: Tracking Bone Remodelling in Spaceflight and Recovery*. 35th Australian and New Zealand Bone and Mineral Society Annual Scientific Meeting. Cairns, Australia 11/2025.
2. **M. Walle**. *Mechanoregulation of bone remodelling in diabetes using HR-pQCT in vivo patient data*. Invited Speaker, 50th Annual European Calcified Tissue Society Congress (ECTS 2023), Open Forum: type 1 and 2 diabetes and bone health - results from the FIDELIO research training network, Liverpool, UK, 05/2023.

### PEER-REVIEWED CONFERENCE ABSTRACTS

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#### Oral podium presentations

1. M.T. Kuczynski, C. McMillan, **M. Walle**, S.K. Boyd, L. Gabel, D.E. Whittier. *Comparison between density-based and homogeneous finite element models in adolescent HR-pQCT scans*. 20th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering. Sept. 3-5, 2025, Barcelona, Spain.
2. C. McMillan, M. Kuczynski, **M. Walle**, S.K. Boyd, L. Gabel, D. Whittier. *Childhood obesity alters tibial load distribution and mechanical adaptation of bone microarchitecture*. 20th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering. Sept. 3-5, 2025, Barcelona, Spain.
3. B.E. Matheson, **M. Walle**, C. Ye, S.K. Boyd. *Investigating bone density and strength across sex and age using machine learning and finite element modeling*. The European Society of Biomechanics. Zürich, Switzerland, July 6-9, 2025.
4. B.E. Matheson, **M. Walle**, L. Gabel, A. Liphardt, P.A. Hulme, M. Heer, S.R. Zwart, S.M. Smith, J.D. Sibonga, S.K. Boyd. *Recovery of Bone Microarchitecture and Density Four Years After Spaceflight*. The European Society of Biomechanics. Zürich, Switzerland, July 6-9, 2025.
5. **M. Walle**, L. Gabel, D.E. Whittier, A. Liphardt, P.A. Hulme, M. Heer, S.R. Zwart, S.M. Smith, J.D. Sibonga, S.K. Boyd. *Investigating the time-dependent recovery of spaceflight-induced bone resorption in astronauts*. 16<sup>th</sup> Congress of the International Society of Bone Morphometry, Toronto, ON, Canada, October 3-6, 2024.
6. **M. Walle**, L. Gabel, D.E. Whittier, A. Liphardt, P.A. Hulme, M. Heer, S.R. Zwart, S.M. Smith, J.D. Sibonga, S.K. Boyd. *Investigating the time-dependent recovery of spaceflight-induced bone resorption in astronauts*. ASBMR, Toronto, ON, Canada, September 27-30, 2024.
7. **M. Walle**, L. Gabel, D.E. Whittier, A. Liphardt, P.A. Hulme, M. Heer, S.R. Zwart, S.M. Smith, J.D. Sibonga, S.K. Boyd. *Timelapsed HR-pQCT of local remodelling sites reveals coupling of bone formation and resorption sites during spaceflight and recovery of Earth*. The 24th International Workshop on Quantitative Musculoskeletal Imaging, The Barossa Valley, South Australia November 3-8, 2024.
8. **M. Walle**, D.E. Whittier, S.K. Boyd, R. Müller and C. J. Collins. *Measuring bone remodelling in vivo: does voxel size really matter?* Annual Alberta Biomedical Engineering Conference 2023, Banff, Alberta, Canada, 2023.

9. **M. Walle**, D. Eggemann, P.R. Atkins, K. Stock, R. Müller, C.J. Collins. *Integration of artificial intelligence into diagnostic imaging: convolutional neural network-supported HR-pQCT visual grading*. 9th World Congress of Biomechanics, July 10-14, 2022, Taipei, Taiwan.
10. P. Y. Steiner, **M. Walle**, M. Rigotti, D.E. Whittier, C. McLennan, P. R. Atkins, R. Müller, C. J. Collins. *Correction of motion artefacts in HR-pQCT using cycle-consistent adversarial networks*. Abstracts 27th Congress of the European Society of Biomechanics, Porto, Portugal, June 26-29, 2022.
11. D.E. Whittier, **M. Walle**, P. Christen, P.R. Atkins, C. Collins, M. Blauth, K. Lippuner, R. Müller. *Changes in loading during fracture healing do not impact bone microarchitecture of the unfractured wrist*. Abstracts 27th Congress of the European Society of Biomechanics (ESB), Porto, Portugal, June 26-29, 2022.
12. **M. Walle**, D.E. Whittier, C. Weidlich, D.O. Windisch, P.R. Atkins, P. Christen, M. Blauth, K. Lippuner, R. Müller, C.J. Collins. *Time-lapsed HR-pQCT allows monitoring local bone remodelling events at various follow-up time-points in vivo*. The 23rd International Workshop on Quantitative Musculoskeletal Imaging, June 13-17, 2022, Noordwijk, Netherlands.
13. **M. Walle**, F.C. Marques, N. Ohs, M. Blauth, R. Müller and C. J. Collins. *Bone mechanoregulation allows subject-specific in vivo estimation of microstructural tissue loading history*. 26th Congress of the European Society of Biomechanics, July 11-14, 2021, Milan, Italy.

### Flash podium/hybrid presentations

1. D.E. Whittier, **M. Walle**, C. Ledoux, P.R. Atkins, C.J. Collins, J.A. Holtmann, M.A. Zumstein, P. Christen, K. Lippuner, R. Müller. *fracture healing leads to localized structural bone loss quantified using void space analysis*. Abstracts ASBMR 2023 Annual Meeting, Vancouver, Canada, J. Bone Miner. Res., 2023.
2. **M. Walle**, D.E. Whittier, D. Schenk, M. Blauth, P. Zysset, K. Lippuner, R. Müller, C.J. Collins. *In vivo repeatability of bone mechanoregulation assessment using longitudinal high-resolution peripheral quantitative computed tomography*. Abstracts 50th Annual European Calcified Tissue Society Congress, Liverpool, UK, 05/15-18, JBMR Plus: Volume 7, Issue S3, 2023.
3. D.E. Whittier, **M. Walle**, C. Ledoux, J. Holtmann, C.J. Collins, K. Lippuner, R. Müller. *Early bone remodelling during fracture healing measured by HR-pQCT is a determinant of long-term bone mineral density*. Abstracts 50th Annual European Calcified Tissue Society Congress, Liverpool, UK, 05/15-18, JBMR Plus: Volume 7, Issue S3, 2023.
4. **M. Walle**, D. Whittier, R. Müller, C.J. Collins. *HR-pQCT measures of bone microarchitecture in type 1 and type 2 diabetes mellitus: systematic review and meta-analysis*. European Calcified Tissue Society Congress 2022, 07-10 May, 2022, Helsinki, Finland.
5. **M. Walle**, M. Abbasian, D. Yeritsyan, R. Oftadeh, A. Nazarian. *plate and rod networks describe load transfer in trabecular bone*. 26th Congress of the European Society of Biomechanics, July 11-14, 2021, Milan, Italy.
6. **M. Walle**, F. C. Marques, N. Ohs, R. Müller, and C. J. Collins. *3D physiological load estimation based on time-lapsed HR-pQCT images*. Abstracts ASBMR 2020 Annual Meeting, Seattle, USA, J. Bone Miner. Res., 2020.

### Poster presentations

1. S. Ziolkowski, B. Matheson, **M. Walle**, A. Fettahoglu, J. Gill, S. Boyd, C. Ye. *Assessing the effects of immune checkpoint inhibitors and pretreatment kidney function on muscle mass and density*. American Society of Nephrology (ASN) Kidney Week 2025. 10/29–11/2, 2025. Houston, TX.
2. **M. Walle**, B. Matheson, A. Abbott, C. Ye, M. Monument, S.K. Boyd. *Non-invasive automatic assessment of vertebral strength in cancer patients with and without bone metastasis*. ASBMR, Toronto, ON, Canada, September 27-30, 2024.
3. **M. Walle**, A. Duseja, D.E. Whittier, T. Vilaca, M. Paggiosi, R. Eastell, R. Müller, C.J. Collins. *Bone remodelling and responsiveness to mechanical stimuli in type 1 diabetes mellitus: the role of neuropathy*. Abstracts ASBMR 2023 Annual Meeting, Vancouver, Canada, J. Bone Miner. Res., 2023.
4. V. Kasey, **M. Walle**, J. Egan, D. Yeritsyan, Y. Wu, B.D. Snyder, E.K. Rodriguez, J.L. Ackerman and A. Nazarian. *A versatile MRI post-processing package with graphical user interface in MATLAB*. 63rd ENC, April 24-29, 2022, Orlando, Florida, USA.

5. **M. Walle**, D. Eggemann, P.R. Atkins, K. Stock, Müller, C.J. Collins. *Operator-independent characterisation of image quality in HR-pQCT scans using a fully automated convolutional neural network-based classification method*. ORS 2022 Annual Meeting, February 4 – 8, 2022, Tampa, Florida, USA.
6. V. Kassey, **M. Walle**, J. Egan, D. Yeritsyan, Y. Wu, B. Snyder, E. Rodriguez, J. Ackerman, A. Nazarian. *A combined solid-state 1H and 31P magnetic resonance imaging to assess bone mineral and matrix densities in rat bones*. Abstracts 2021 ISMRM & SMRT Annual Meeting, International Society for Magnetic Resonance in Medicine.
7. D. Eggemann, **M. Walle**, P. Atkins, K. Stock, R. Müller, and C. J. Collins. *Operator-independent characterization of image quality in HR-pQCT scans using a fully automated convolutional neural network-based classification method*. Abstracts ASBMR 2021 Annual Meeting, Toronto, Canada, J. Bone Miner. Res., 2021.
8. **M. Walle**, F. C. Marques, N. Ohs, M. Blauth, R. Müller and C. J. Collins. *Tissue-level mechanical stimuli drive bone formation and resorption in humans and mice*. Digital Congress of the European Calcified Tissue Society, 05/6-8, 2021, online.

#### Abstracts in submission

1. B.E. Matheson, **M. Walle**, C. Ye, S.K. Boyd. *From Incidental to Intentional: Unlocking Bone Health Insights from Routine CT Data*. Radiological Society of North America Annual Meeting 2025. Nov. 30 – Dec. 4, 2025, Chicago, USA. *Submitted*.
2. V.E. Castronuovo, B.E. Matheson, **M. Walle**, S.K. Boyd. *Comparison of Bone Mineral Density Measurements Using Internal and Asynchronous Calibration Methods*. 26th Annual Alberta Biomedical Engineering Conference. 10/24-24, 2025.
3. S. Elmahdy, M.T. Kuczynski, A. Bugbird, **M. Walle**, S.L. Manske, D.E. Whittier. *Local adaptive thresholding improves hand bone segmentation accuracy from HR-pQCT*. 26th Annual Alberta Biomedical Engineering Conference. Oct. 24-26, 2025, Canmore, AB.

#### TEACHING EXPERIENCE

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| 1. <b>Lecturer, OsNET Summer School 2025, University of Calgary.</b>   | 06/25-06/25   |
| Preparation, implementation and instruction of the first OsNET summer school. Responsible for delivering 2 lecture sessions (40 Students).   |               |
| 2. <b>Senior teaching assistant, Imaging and Computing in Medicine, ETH Zürich.</b>  | 03/20 – 09/23 |
| Preparation, implementation and instruction of six flipped classroom sessions, co-supervision and coordination of undergraduate tutors, and managing the course moodle page (200 students).      |               |
| 3. <b>Examiner, Orthopaedic Biomechanics, ETH Zürich.</b>  | 09/21 – 12/21 |
| Oral examination of bachelor students on topics in mechanical and structural engineering of the musculoskeletal system alongside the analysis and design of orthopaedic solutions (50 students). |               |
| 4. <b>Teaching assistant, Principles of Modern Information Technology I and II, TU Munich.</b>   | 10/16 – 03/17 |
| Developed and presented exercises on modern information technology to engineering students (800 students).   |               |

#### Guest lectures

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| 1. <b>M. Walle.</b> <i>Modelling and simulations</i> . Guest lecture, Medical Imaging Applications (MDSC 689.11), University of Calgary, Calgary, Canada.  | 03/24 |
| 2. <b>M. Walle.</b> <i>Bones under pressure: how mechanical forces influence bone remodelling in diabetes</i> . Guest lecture, Mechanobiology (ME 602), Boise State University, Boise, Idaho, USA. | 11/23 |

## ADVISORY AND SUPERVISORY RESPONSIBILITIES

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### Teaching assistants

1. **V. Tütsch**, M.Sc. Health Sciences and Technology, ETH Zürich. 02/21 – 05/22
2. **D. Windisch**, M.Sc. Health Sciences and Technology, ETH Zürich. 02/21 – 05/22
3. **V. Kecheliev**, M.Sc. Health Sciences and Technology, ETH Zürich. 02/21 – 05/22
4. **A. Arizzi**, M.Sc. Health Sciences and Technology, ETH Zürich. 02/21 – 05/21
5. **J. Kendall**, M.Sc. Mechanical Engineering, ETH Zürich. 02/21 – 05/21

### Scientific supervision

1. **M. Kamphuis**. *Human bone mechanoregulation based on high-resolution quantitative computed tomography*. Research Internship, MSc Biomedical Engineering, University of Technology Eindhoven. 05/22 – 08/22
2. **M. Marzetta**. *An automated registration approach for multi-stack time-lapsed imaging using high-resolution peripheral quantitative computed tomography*. Bachelor Thesis, B.S. Computational Science and Engineering, ETH Zürich. 03/22 – 09/22
3. **D. Windisch**. *In vivo repeatability of time-lapsed bone remodelling analysis of the distal radius and tibia*. Research Internship, M.S. Health Sciences and Technology, ETH Zürich. 02/22 – 05/22
4. **C. Weidlich**. *Validation of mechanoregulation methods of human studies: impact of cortical and trabecular segmentation*. Master Thesis, M.S. Mechanical Engineering, ETH Zürich. 10/21 – 05/22
5. **A. Sachan**. *Agent-based simulations of the effects of treatment on diabetic vs non-diabetic bone*. Bachelor Thesis, B.Tech., IIT Bombay, India. 08/21 – 05/22
6. **D. Windisch**. *Automated mechanoregulation pipeline for human studies: image registration module*. Practical Internship, M.S. Health Sciences and Technology, ETH Zürich. 10/21 – 02/22
7. **J. Heim**. *Quality control of HR-pQCT based bone mechanoregulation analysis*. Semester Project, M.S. Biomedical Engineering, ETH Zürich. 07/21 – 10/21
8. **P. Steiner**. *Suppression of subject motion induced artefacts in HR-pQCT scans using deep neural networks*. Master Thesis, M.S. Mechanical Engineering, ETH Zürich. 06/21 – 12/21
9. **A. Sachan**. *Multiphysics simulations of diabetic bone and procedure for inclusion of new pathways*. Research Internship, B.Tech. IIT Bombay, India, ETH Zürich. 05/21 – 07/21
10. **C. Weidlich**. *Digital biopsy representative region extraction in human radii*. Semester Project, M.S. Mechanical Engineering, ETH Zürich. 02/21 – 05/21
11. **D. Eggemann**. *Characterisation of image quality in HR-pQCT scans using a deep-learning-based classification method*. Semester Project, M.S. Electrical Engineering, ETH Zürich. 02/21 – 06/21

## ACADEMIC CITIZEN- AND LEADERSHIP

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### Institutional service

- Committee member**, OsNET Summer School Planning Committee, University of Calgary. 24-25
- Chair**, International Society of Bone Morphometry (ISBM) Young investigator Committee. 24-Present
- Committee member**, Foothills Postdoc Council, University of Calgary. 24-Present
- Postdoc representative**, McCaig Trainee Committee, University of Calgary. 24-Present
- Community member**, Open and Reproducible Musculoskeletal Imaging Research Community (ORMIR) 23-Present

**HubLE editor**, International Federation of Musculoskeletal Research Societies (IFMRS) 22-Present  
**Committee member**, International Society of Bone Morphometry (ISBM) Young Investigator Committee. 22-24

### Active professional society memberships

Engineer in Training (E.I.T.) Professional Engineers of Alberta (APEGA) 25-Present  
 European Society of Biomechanics (ESB) 20-24  
 European Calcified Tissue Society (ECTS) 20-24  
 American Society of Bone and Mineral Research (ASBMR) 20-Present  
 International Society of Bone Morphometry (ISBM) 23-Present

### Peer review contributions

Bone (IF 2024: 4.1) 23-Present  
 Nature Communications (IF 2024: 16.6) 23-Present  
 Frontiers in Endocrinology (IF 2024: 5.6) 23-Present  
 The Journal of Bone and Mineral Research (IF 2023: 6.2) 22-Present  
 Annals of Biomedical Engineering (IF 2022: 3.8) 22-Present

### Other leadership roles

**Selection Committee**, Dr. Jon Meddings Leadership Awards, 2024, University of Calgary. 11/24  
**Poster judge**, 16th Annual Leaders in Medicine Symposium, University of Calgary. 11/24  
**Junior session moderator**, Clinical Bone Imaging, 16<sup>th</sup> Congress of the International Society of Bone Morphometry 2024, Toronto, ON, Canada 09/24  
**Abstract judge**, Summer Student Symposium 2024, McCaig Institute, University of Calgary. 07/24  
**Session moderator**, T. Chen Fong fellow and resident presentations. Department of Radiology, University of Calgary, research day 2024 05/24  
**Oral presentation judge**, Dr. Marvin Fritzler Nidus Award 2024. McCaig Institute Research Day, University of Calgary. 04/24  
**Poster judge**, Cumming School of Medicine Research Day, University of Calgary, 2024. 05/24

### Professional development and training activities

**Sharing and curating open data in musculoskeletal imaging research** (4 days). 01/24  
 2<sup>nd</sup> workshop of the open and reproducible musculoskeletal imaging research (ORMIR) community.  
**Fundamentals of mechanical testing and computational modelling of bone** (4 days). 02/22  
 University Medical Center, Hamburg-Eppendorf, Germany.  
**Basics of RNA isolation using spin column-based extraction kits** (4 days). 04/22  
 Qiagen, Hilden, Germany.  
**Scientific writing course** (3 days). 02/22  
 University of Southern Denmark, Odense, Denmark.  
**Computing on a scientific cluster & writing fast(er) Python code workshops** (4 days). 11/21  
 Scientific IT Services, ETH Zürich, Switzerland.  
**Summer school biomedical imaging** (10 days). 09/21  
 ETH Zürich, Switzerland.  
**Professional development programme** (5 days) 03/21  
 on collaboration, leadership, innovation, public and patient engagement, presentation skills. Tesselle Development, Sheffield, United Kingdom.

<b>Developing scientific writing skills at doctoral level</b> (1 day). Dr. Simon Milligan, University of Zürich, ETH Zürich, Switzerland.	09/20
<b>How to critically appraise real-world evidence in medicine</b> (1 day). Dr. Andrea Burden, ETH Zürich, Switzerland.	12/20
<b>Invigilating online examinations</b> (1 day). Sandra Hundseder, ETH Zürich, Switzerland.	08/20
<b>Think ahead summer school on research communication and implicit bias</b> (2 days). Tesselle Development, Sheffield, United Kingdom.	07/20
<b>Design to value and negotiation strategy</b> (2 days). McKinsey, Munich, Germany.	06/18
<b>Soft skills workshop</b> (3 days). Center of Key Competencies, TU Munich, Germany.	09/13

#### Research engagement activities (presentations for research, industry, and clinical audiences)

1. B.E. Matheson, <b>M. Walle</b> , S.K. Boyd. <i>Early Skeletal Deteriorations Following Short-Duration Spaceflight: Insights from the Polaris Dawn Program. Polaris Dawn Research Day 2025, 2025-04-06, Houston, TX, USA.</i>	04/5
2. <b>M. Walle</b> . <i>Advanced Bone Health Analysis through Integrated AI and Virtual Bone Strength Testing using CT Imaging.</i> Radiotherapy lecture series, University of Calgary, Calgary, Canada, 2025.	04/25
3. <b>M. Walle</b> . <i>Non-invasive automatic assessment of vertebral strength in cancer patients with and without bone metastasis.</i> Department of Radiology Research Day, University of Calgary, Calgary, Canada, 2024.	05/24
4. <b>M. Walle</b> . <i>Bones under pressure: how mechanical forces influence bone remodelling in diabetes.</i> McCaig Seminar Series 2023-24, Calgary, Canada.	11/23
5. <b>M. Walle</b> . <i>Please don't move: assessing and addressing motion challenges in high-resolution CT imaging in vivo with deep learning.</i> Advanced Medical Imaging Seminar Series 2023-24, Calgary, Canada.	10/23
6. <b>M. Walle</b> . <i>Are bones with diabetes less responsive to mechanical loading?</i> FIDELIO Annual meeting 2023, Sheffield, UK.	04/23
7. <b>M. Walle</b> . <i>Advanced computational tools for HR-pQCT image analysis.</i> FIDELIO Annual meeting 22, Dresden, Germany.	06/22
8. <b>M. Walle</b> . <i>Mechanoregulation of bone remodelling in diabetes mellitus.</i> Colloquium in Biomechanics, ETH Zürich, Switzerland.	05/22
9. <b>M. Walle</b> . <i>Please don't move: Motion artefacts during HR-pQCT scanning.</i> Colloquium in Biomechanics, ETH Zürich, Switzerland.	11/21
10. <b>M. Walle</b> . <i>Mechanoregulation of bone remodelling in type 2 diabetes using HR-pQCT in vivo patient data.</i> Invited speaker, FIDELIO Annual meeting 21, online.	07/21
11. <b>M. Walle</b> . <i>Physiological load estimation based on time-lapsed HR-pQCT images.</i> Colloquium in Biomechanics, ETH Zürich, Switzerland.	04/21

#### OUTREACH

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1. G. Meyer, A. Liphardt, and <b>M. Walle</b> . <i>What Space Missions Teach Us About Bone Loss.</i> North German Broadcasting (NDR Info – Science), <a href="#">Interview</a> (original language: German).	01/25
2. G. Meyer, A. Liphardt, and <b>M. Walle</b> . <i>Hard Work in Space and Heavenly Highlights 2025.</i> Deutschlandradio (Research Today), <a href="#">Interview</a> (original language: German).	01/25
3. <b>M. Walle</b> . <i>Bone Health Research - Navigating a Difficult 'Joint' Venture.</i> Humour us! Knowledge Translation Through Comedy Competition. University of Calgary (Winner: 200 C-\$ prize)	09/24

4. R. Mitchell and **M. Walle**, *Effects of microgravity on bone health*. Interview for the Minority Introduction to Engineering, and Science at the Massachusetts Institute of Technology (MIT MITES). 07/24
  5. **M. Walle**. *Time-lapsed HR-pQCT and bone mechanoregulation*. FIDELIO webinar, [YouTube.com](https://www.youtube.com). 12/22
  6. **M. Walle** and D. Carro-Vazquez. *Effect of denosumab on circulating microRNAs after 2 years of treatment in postmenopausal women*. HubLE exchange interview, international federation of musculoskeletal research, [huble.org](https://huble.org). 05/22
  7. **M. Walle** and L. Emini. *Characterizing the bone phenotype of a polygenetic mouse model of type 2 diabetes*. HubLE exchange interview, international federation of musculoskeletal research, [huble.org](https://huble.org). 05/22
  8. **M. Walle**. *Mechanobiology in diabetes patients*. Project video, [YouTube.com](https://www.youtube.com). 02/22
  9. **Scientifica**: Zurich Science Days. Demonstration and tour through the laboratory for bone biomechanics to give young children and teenagers insights into simulations of cellular processes in bone, [scientificach.ch](https://scientificach.ch). 09/21
  10. C. Ledoux, **M. Walle**, R. Müller, C.J. Collins. *Insights into bone processes*. The Globe article, [ethz.ch](https://ethz.ch). 09/21
  11. Andreasen C. Møller and **M. Walle**. *Tissue-level mechanical stimuli drive bone formation and resorption in humans and mice*. HubLE exchange interview, international federation of musculoskeletal research, [huble.org](https://huble.org). 06/21
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