

# Curriculum Vitae

26.3.2021

## PERSONAL INFORMATION

Full name: Petro Kalle Tapani Julkunen  
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Date of birth: 11 June 1980  
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## TITLES, EDUCATION AND ACADEMIC DEGREES

2020 Medical Physics Expert in the field of industry, research and education, Finnish radiation authority (Säteilyturvakeskus)

2019 Qualified radiation protection officer in the field of industry, research and education, AEL

2019 Bachelor-level studies on leadership and economics, University of Eastern Finland, 30 ECTS

2016 Professor in Neuromuscular Biomechanics and Imaging, Faculty of Science and Forestry, University of Eastern Finland

2014 Specialist Medical Physicist in Clinical Neurophysiology (European Federation of Medical Physicists, Policy Statement 12), registered by Finnish Association of Medical Physicists

2009 Title of Docent (Field: Medical physics / neurophysiology physics), University of Kuopio (now University of Eastern Finland), Department of Applied Physics, Kuopio, Finland

2009 Medical Physicist / Medical Physics Expert (registered by National Supervisory Authority for Welfare and Health, Valvira), University of Kuopio, Kuopio, Finland

2008 Doctor in Philosophy (Medical physics), University of Kuopio, Kuopio, Finland  
*Thesis: "Relationships between Structure, Composition and Function of Articular Cartilage – Studies based on Fibril Reinforced Poroviscoelastic Modeling"*

2004 Master in Science in Engineering (Biomedical engineering), Tampere Technology, Tampere, Finland, *Thesis: "Implementation, optimization and application of fibril reinforced poroviscoelastic model for articular cartilage"*

1999 Undergraduate of Porin Suomalaisen yhteislyseon lukio, Pori, Finland

## LINGUISTIC SKILLS

Mother tongue: Finnish

Other languages: English (fluent), Swedish (fair skills), German (basics)

## CURRENT POSITION

- since 2021 Chief physicist, Diagnostic Imaging Center, Kuopio University Hospital, Kuopio, Finland
- since 2016 Professor of Neuromuscular Biomechanics and Imaging, Faculty of Science and Forestry, University of Eastern Finland
- since 2015 Entrepreneur, Medical Physics Expert, Radiation Safety Expert, Tmi Petro Julkunen, Kuopio (webpage: <https://fyysikkopi.fi>)

## PREVIOUS WORK EXPERIENCE

- 2008, 2011, 2014 Consultant, Nexstim Oy, Helsinki, Finland
- 2010–2021 Assistant chief physicist, Diagnostic Imaging Centre, Department of Clinical Neurophysiology, Kuopio University Hospital, Kuopio, Finland
- 2008–2010 Medical Physicist, Diagnostic Imaging Centre, Department of Clinical Neurophysiology, Kuopio University Hospital, Kuopio, Finland
- 2004–2008 Specializing medical physicist, Diagnostic Imaging Centre, Department of Clinical Neurophysiology, Kuopio University Hospital, Kuopio, Finland
- 2005 Visiting researcher, Department of Biomedical Engineering, Eindhoven University of Technology, Eindhoven, The Netherlands
- 2005–2006 Researcher, Department of Applied Physics, University of Kuopio, Kuopio, Finland

## MOST RECENT RESEARCH FUNDING

- 2019–2023 Academy of Finland, 600000 € (300000 € as consortium partner) for consortium project “Biophysical and biological correlates of pain and dysfunction in osteoarthritis”, as consortium lead and principal investigator
- 2018–2019 Nexstim Plc and University of Eastern Finland, R&D funding, 43651€ for project “rTMS pain therapy project – quantitative prediction of treatment efficacy”, as principal investigator
- 2017 State research fund, 46015 € for project “Neuromuscular and biomechanical changes after knee surgery”, as principal investigator
- 2015-2016 Cancer Society of Finland, 55000 € for project “Radiotherapy-induced functional changes in motor cortex”, as principal investigator
- 2015 State research fund, 82920 € for projects “Radiotherapy-induced functional changes in motor cortex” and “Impairment and recovery of motor cortical connections in stroke”, as principal investigator
- 2014 State research fund, 26067 € for project “Connecting pathways between cortical areas in healthy and damaged brain”, as principal investigator
- 2013 State research fund, 24080 € for post-doc funding for project “Assessment of motor cortex structure and function by navigated transcranial magnetic stimulation”, as principal investigator
- 2012 State research fund, 41988 € for project “Revealing cortical connectivity through inhibitory and excitatory circuits of the brain”, as principal investigator

- 2012 European Research Council, 1303056 € for project “Evaluation of Osteoarthritis Progression in a Patient-Specific Manner using Magnetic Resonance Imaging and Computational Modeling (OAPROGRESS)”, as research group member, PI Prof. R Korhonen
- 2012 Orion-Farmos research fund, 20000 € for project “Aivokuoren inhiboivien välineuronien puoliero aivohalvauksen kuntoutumisennusteen mittarina”, as principal investigator

## SUPERVISING OF ACADEMIC THESES AND STUDIES

- 11 Master of Science theses: J Marjanen 2008; M Mononen 2009; M Mikkola 2010; J Iivarinen 2010; P Tanska 2012; R Lasanen 2012; K Salo 2014; M Pitkänen 2014; A Mohammadi 2018; K Lepková 2020; A Lowe 2020; S Alawi 2021 (on-going).
- 3 Doctoral theses (PhDs) in Medicine: N Danner 2012; O Löfberg 2019; J Sirkka (on-going)
- 13 Doctoral theses (PhDs) in Medical Physics: M Mononen 2013; J Iivarinen 2014; R Lasanen 2015; E Kallioniemi 2016; P Tanska 2016; M Pitkänen 2018; J Saari (on-going); D Nguyen (on-going); J Reijonen (on-going); S Kariminezhad (on-going); A Eskelinen (on-going); M Demjan (on-going); J Koivukoski (on-going)
- 4 Post-Doc studies: E Kallioniemi (2016–2017), S Kaartinen (2017–2018), L Säisänen (2017–2019), M Pitkänen (2018)

## TEACHING AND INVITED LECTURES

### Lectures and exercises

- since 2019 Course head “*Physics in Clinical Physiology and Neurophysiology*”, University of Eastern Finland
- since 2019 Course head “*Radiologisen fysiikan ja säteilysuojelun kurssi*”, Radiological Society of Finland and University of Eastern Finland
- 2018 Lecturer “*Medical signal analysis*”, University of Eastern Finland
- 2015–2018 Lecturer/demonstrator of computed tomography in course “*Radiologisen fysiikan ja säteilysuojelun kurssi*”, Radiological Society of Finland and University of Eastern Finland
- 2008–2018 Lecturer of evoked potentials in course “*Neuroscience for medical students*”, University of Kuopio / University of Eastern Finland
- 2006–2017 Lecturer/demonstrator of dose optimization in course “*Clinical radiology physics*”, University of Kuopio / University of Eastern Finland
- 2015 Visiting lecturer, “*Biosignals*”, Savonia University of Applied Sciences
- 2008–2017 Visiting lecturer “*Biomechanics*”, University of Kuopio / University of Eastern Finland
- 2013 Visiting lecturer, “*Clinical neurophysiology*”, Savonia University of Applied Sciences
- 2007, 2009, 2011 Visiting lecturer “*Clinical physiology physics*”, University of Kuopio / University of Eastern Finland
- 2009 Visiting lecturer in iBioMEP graduate school course “*Biomechanical Modelling of Bone and Cartilage*”, University of Kuopio
- 2007, 2009 Visiting lecturer “*Modeling II*”, University of Kuopio
- 2006 Lecturer on Medical Physics, Cram school for students aiming for Medical Degree studies, Medicina Oy
- 2005 Visiting lecturer “*Biomechanical testing and modeling*”, University of Kuopio

## AWARDS

- 2010 Docent award, Radiological Society of Finland  
2009 Young publisher of the year 2008, Department of Physics, University of Kuopio  
2009 Doctoral award, Radiological Society of Finland

## OTHER ACADEMIC MERITS

### Opponent duties:

1 Doctoral thesis in Medical Physics: L Lehmonen 2020

### Pre-examiner duties:

4 Doctoral theses in Medical Physics: K Palmu 2014; M Tenhunen 2015; A-M Vitikainen 2016; L Kuusela 2020

2 Doctoral theses in Medicine: H Jurvelin 2017; A Rodionov 2020

2 Licentiate theses in Medical Physics: S Turunen 2014; L Kuusela 2018

6 Masters in Science theses in Medical Physics:

E Danso 2011; M Ebrahimi 2018; A Eskelinen 2018; S Kainulainen 2018; M Golam Eleous 2019; M Demjan 2020

### Evaluation of academic competence:

2 Title of docent: M Tenhunen, University of Tampere, 2016; J Keyriläinen, University of Helsinki, 2019

### Reviews for European grants

French National Research Agency (ANR, 2011), Icelandic Research Fund (2012), Medical Research Council (MRC, 2018), European Commission (H2020-MSCA-IF-2019, 2019), European Commission (H2020-MSCA-IF-2020, 2020), National Science Centre of Poland (PRELUDIUM-19, 2020)

### Editor duties

Member of the Editorial Board, Journal of Neuroscience Methods, Elsevier, since 2018

Guest editor in Computational and Mathematical Methods in Medicine, 2012

Guest editor in Brain Sciences, 2020-2021

Guest editor in Journal of Neuroscience Methods, 2020-2021

### Referee for scientific and scholarly journals

54 journals: *Acta Biomaterialia*; *Annals of Neurology*; *ASME Journal of Biomechanical Engineering*; *Biomechanics and Modeling in Mechanobiology*; *Biomedical Engineering/Biomedizinische Technik*; *Biomedical Engineering Online*; *BMC Developmental Biology*; *BMC Musculoskeletal Disorders*; *BMC Research Notes*; *Brain Imaging and Behavior*; *Brain Sciences*; *Brain Stimulation*; *Brain Topography*; *Cerebral Cortex*; *Clinical Neurophysiology*; *Computer Methods and Programs in Biomedicine*; *Computer Methods in Biomechanics and Biomedical Engineering*; *Connective Tissue Research*; *European Journal of Neurology*; *Experimental Brain Research*; *Frontiers in Human Neuroscience*; *Frontiers in Cellular Neuroscience*; *Frontiers in Cellular Neurology*; *Frontiers in Neuroscience*; *Human Brain Mapping*; *IEEE Transactions on Biomedical Engineering*; *International Journal of Computer Assisted Radiology & Surgery*; *International Journal of Neural Systems*; *Journal of Anatomy*; *Journal of Biomechanics*; *Journal of Clinical Studies & Medical Case Reports*; *Journal of Clinical Neurophysiology*; *Journal of Dental Biomechanics*; *Journal of the Mechanical Behavior of Biomedical Materials*; *Journal of Neural Transmission*; *Journal of Neurological*

*Sciences; Journal of Neurological Surgery - Part A; Journal of Neurology; Journal of Neurology, Neurosurgery and Psychiatry; Journal of Neuroscience Methods; Journal of Orthopaedic Research; Journal of Physiology; Medical & Biological Engineering & Computing; Medical Engineering & Physics; Neural Plasticity; NeuroImage; Neuromodulation; Neuroscience; Neuroscience Journal; Neurosurgery; Osteoarthritis and Cartilage; PLoS One; Psychiatry Research: Neuroimaging; Seizure; Tribology International.*

### Peer-reviews for books

BenthamScience

### Other academic duties

2013–2017            Advisory research board member, Kuopio University Hospital  
since 2018            Panel member in National Publication Forum (JUFO), panel 11 *Medical engineering, biotechnology and basic medicine*  
since 2019            Member of the board of physics for preparation and evaluation of national entrance examination in the field of medicine (vice chairman since 2020).  
University of Eastern Finland.

### Invited lectures

23.10.2008            Sädeturvapäivät, Tampere, Title: "*Esittely mittauksista - Röntgensäteilyn sironta tutkimushuoneissa*". Language: Finnish.  
29.5.2008            Frontiers and Methods in Articular Cartilage and Osteoarthritis Research, Kuopio, Title: "*Functional imaging of articular cartilage*". Language: English.  
8.10.2010            2nd International Workshop on Navigated Brain Stimulation in Neurosurgery, Berlin, Germany, Title: "*Transfer of NBS motor mapping data through neuronavigator into optic field of operating microscope*". Language: English.  
27.5.2011            Workshop for transcranial magnetic stimulation (TMS) in brain research, Jyväskylä, Title: "*Principles of TMS*". Language: English.  
28.9.2012            Kliinisen neurofysiologian päivät, Kuopio, Title: "*TMS-EEG*". Language: Finnish.  
12.11.2014            Kliinisen neurofysiologian päivät, Turku, Title: "*nTMS käytännössä ja mitä fyysikon tulee hallita*". Language: Finnish.  
16.6.2015            10th International Conference in Bioelectromagnetism, Tallinn, Estonia, Title: "*Non-invasive estimation of motor cortical functional anisotropy and muscle representation with neuronavigated transcranial magnetic stimulation*". Language: English.  
14.5.2016            Sairaalafysiikan päivät, Tuusula, Title: "*Sairaalafysiikkokoulutuksen uudistukset*". Language: Finnish.  
15.3.2017            Nordic Congress of Clinical Neurophysiology & Kuopio Epilepsy Symposium, Kuopio, Title: "*TMS in therapy*". Language: English.  
12.6.2017            European Medical and Biological Engineering Conference (EMBEC) and the Nordic-Baltic Conference on Biomedical Engineering (NBC), Tampere, "*State-of-art musculoskeletal imaging of osteoarthritis (OA)*". Language: English.  
8.2.2018            The annual Finnish Society for Medical Physics and Medical Engineering day, Tahkovouri, Title: "*Human neuromodulation*". Language: English.

- 12.10.2018 10th International Symposium on Navigated Brain Stimulation in Neurosurgery & Neuromodulation, Berlin, Germany, Title: *“Update on neurophysiology of the motor system, by nTMS”*. Language: English.
- 22.3.2019 Annual meeting of the Finnish Society of Clinical Neurophysiology, Hämeenlinna, *“Aivojen modulaatio magneettistimulaatiolla neuroplastisin seurauksin”*. Language: Finnish.

## SCIENTIFIC AND SOCIETAL IMPACT OF RESEARCH

*h*-index: 30 (source: Scopus, 26.3.2021)

Journal articles and reviews published in indexed peer-reviewed journals: 112

Abstracts published peer-reviewed Conference Proceedings: 95

Book sections: 5

Patents: *Järnefelt G, Julkunen P. Navigated transcranial magnetic stimulation planning using a structural effectiveness index. Nexstim Plc. (Granted 3.3.2020) US10576296B2*

Other publications: >25

## POSITIONS OF TRUST IN SOCIETY AND OTHER SOCIETAL MERITS

### Memberships and positions in organizations:

- since 2017 Society of Scientists and Parliament Members TUTKAS
- since 2015 Tekniikka ja terveystieteiden KTN Kuopio ry (board member since 2015)
- 2014–2018 National Committee in Medical Physics and Biomedical Engineering (board member 2014–2018)
- since 2014 Academic Association for Mathematics and Natural Sciences - MAL
- since 2012 Finnish Society of Clinical Neurophysiology (board member 2013–2016 and 2019–2020)
- since 2011 Municipal Academic Engineers and Architects in Finland – Kunta-TEK (chairman of the board since 2015)
- since 2008 Radiological Society of Finland
- since 2008 European Society of Radiology
- since 2007 Finnish Association of Medical Physicists (board member since 2012, former president 2013–2014)
- since 2002 Finnish Society for Medical Physics and Medical Engineering
- since 2002 Academic Engineers and Architects in Finland - TEK (member of education committee 2015–2017, member of the municipal committee 2017–2023, member of general council since 2017–2023)

### International community activities

- 2017–2018 Member of International Advisory Board, 2018 World Congress on Medical Physics and Biomedical Engineering, Prague, Czech Republic, 3.–8.6.2018
- 2016–2017 Member of the scientific committee, European Medical and Biological Engineering Conference (EMBEC) and the Nordic-Baltic Conference on Biomedical Engineering (NBC), in Tampere, Finland, 11.-15.6.2017
- 2016–2017 Member of the scientific organizing committee, Nordic Congress of Clinical Neurophysiology & Kuopio Epilepsy Symposium, Kuopio, Finland, March 15-17, 2017
- 2013–2019 National delegate, International Organization for Medical Physics (IOMP)

### Other trusted positions

|            |  |
|------------|--|
| since 2021 | Radiation Protection Expert, Seppämagneetti Oy, Jyväskylä  |
| since 2020 | Founding board member, Radiation Protection Expert, Itä-Suomen Magneetti Oy / Karelia Magneetti                                      |
| since 2020 | Radiation Protection Officer (according to Radiation Act 859/2018), Lab Animal Centre, University of Eastern Finland                 |
| since 2019 | Member of national entrance exam committee in Medicine.  |
| since 2019 | Radiation Protection Expert (according to Radiation Act 859/2018), Healthcare and veterinary medicine, University of Eastern Finland |
| since 2019 | Radiation Protection Expert, Radiological imaging in surgery, Kuopio University Hospital   |
| since 2019 | Radiation Protection Officer (according to Radiation Act 859/2018), Department of Applied Physics, University of Eastern Finland     |
| since 2019 | Vice-chairman of Advisory Board for Radiation Safety, Ministry of Social Affairs and Health, Radiation and Nuclear Safety Authority  |
| since 2017 | Chairman and coordinator of Radiation Safety, University of Eastern Finland  |
| since 2017 | Member of the Executive Council, Department of Applied Physics, University of Eastern Finland  |
| 2015–2017  | Education, research and development task group member, Pohjois-Savon SOTE, Regional Council of Pohjois-Savo                          |
| 2015–2016  | Union Representative (JUKO) at Kuopio University Hospital, Kuopio, FINLAND   |
| since 2011 | Member of the Executive Council, Diagnostic Imaging Centre, Kuopio University Hospital   |