

Update from the PARENCHIMA programme

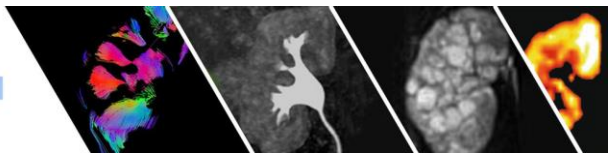
Anna Caroli

Istituto di Ricerche Farmacologiche Mario Negri IRCCS, Bergamo, Italy



**ISTITUTO DI RICERCHE
FARMACOLOGICHE
MARIO NEGRI · IRCCS**

PARENCHIMA WG3 lead



History of the project

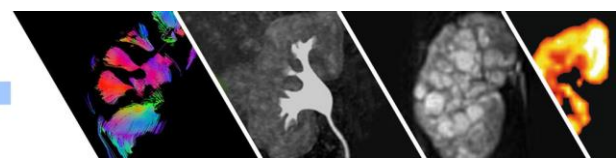
- Pre 2014: Emerging networks in Europe around renal MRI
Eg. COST B21, UK renal Imaging Network, ...
- 09-2014: First attempt to coordinate: H2020-PHC-11-2015
- 01-2015: H2020 rejected at stage 1
- 03-2015: widen network, 1st submission to COST
- 10-2015: 1st international meeting (Bordeaux)
- 11-2015: COST application rejected
- 03-2016: 2nd submission to COST
- 10-2016: Success!
- Since Oct 2016 – widen network, now 25 countries!
- 04-2017 – Launch



Bordeaux 2015 MEETING ARCHIVES
sites.google.com/site/renalmriworkshop



www.cost.eu/media/newsroom/european-researchers-tackle-chronic-kidney-disease



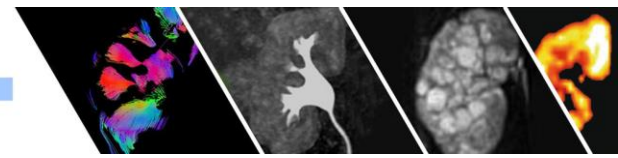
Key facts and figures

PARENCHIMA - Magnetic Resonance Imaging Biomarkers for CKD

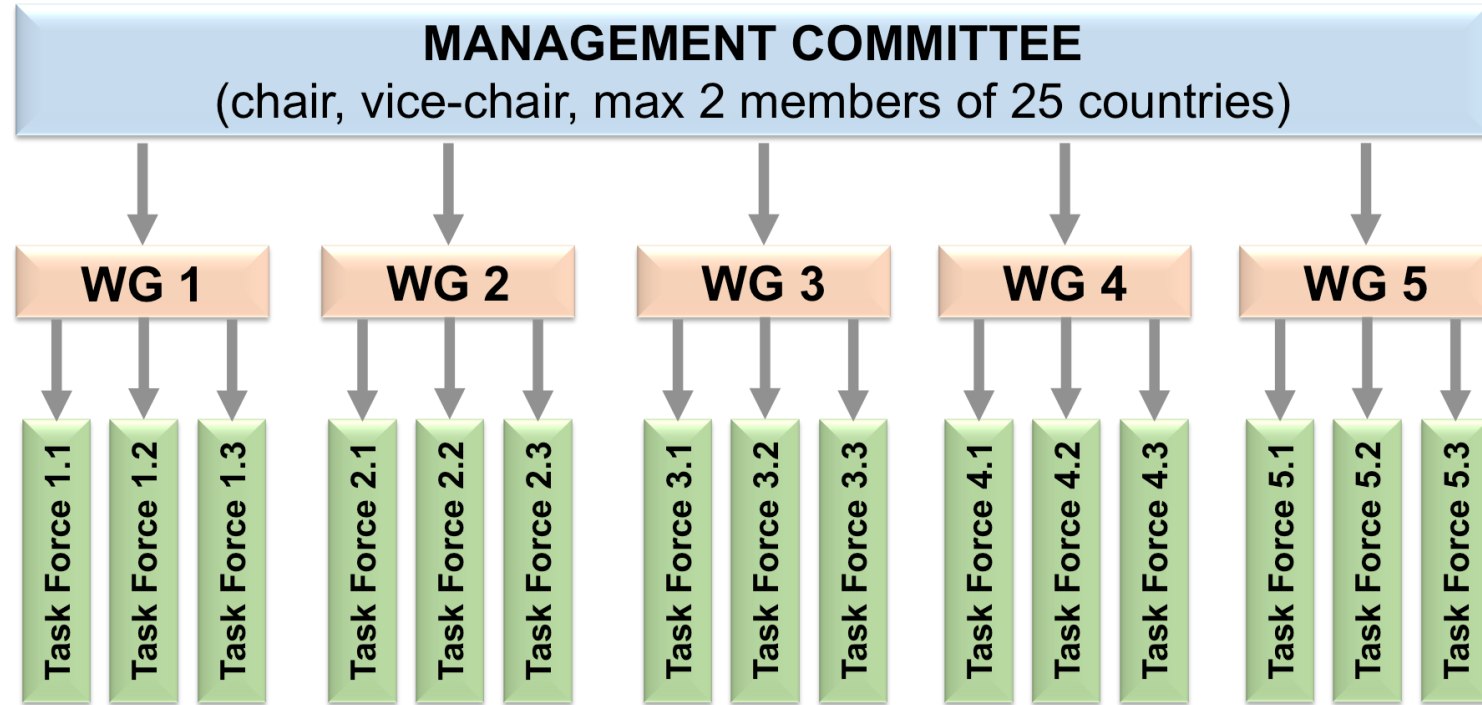
- COST action:
 - Do not fund research but networking
 - Improve impact by coordinating ongoing & planned research
 - Promote inclusivity in research: geographical (ITC/NNC), gender, career stage.
- http://www.cost.eu/COST_Actions/ca/CA16103
- Project website: www.renalmri.org
- Duration: 4 april 2017 – 3 april 2021
- Parties: 29 countries
- Budget +/- 140.000 euros per year
- Participants: renalmri mailing list (N=250)

Open and growing network

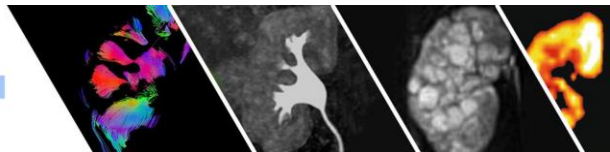
**Everyone is invited to join
PARENCHIMA**



Organisation



Objectives



Renal MRI biomarkers:

- high potential as enrichment/outcome biomarkers (non-invasive, sensitive)
- underused (need for dedicated expertise and development)

Lack of standardization and difficulties in comparing results limits commercial exploitation, and hinders the set-up of multi-center trials/translation into clinics.



Aim: boost the use of renal MRI biomarkers to improve the management of CKD patients

WG1: Improve the standardisation and reproducibility of renal MRI biomarkers.

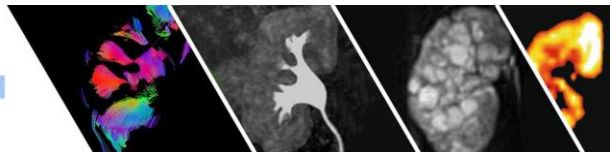
WG2: Increase their availability by developing an open-access toolbox (software/data)

WG3: Demonstrate biological validity and clinical utility of renal MRI biomarkers

WG4: Develop a training program on renal MRI for basic scientists and clinical users

WG5: Build an international multi-disciplinary community of stakeholders in renal MRI.

Main activities year 1



WG1 & WG4 kick-off

Budapest, 10-11 July 2017



WG3 kick-off

Bergamo, 13-14 July 2017



WG2 kick-off

Prague, 07 Sept 2017



WG3 strategy

Utrecht, 23 April 2018



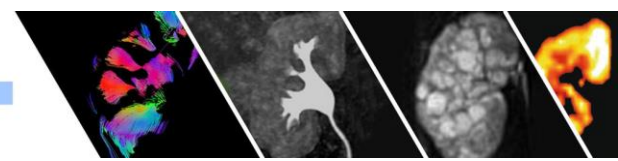
International symposium on functional renal imaging

Berlin, 11-13 October 2017

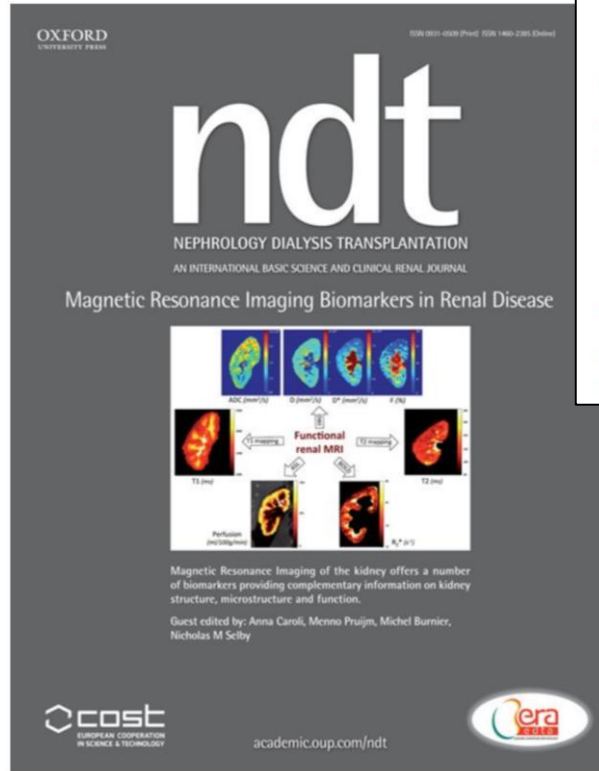


WG5: website development

www.renalmri.org



Year 1 – special issue NDT (WG3)



EDITORIALS

Functional magnetic resonance imaging of the kidneys: where do we stand?
The perspective of the European COST Action PARENCHIMA

Anna Caroli; Menno Pruijm; Michel Burnier; Nicholas M Selby

Nephrology Dialysis Transplantation, Volume 33, Issue suppl_2, 1 September 2018, Pages ii1–ii3,
<https://doi.org/10.1093/ndt/gfy181>

Extract View article

SPECIAL REPORT

Magnetic resonance imaging biomarkers for chronic kidney disease: a position paper from the European Cooperation in Science and Technology Action PARENCHIMA

Nicholas M Selby; Peter J Blankestijn; Peter Boor; Christian Combe; Kai-Uwe Eckardt ...

Nephrology Dialysis Transplantation, Volume 33, Issue suppl_2, 1 September 2018, Pages ii4–ii14,
<https://doi.org/10.1093/ndt/gfy152>

Abstract View article

Arterial spin labelling MRI to measure renal perfusion: a systematic review and statement paper

Aghogho Odudu; Fabio Nery; Anita A Harteveld; Roger G Evans; Douglas Pendse ...

Nephrology Dialysis Transplantation, Volume 33, Issue suppl_2, 1 September 2018, Pages ii15–ii21,
<https://doi.org/10.1093/ndt/gfy180>

Abstract View article Supplementary data

Renal blood oxygenation level-dependent magnetic resonance imaging to measure renal tissue oxygenation: a statement paper and systematic review

Menno Pruijm; Iosif A Mendichovszky; Per Liss; Patricia Van der Niepen; Stephen C Textor ...

Nephrology Dialysis Transplantation, Volume 33, Issue suppl_2, 1 September 2018, Pages ii22–ii28,
<https://doi.org/10.1093/ndt/gfy243>

Abstract View article Supplementary data

Diffusion-weighted magnetic resonance imaging to assess diffuse renal pathology: a systematic review and statement paper

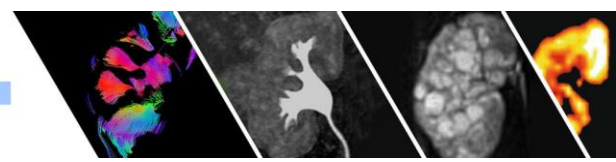
Anna Caroli; Moritz Schneider; Iris Friedli; Alexandra Ljimini; Sophie De Seigneux ...

Nephrology Dialysis Transplantation, Volume 33, Issue suppl_2, 1 September 2018, Pages ii29–ii40,
<https://doi.org/10.1093/ndt/gfy163>

Abstract View article Supplementary data

Magnetic resonance imaging T1- and T2-mapping to assess renal structure and function: a systematic review and statement paper

Marcos Wolf; Anneloes de Boer; Kanishka Sharma; Peter Boor; Tim Leiner ...



Year 2 – Prague meeting (Oct 2018)

- 11:30. Nuria Garcia Fernandez: Early diagnosis and prognosis in DKD with ASL-MRI and serum metalloproteinase-10: A Spanish multi-centre study. ([Slides](#))
- 11:45. Lisa Jarl (Antaros): Experience from renal multicentre interventional trials.
- 12:00. Sue Francis: The UK Renal Imaging Network and UK partnership grant (UCL, Leeds, Nottingham, Cambridge).
- 12:15. Kanishka Sharma: The iBEAT study (Leeds, Bordeaux, Bari/Tricase, Turku, SIB-Lausanne, Lund, Michigan).
- 12:30. Peter Blankstijn: Planning for sessions at the next EDTA congress.
- 12:45. Adjournal and move to lunch.

[13:00 – 14:00] Lunch (provided by the organisers)

[14:00 – 14:45] Plenary Session 3: WG 5 - Homepage and social medial presence (Chair: Marcos Wolf)

Group picture

- 14:00. Homepage (www.renalmri.org) - Interactive session & feedback on structure and maintenance ("backend") & visitor statistics
- 14:15. Social Media - Twitter, LinkedIn, etc: Discussion around account optimizations; engaging with other societies; open positions in WGS

- 10:10. Presentation and ideas for MAGMA special issue on renal MRI (click [here](#) for approved proposal)

WG2: Image processing – review of use cases, algorithms, harmonisation of library (Chair: F. Zoellner & Peter Rogelj)

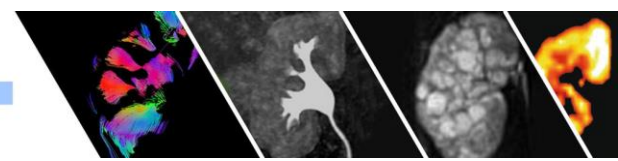
Presentation of processing algorithms. What they do, how they work, classification, their advantages and limitations, evaluation strategies. Discussion after each presentation.

- 09:00. Image segmentation (Juan E. Ortuno)
- 09:15. Image registration (Peter Rogelj)
- 09:30. Modelling – DCE (Susmita Basak)
- 09:45. Identification of algorithms from the algorithms database (Marek Kocinski) and algorithms being developed by WG2 members.

Use cases in detail – brief review of the workflows listing processing steps or algorithms

- 10:00. DCE-MRI (Frank Zoellner)
- 10:10. Multiparametric studies (Arvid Lundervold)





Year 2 – social media profile (WG5)

NEWSLETTER

2019.08.13 NEWSLETTER

Read our Newsletter from August 13, 2019

2019.01.11 NEWSLETTER

Read our Newsletter from January 11, 2019

2018.12.05 NEWSLETTER

Read our Newsletter from December 5, 2018

2018.11.10 NEWSLETTER

Read our Newsletter from November 10, 2018

Project

PARENCHIMA - Magnetic Resonance Imaging Biomarkers for Chronic Kidney Disease

Anna Caroli · Kanishka Sharma · Peter Boor · [Show all 98 collaborators](#)

Goal: PARENCHIMA - Magnetic Resonance Imaging Biomarkers for Chronic Kidney Disease (COST action CA16103)

...

Updates [1 new](#) 5
Recommendations [2 new](#) 3
Followers [6 new](#) 71
Reads [115 new](#) 1029

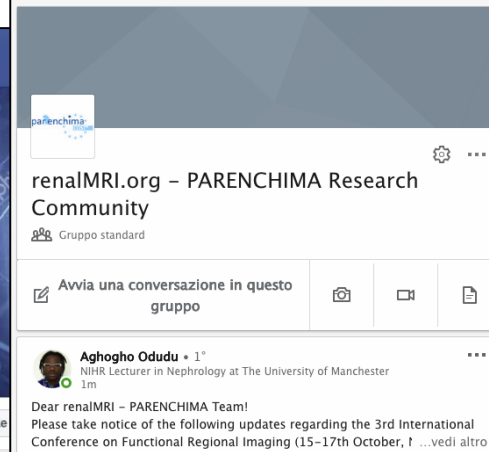
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Renalmri
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Home
Posts
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Community

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Posts



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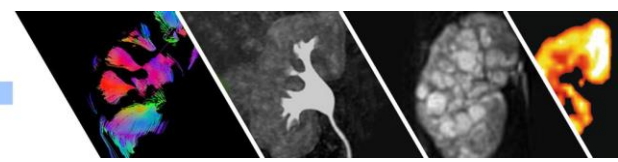
Update: 3rd International conference on Renal Imaging, Nottingham, October 15-17th 2019

60 membri [View](#)
[Invita membri](#)

Informazioni sul gruppo
THIS GROUP IS FOR people involved in an aspect of renal magnetic resonance research. We welcome as members clinicians, basic (pre)clinical scientists, as well as researchers from industry. Professionals, students and anyone else interested in this field are equally welcome.
[Mostra altro](#)

Regole del gruppo
All posts that are deemed to be unrelated to renal magnetic resonance research will be deleted.
Members who repeatedly post unrelated or promotional content will be removed from the group.
[Mostra altro](#)





Year 2 – Outreach (WG5)

NIH NIDDK Research & Funding Health Information About NIDDK News

View Meetings & Workshops

RENAL IMAGING WORKSHOP
July 12-13, 2019
Natcher Conference Center
Balcony A & B
45 Center Drive, Building 45
Bethesda, MD

Renal Imaging Workshop

ISMRM 27TH ANNUAL MEETING & EXHIBITION
11–16 May 2019
SMRT 28th Annual Meeting • 10–13 May 2019
www.smrt.org
Montréal, QC, Canada

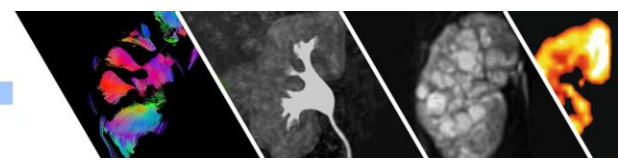
EARLY MEETING REGISTRATION DEADLINE: 03 APRIL 2019
SMRM & SMRT HOUSING DEADLINE: 05 APRIL 2019

- 8:45 a.m. – 9:05 a.m.
- BOLD and Diffusion MRI for Evaluating Renal Oxygenation and Fibrosis [Presentation (PDF, 4.33 MB)]
Pottumarthi Prasad, Ph.D., Northshore University Health Systems
- 9:05 a.m. – 9:25 a.m.
- Efforts of European Consortium in MRI (Parenchima) [Presentation (PDF, 13.52 MB)]
Anna Caroli, Ph.D., IRCCS Istituto di Ricerche Farmacologiche Mario Negri
- 9:25 a.m. – 9:45 a.m.
- MR Imaging of Renal Perfusion using ASL [Presentation (PDF, 4.33 MB)]
Sean Fain, Ph.D., University of Wisconsin–Madison
- 9:45 a.m. – 10:05 a.m.

- 27 Feb**
Wednesday, February 27, 08:30–10:00, Room M 1
Joint Session of the ESR and EIBALL
(European Imaging Biomarkers Alliance)
Imaging biomarkers and their combinations in the era of artificial intelligence **LEVEL II+III**
- » **Chairpersons' Introduction**
O. Clément; Paris/FR [A-0056]
N.M. deSouza; Sutton/UK [A-0057]
 - » **Building and discovering biomarkers with AI** [A-0058]
B. Rance; Paris/FR
 - » **COST action Initiatives as a platform for image biomarker selection** [A-0059]
A. Caroli; Ranica/IT
 - » **Role of AI in the Introduction of Imaging biomarkers: accelerator or obstacle?** [A-0060]
J.C. Waterton; Manchester/UK
 - » **Panel discussion: What Infrastructure do we need to exploit AI for selecting, validating and managing imaging biomarkers?**

ECR2019
the bigger picture
February 27–March 3 | Vienna

EFRS EUROPEAN FEDERATION OF RADIOGRAPHIC SOCIETIES
ESHI^{MT} MOLECULAR, TRANSLATIONAL HYBRID IMAGING



Year 2 – QUIBIM workshop (WG2)



Algorithms Integration Training Workshop (March 2019).
How to integrate algorithms into the Quibim Precision® platform



Working group 2 -> 2.1 Database (open)

Valencia, Spain - Mar. 12-13, 2019

WG2: ALGORITHMS INTEGRATION TRAINING WORKSHOP (OPEN)

We are very happy to announce the Algorithms Integration Training Workshop in Valencia on March 12 and 13. The training will consist of a block of theoretical lessons followed by a guided hands-on. We will provide a sample algorithm to be integrated in the Quibim Precision® platform. If anyone is interested in integrating their own developed algorithms, feel free to bring it with. Do not hesitate to contact local organizers at contact@quibim.com or WG2 leads for any concern you may have.

REGISTRATION

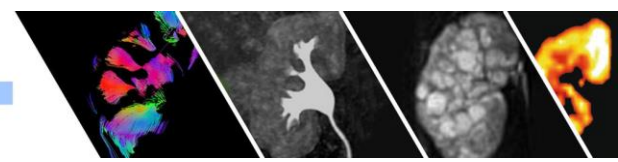
The workshop is open to anyone with an interest in integrating algorithms in the Quibim Precision® platform. COST will support this workshop and registered participants will be reimbursed according to the [COST Vademecum](#). If you are interested to join the workshop please contact the [WG2 leads](#) in order to get registered or use the [online registration form](#).

REIMBURSEMENT

PARENCHIMA can reimburse limited number of participants. We will prioritise reimbursement to participants who will actively contribute to the action.

ORGANISERS

The meeting is organised by the working group 2 leads and local organisers:



Year 2 – harmonisation efforts (WG1)

parenchima cost

Working group 1 | Working group 2 | Working group 3 | Working group 4 | Working group 5

1.2 TECHNICAL RECOMMENDATIONS ON CLINICAL RENAL MRI

AIMS

This task force will develop technical recommendations on how to measure renal MRI biomarkers on clinical scanners of 1.5T and 3T field strengths. If you want to start a clinical study, you will find here concrete guidelines on how to implement the acquisitions, and you can be reassured that the approach will be accepted by a broad body of experts in the field.

The recommendations will be published open-access in a special issue of the journal MAGMA, detailing the process and rationale underlying the choices that were made. Detailed instructions on how to implement the recommendations will be made available as supplementary material in an open-access version-controlled repository.

We expect this to lead to a significant improvement in efficacy of research as it eliminates the need for local development and optimisation. It will also form a driver for a more standardised approach, improving comparability of results by different teams, and establishing a common benchmark to evaluate future developments.

The recommendations will be developed by panels of experts. The panels are open to any MRI scientist with a relevant track record, and their composition can change dynamically. Ideally they cover experience with all MRI vendors and application areas.

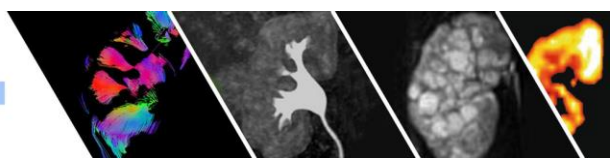
The task force is led by **Steven Sourbron** (chair) and **Pim Pullens** (co-chair).

Development of detailed recommendations on clinical renal MRI acquisition

- evidence-driven consensus process
- dynamic approach
- DWI, BOLD, ASL, T1-T2

Task force 1.2 face-to-face meeting
Aarhus, 18-19 March 2019





Year 3 (coming soon): MAGMA special issue (WG1)

Expected publication: Jan 2020

- Cover paper (consensus process)
- Technical recommendations on clinical renal MRI acquisition (DWI, BOLD, ASL, T1-T2)
- PC-MRI review

doi: 10.1007/s10334-019-00772-0. [Epub ahead of print]

- ... other review and papers on renal MRI ...

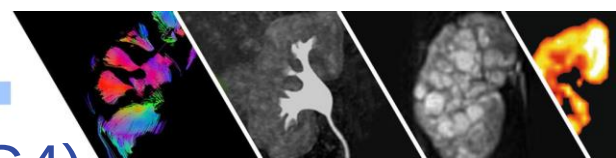


Call for Papers

Special Issue on
Magnetic Resonance Imaging Biomarkers of Renal Disease
MAGMA Special Issue, planned publication 1/2020

The past few years have seen a rapid growth in the interest in functional MRI of the kidney. The first international meetings were organized in Bordeaux 2015 [1] and Berlin 2017 [2], and a third is planned in Nottingham 2019 [3]. A European network in renal MRI (PARENCHIMA) was funded in 2016 for 4 years [4] and a 3-year national infrastructure grant was awarded to the UK Renal Imaging Network in 2018 [5]. In the same year, the NIDDK launched a new national initiative in renal MRI [6].

The current interest in renal MRI is strongly driven by clinical demand [7]. Renal diseases pose a significant and escalating socio-economic burden on healthcare

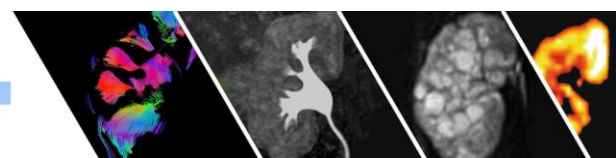


Year 3 (coming soon): Preclinical book (WG4)

Preclinical MRI imaging of the kidney – methods and protocols for experiments and analyses

Preclinical MR Imaging of the Kidney - Methods and Protocols for Experiments and Analyses TABLE OF CONTENT PRELIMINARY VERSION, 12/7/2018 <u>Section editors:</u> Andrea Fekete [AF], Andreas Pohlmann [AP], Chris Laustsen [CL], Dario Longo [DL], Erdmann Seeliger [ES], Joao Periquito [JP], Martin Meier [MM], Min-Chi Ku [MCK], Neil Jerome [NJ] PART I ANIMAL MODELS AND PREPARATION Animal models of renal pathophysiology and disease [AF] Preparation and monitoring of animals in renal MRI [AF] PART II MR IMAGING METHODS Quantitative assessment of renal physiology by invasive probes: State-of-the-art [ES] MR hardware considerations for preclinical MR of the kidney [MM] Quantitative blood flow measurements in the kidney: State-of-the-art [MCK] Renal diffusion weighted imaging (DWI), tensor imaging (DTI), and intra voxel incoherent motion (IVIM): State-of-the-art [NJ] Excretory MR urography (MRU) and dynamic contrast enhancement (DCE) derived renal perfusion: State-of-the-art [DL] Renal perfusion measurement by arterial spin labelling (ASL): State-of-the-art [MCK] Parametric mapping of renal T₂: State-of-the-art [IF] Parametric mapping of renal T₂*: State-of-the-art [JP] Parametric mapping of renal T₂* (BOLD): State-of-the-art [AP] Chemical exchange saturation transfer (CEST) MR in the kidney: State-of-the-art [DL] Sodium (²³Na) MR imaging of the kidney: State-of-the-art [CL] Hyperpolarized carbon (¹³C) MRI and Phosphorus (³¹P) MRS in the kidney: State-of-the-art [CL] Multi-modality imaging of the kidney: State-of-the-art [MM]	PART III EXPERIMENTAL PROTOCOLS Quantitative assessment of renal physiology by invasive probes: Perfusion pressure, blood flow, and tissue pO₂ [ES] Renal MRI: Initial steps, anatomical imaging and static-fluid MR urography (MRU) [AP] Measurement of renal volume with MRI [MM] Quantitative blood flow measurements (PC) in the kidney [MCK] Assessment of renal water diffusion: Diffusion weighted imaging (DWI), tensor imaging (DTI), intra voxel incoherent motion (IVIM) [NJ] Excretory MR urography (MRU) and dynamic contrast enhancement (DCE) derived renal perfusion [DL] Non-contrast enhanced renal perfusion measurement by arterial spin labelling (ASL) [MCK] Renal T₁ - mapping [IF] Renal T₂ - mapping [JP] Renal T₂* - mapping (BOLD) [AP] Chemical exchange saturation transfer (CEST) MR in the kidney [DL] Sodium (²³Na) MR imaging of the kidney [CL] Hyperpolarized carbon (¹³C) MRI in the kidney [CL] PART IV ADVANCED ANALYSIS PROTOCOLS Analysis of renal perfusion pressure, blood flow, and tissue pO₂ measured by invasive probes [ES] Image registration in MRI of the kidney [NJ] Image segmentation in MRI of the kidney [NJ] Denoising MR images of the kidney [NJ] Image analysis for measuring renal volume with MRI [MM] Analysis of renal diffusion weighted imaging (DWI), tensor imaging (DTI), and intra voxel incoherent motion (IVIM) [NJ] Analysis of excretory MR urography (MRU) and dynamic contrast enhancement (DCE) derived renal perfusion [DL] Analysis of renal arterial spin labelling (ASL) perfusion [MCK] Analysis of renal T₁ [IF] Analysis of renal T₂ and T₂* - mapping (BOLD) [AP,JP] Analysis of chemical exchange saturation transfer (CEST) in the kidney [DL] Analysis of sodium MR (²³Na) in the kidney [CL] Analysis of hyperpolarized carbon (¹³C) MRI in the kidney [CL]
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Year 3



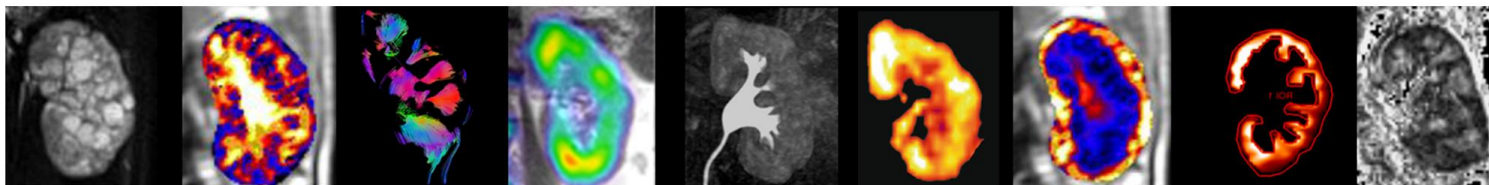
Nottingham, UK
October 15-17th

www.nottingham.ac.uk/go/3rdrenalmri

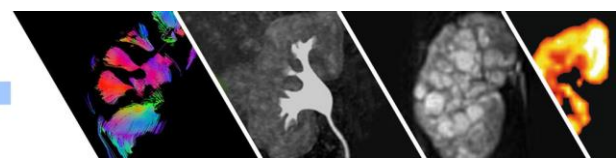
Co-organised by



Funded by the Horizon 2020 Framework Programme of the European Union



www.renalmri.org



PARENCHIMA in the conference programme

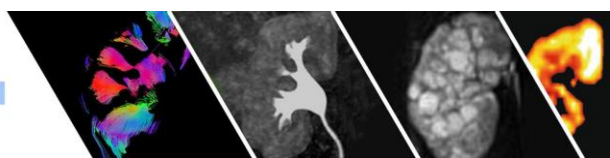
Tuesday October 15th

- 17.00: WG1 update + MRI acquisition recommendations (ASL, BOLD, DWI, T1/T2)
- 17.30: WG2 update

Wednesday October 16th

- 8-10.00: Management Committee meeting (MC members only)
- 11:45: Power pitches and short term scientific missions
- 16.00: WG3 update
- 16.10: WG4 update
- 16.20: WG5 update
- 16.30: Working group breakout sessions (WG1&WG2 / WG3 parallel sessions)

Everyone can
apply for a STSM
(early career,
from ITC most
welcome)



Acknowledgement

This presentation is based upon work from COST Action PARENCHIMA (CA16013), supported by COST (European Cooperation in Science and Technology).

COST (European Cooperation in Science and Technology) is a funding agency for research and innovation networks. Our Actions help connect research initiatives across Europe and enable scientists to grow their ideas by sharing them with their peers. This boosts their research, career and innovation. www.cost.eu