Join Radboud Summer School 2017!

The Ins and Outs of Kidneys: from Physiomics to Transplantation

change perspective

Radboud Universiteit

IN·DEI·NOMINE·FELICITER

The Ins and Outs of Kidneys: from Physiomics to Transplantation

At the RadboudUMC, a close collaboration between renal researchers and nephrologists provides (bio)medical students interested in nephrology and renal physiology additional opportunities for research training. This summer school course on the ins and outs of kidneys: from physiomics to transplantation will be organised around renal research in general and the actual research in Nijmegen in particular, examining all aspects of kidney function.

Topics include: water homeostasis, salt homeostasis and secretion, acid/base homeostasis, glomerular function, dialysis and transplantation, acute kidney failure, chronic kidney disease, diabetic nephropathy, polycystic kidney failure and a number of syndromes related to renal channelopathies. During the course you will take part in interactive lectures about each topic, combined with practicals on modern molecular techniques. You will be provided with hands-on demonstration at research labs and will be able to visit a modern renal dialysis unit at the hospital. After completing this course, you should have gained a basic understanding of renal research, be able to understand the molecular techniques behind renal research and apply the principles of renal mechanisms to the understanding and treatment of kidney diseases.

More detailed course information can be found on our website!

After this course you are able to:

- Understand renal physiology in depth
- Understand molecular techniques employed in renal research and interpret experimental results
- Interpret the latest insights in nephrology, hypertension, dialysis and transplantation
- Explain the mechanisms behind kidney disorders, hypertension and channelopathies

For whom is this course designed

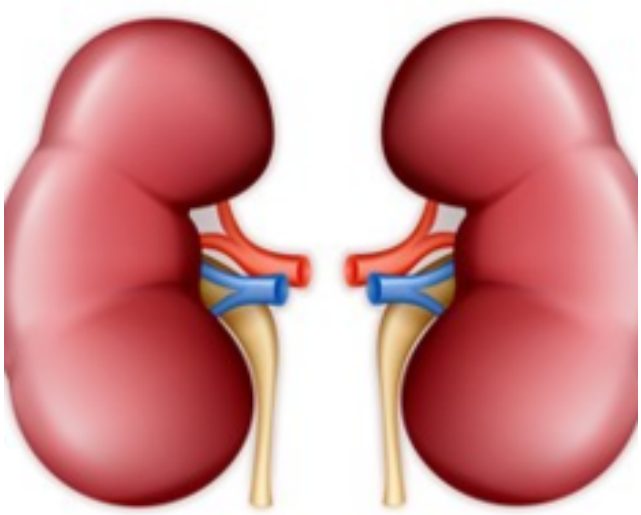
Master and PhD students with a background in biomedical sciences and interest in renal (patho)physiology are eligible.

Number of EC

2 ECTS

Entry level

Advanced bachelor and Master students and Phd students.



Course leader

Dr. Jojanneke Kooij & Prof. Dr. Joost Hoenderop, Physiology Department, Radboudumc

Dates

Monday 7 August – Friday 11 August 2017

Course fee

€500

Discounts

- 10% discount for early bird applicants. The early bird deadline is 1 April 2017.
- 15% discount for students and PhD candidates from partner universities.

Want to be part of the RSS experience?

More than just a course!

Radboud Summer School is more than an academic event. It is a unique opportunity to meet other international students and researchers and to get to know Radboud University and the city of Nijmegen. Our participants come from all over the world and have different cultural and academic backgrounds. Our programme includes the following activities free of charge: welcome reception, sports activity, guest lecture and farewell drink. We offer also a BBQ, River Cruise, City Tour, Pub quiz and excursion for a small fee

Have a look at what participants had to say about their experience!

And do not forget to register now!

Deadline application

June 1, 2017

Contact
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www.ru.nl/radboudsummerschool, August 6-18 2017

RU-27152-en-US-0117-1

Ins and Outs of Kidney from Physiomics towards Transplantation

Lecturer: Joost Hoenderop, PhD

Duration: 2 hrs

Learning objectives

After completing this part, participants:

1. will be able to discuss in general terms the main issues related to renal disorders;
2. will be able to introduce the topics: glomerular diseases, tubular disorders, ciliopathies and renal replacement therapies;
3. will be able to present a case related to one of the renal topics.

Description

As kick-off of this renal week, a general introduction about the topic Renal Disorders will be presented including the following topics:

- Glomerular diseases
- Tubular disorders
- Ciliopathies
- Renal replacement therapies

In addition, the challenge will be introduced by which the participants in groups of 2-4 will address a question related to one of the aforementioned topics by studying the presented case, search literature, discuss with fellow participants. In relation to the challenge, a presentation will be given by each group on the last day of the course with respect to their topic.

Finally, an insight into the tutorial on the usage of biomarkers will be given.

Program

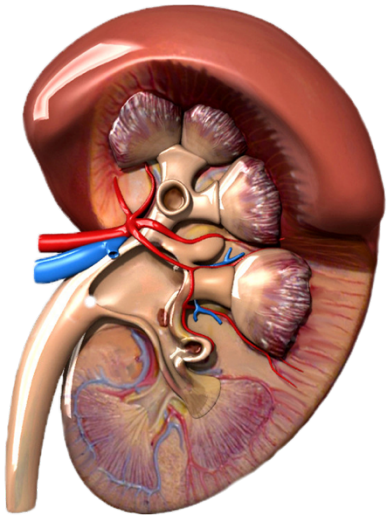
- Lecture: Some practical information
- Interactive lecture: Introduction to the topic of renal disorders
- Workshop: The challenge

Prerequisites

- Basic biological/physiological knowledge of the human body and preferentially basic knowledge of the kidney

Recommended reading

- Human Physiology, Boron & Boulpaep, 3rd edition, 2016
- The Kidney, Seldin & Giebisch, 5th edition, 2012
- The Kidney, Brenner & Rector, 10th edition, 2016



The Challenge

Lecturer: All

Duration: Monday-Friday

Learning objectives

After completing this part, participants:

1. will be able to discuss and present in detail a clinical case related to: glomerular diseases, tubular disorders, ciliopathies or renal replacement therapies;
2. will have basic knowledge of cases related to these renal topics.

Description

A case will be presented related to: Glomerular diseases, Tubular disorders, Ciliopathies or Renal replacement therapies. Work as a team in groups of 2-4 participants to study one challenging medical case and give a detailed presentation on the last day of the course.

- *Glomerular diseases*: Present a step-by-step approach to identify the soluble factor causing post-transplant recurrence in patients with idiopathic nephrotic syndrome.
- *Tubular disorders*: Mutations in the *SLC12A3* gene are the cause of Gitelman syndrome. One of the main characteristics is hypomagnesemia. Describe key objectives and study design to examine the cause of the hypomagnesemia.
- *Ciliopathies*: A boy of 12-years with femur fracture after minor trauma, routine blood values reveal renal insufficiency as incidental finding. Describe your workup of the case including differential diagnosis and further clinical management.
- *Renal replacement therapies*: The shortage of human donor kidneys has prompted the search for alternative sources of donor organs. Amongst others, the use of porcine kidneys for transplantation in humans has been explored. Currently there are two approaches: Use of whole porcine kidneys for xenotransplantation or decellularization of porcine kidneys to obtain a scaffold which can be repopulated with human cells. For both approaches several hurdles have to be taken before clinical implementation can be realized. Your challenge is to identify the major hurdles and to provide an idea which would take one of the two strategies a significant step further.

Program

- Participants will work on this challenge during the week
- On Friday, the cases will be presented by the individual groups

Prerequisites

- Basic biological/physiological knowledge of the human body and preferentially basic knowledge of the kidney

Recommended reading

- Online literature related to your case

Glomerular Diseases

Lecturer: Bart Smeets, PhD
Duration: 5 hrs

Learning objectives

After completing this part, participants will be able to:

1. understand the pathological and clinical presentation of the most common glomerular diseases
2. visualize and interpret renal tissue morphology, marker expression and ultrastructure using different microscopic approaches for the diagnosis of patients with glomerular diseases.
3. understand the relevance and limitations of the diagnostic and therapeutic needs such as determination of renal function and biomarkers of glomerular diseases.
4. understand the need for research to gain a better understanding of glomerular diseases.

Description

Each kidney is made up of approximately one million nephrons that all contain a glomerulus. The glomerulus plays an essential role in the filtration of blood and the formation of urine. Damage to the glomeruli results in the escape of substances like protein, and even red or white blood cells into the urinary fluid. As the damage progresses, glomerular function is lost. This impairs the excretion of harmful toxic wastes, leading to their build up in the body. When the glomeruli become damaged and lose their function, it is called a glomerular disease.

Program

- Interactive lecture: Introduction to the clinical presentation of glomerular diseases
- Interactive lecture: Introduction to the pathology of glomerular diseases
- Demonstrative lecture: "From diseased kidney to diagnosis" discussing sample preparation, tissue sectioning and microscopic techniques.
- Group assignment: Interpretation and evaluation electron microscopic images of patients with different glomerular diseases.
- Interactive lecture: Methods of determination of renal function, biomarkers and personalized treatment
- Interactive lecture: State-of the-art research approaches to study glomerular disease

Prerequisites

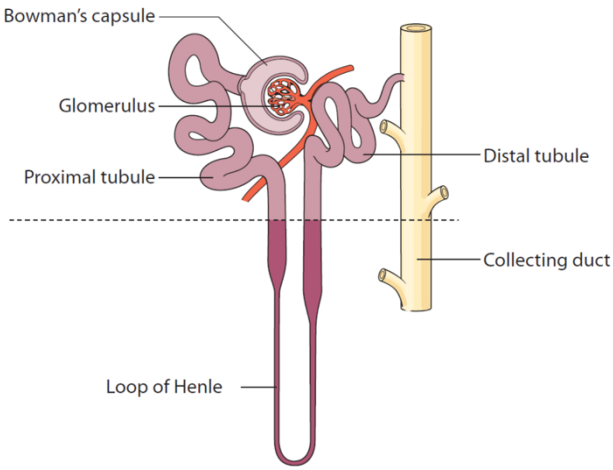
- Basic biological knowledge of the human body and preferentially basic knowledge of the kidney

Recommended reading

- The emergence of the glomerular parietal epithelial cell. Shankland SJ, Smeets B, Pippin JW, Moeller MJ. *Nat Rev Nephrol.* 10:158-73, 2014
- Parietal epithelial cells and podocytes in glomerular diseases. Smeets B, Moeller MJ. *Semin Nephrol.* 32:357-67, 2012

Tubular Disorders

Lecturer: René Bindels, PhD, Joost Hoenderop, PhD, Esther Peters, PhD
Duration: 5 hrs



Learning objectives

After completing this part, participants will be able to:

1. understand the clinical presentation and the molecular disturbance of the most common tubulopathies
2. describe the various model systems to study renal transport functions

Description

The tubular segments of the kidney are lined by specialized epithelial cells which play an essential role in homeostasis by reabsorbing, secreting and excreting solutes and thus fixing the final composition of urine. Multiple rare disorders have been described affecting these specialized functions, leading to inappropriate renal losses of NaCl, calcium, magnesium, water and phosphate, hypertension and acid-base disturbances. These disorders are often affecting children and causing multi-systemic, life-threatening complications and progression to renal failure. Knowledge of the primary cause of these renal diseases is essential to understand its molecular mechanisms and for adequate classification, prognosis, and treatment. Here we will present genotype-phenotype correlations of various tubulopathies including the characterization of novel identified renal electrolyte transporters at the molecular, cellular and functional level, and finally at a systemic level that intertwines a multidisciplinary approach to establish comprehensive models for renal salt transport. The functiomics of the mutated renal proteins will be discussed in order to elucidate the molecular mechanisms of renal diseases.

Program

- Interactive lecture: A guided tour along the nephron
- Interactive lecture: An overview of the tubulopathies
- Demonstration: models to study kidney function including zebra fish and renal cell lines
- Hands-on: Measure tubular transport function

Prerequisites

- Basic biological knowledge of the human body and preferentially basic knowledge of the kidney

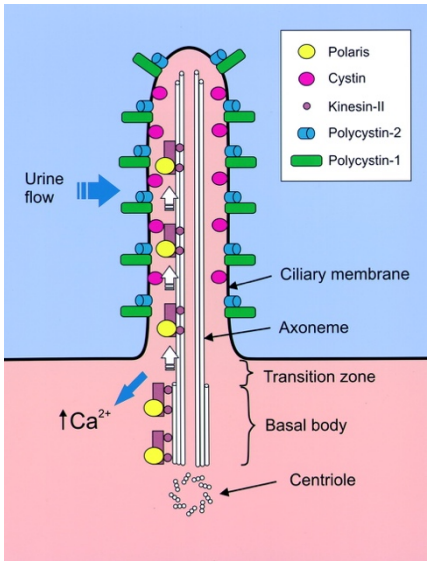
Recommended reading

- Gitelman's syndrome: towards genotype-phenotype correlations? Riveira-Munoz E, Chang Q, Bindels RJ, Devuyst O. *Pediatr Nephrol.* 22:326-32, 2007
- Inherited renal diseases. Leung JC. *Curr Pediatr Rev.* 10:95-100, 2014
- Magnesium in man: implications for health and disease. de Baaij JH, Hoenderop JG, Bindels RJ. *Physiol Rev.* 95:1-46, 2015

Ciliopathies

Lecturer: Miriam Schmidts, MD, PhD

Duration: 5 hrs



Learning objectives

After completing this part, participants will be able to:

1. understand the pathological and clinical presentation of the most common ciliopathies with renal involvement
2. understand the relevance and limitations of the diagnostic and therapeutic approaches such as disease classification by phenotype assessment, renal imaging approaches, human genetics approaches and ciliary visualization
3. understand the need for research to gain a better understanding of ciliopathies with renal involvement

Description

Cilia are hair-like structures extending from most human cells including the renal tubules. Over the past 2 decades, an essential role of these evolutionarily extremely well conserved organelles in diverse cell signalling pathways as emerged and ciliary dysfunction and/or malfunction of ciliary proteins results in diverse human phenotypes including renal malformations, cyst development and loss or renal function. During this tutorial, you will get hands-on experience on how to diagnose a renal ciliopathy and identify the underlying genetic cause in a human patient. You will get an outlook on Ciliopathy research, including potential therapeutic approaches. If you have an unsolved case you are invited to bring your own dataset.

Program

- Interactive lecture: Introduction to the clinical spectrum of ciliopathies (with renal involvement)
- Demonstrative lecture: Introduction to ciliopathy genetics and Next generation sequencing techniques
- Group assignment: Interpretation and evaluation of clinical and NGS sequencing data of patients with different renal ciliopathies (Case review, whole exome sequencing data filtering, short internet search and concise presentation of results to the other groups)
- Interactive lecture: State-of the-art research approaches to study ciliopathies

Prerequisites

- Basic biological knowledge of the human body and preferentially basic knowledge of the kidney
- Basic knowledge of human genetics

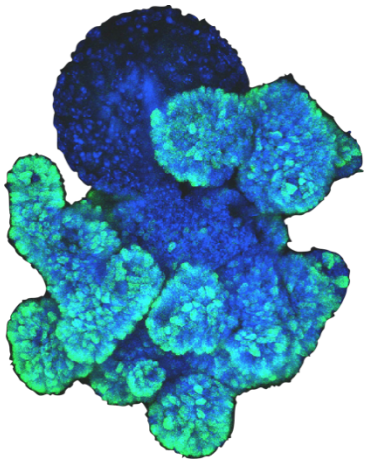
Recommended reading

- Are renal ciliopathies (replication) stressed out? Slaats GG, Giles RH. *Trends Cell Biol.* 25:317-9, 2015
- Ciliopathies: Genetics in Pediatric Medicine. Oud MM, Lamers IJ, Arts HH. *J Pediatr Genet.* 6:18-29, 2017

Renal Replacement Therapies

Lecturer: Luuk Hilbrands, MD, PhD and Martijn Wilmer, PhD

Duration: 5 hrs



Learning objectives

After completing this part, participants will be able to:

1. discuss the various replacement therapies given to patients with a kidney disease
2. describe the recent developments in this field

Description

Patients with end-stage renal disease (ERSD) are unable to remove waste products and fluids from their body. To stay alive, they have to be treated with renal replacement therapy. Currently, there are two available renal replacement treatment options for individuals with ESRD: dialysis and kidney transplantation.

Both modes of treatments have their own merits and shortcomings. In a plenary lecture, we will discuss the current state-of-the-art of dialysis and transplantation and address the limitations of these treatment options. The lecture will be illustrated by a guided tour on the dialysis ward of our university hospital where the working mechanism of dialysis machines is demonstrated during the treatment of patients. Moreover, you will have an interview with a patient who underwent renal transplantation.

The shortage of donor kidneys from deceased donors, has stimulated the use of kidneys from living donors. Currently, more than 60% of the kidney transplantations in the Netherlands are performed with living kidney donors. With innovative solutions, we are now able to cross traditional barriers, e.g. enabling the transplantation between blood group incompatible donors and recipients.

Program

- Interactive lecture: Introduction to renal replacement therapies
- Interview with a patient who underwent renal transplantation
- Hands-on in the laboratory of the Biokid
- A tour at the dialysis center of the Radboud university medical center

Prerequisites

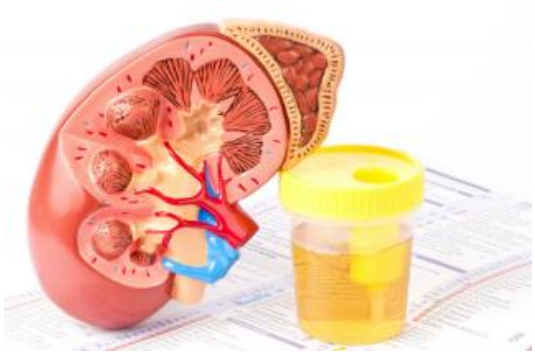
- Basic biological/physiological knowledge of the human body and preferentially basic knowledge of the kidney

Recommended reading

- Urinary microRNA as biomarker in renal transplantation. van de Vrie M, Deegens JK, Eikmans M, van der Vlag J, Hilbrands LB. *Am J Transplant.* 2016 Oct 15. doi: 10.1111
- A strategy for generating kidney organoids: Recapitulating the development in human pluripotent stem cells. Takasato M, Little MH. *Dev Biol.* 420:210-20, 2016

Kidney Biomarkers from Bench to Bedside: a tutorial

Lecturer: Jan van den Brand, PhD



Duration: 3 hrs

Learning objectives

After completing the tutorial, participants:

1. will be able to provide a working definition of the concept biomarker
2. will have a basic understanding of epidemiological research designs to evaluate predictive performance of biomarkers
3. can calculate and interpret predictive performance measures in diagnostic and prognostic biomarker studies
4. will be able create a basic multivariate prediction model using logistic regression (or Cox regression – advanced)
5. can explain the need for external validation, clinical impact assessment and model updating prior to applying a new biomarker to your specific setting

Description

During this tutorial, you will get hands-on experience on how to design, analyze and interpret a clinical epidemiological study to evaluate the predictive performance of a possible diagnostic or prognostic biomarker in kidney disease. The tutorial will consist of interactive lectures and assignments to get you started on your own clinical study. If you are working on a clinical prediction model for diagnosis or prognosis you are invited to bring your own dataset.

Prerequisites

- Basic skills in a statistical software program capable of running multivariate regression analysis (e.g. SPSS, SAS, Stata, R). Access to SPSS, SAS and R is available on campus. If you prefer to use another program, bring your own laptop!

Recommended reading

- Bias in Clinical Research. G, Jager KJ, Dekker FW, Wanner C, Zoccali C. *Kidney Int.* 73:148-53, 2008
- Diagnostic methods I: sensitivity, specificity, and other measures of accuracy. van Stralen KJ, Stel VS, Reitsma JB, Dekker FW, Zoccali C, Jager KJ. *Kidney Int.* 75:1257-63, 2009
- Prognosis and prognostic research: what, why and how? Moons KG, Royston P, Vergouwe Y, Grobbee DE, Altman DG. *BMJ.* 338:b375, 2009

Schedule Radboud Summer School 2017

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
week 1:	06/08/2017	07/08/2017	08/08/2017	09/08/2017	10/08/2017	11/08/2017	12/08/2017
08.30-09.00		Welcome	Glomerular diseases - Smeets	Tubular disorders - Bindels	Ciliopathies - Schmidts	Tutorial Biomarkers	
09.00-09.30		(Aula)	Glomerular diseases - Smeets	Tubular disorders - Bindels	Ciliopathies - Schmidts	Tutorial Biomarkers	
09.30-10.00		Opening Ceremony	Glomerular diseases - Smeets	Tubular disorders - Bindels	Ciliopathies - Schmidts	Tutorial Biomarkers	Start Excursion
10.00-10.30		(Aula)	Glomerular diseases - Smeets	Tubular disorders - Bindels	Prepare challenge	Tutorial Biomarkers	
10.30-11.00			Glomerular diseases - Smeets	Tubular disorders - Bindels	Prepare challenge	Tutorial Biomarkers	
11.00-11.30		Ins and Outs - Hoenderop	Glomerular diseases - Smeets	Tubular disorders - Bindels	Replacments - Hilbrands	Tutorial Biomarkers	
11.30-12.00		Ins and Outs - Hoenderop	Glomerular diseases - Smeets	Prepare challenge	Replacments - Hilbrands	Challenge Presentations	
12.00-12.30	Registration	Lunch	Lunch	Lunch	Lunch	Lunch /	
12.30-13.00	&					Hand in bikes	
13.00-13.30	handing out key to accommodation						
13.30-14.00	(Aula)	Ins and Outs - Hoenderop	Glomerular diseases - Smeets	Prepare challenge	Replacments - Hilbrands	Challenge Presentations	
14.00-14.30		Ins and Outs - Hoenderop	Glomerular diseases - Smeets	Ciliopathies - Schmidts	Replacments - Hilbrands	Challenge Presentations	
14.30-15.00		Challenge outline	Prepare challenge	Ciliopathies - Schmidts	Replacments - Hilbrands	Challenge Presentations	
15.00-15.30		Prepare challenge	Prepare challenge	Ciliopathies - Schmidts	Replacments - Hilbrands	Challenge Presentations	
15.30-16.00		Prepare challenge	Tubular disorders - Bindels	Ciliopathies - Schmidts	Replacments - Hilbrands	Certificate Ceremony	
16.00-16.30		Prepare challenge	Tubular disorders - Bindels	Ciliopathies - Schmidts	Replacments - Hilbrands	Farewell Reception	
16.30-17.00		Prepare challenge	Tubular disorders - Bindels	Ciliopathies - Schmidts	Replacments - Hilbrands	(Aula)	
17.00-17.30							
17.30-18.00							
18.00-18.30			City tour	Guest lecture		Hand in bikes	
18.30-19.00			or	(Aula)		(Car Park Spinoza)	
19.00-19.30	Bike distribution		Boat trip	followed by			
19.30-20.00	(Car Park Spinoza)		Pancake dinner	a BBQ			
20.00-20.30	Welcome reception	Sports programme					
20.30-21.00	(Aula)	(Sports Centre)					End Excursion
21.00-21.30			Pub quiz				
21.30-22.00			(city center)				