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Meeting Report

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5th International Renal Pathology Conference in Zagreb, Croatia: Meeting Report

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General Overview

The 5th International Renal Pathology Conference was held at the School of Medicine, University of Zagreb, from 18th to 20th May 2023. The organizers were the Renal Pathology Society (RPS) in cooperation with the Nephropathology Working Group of the European Society of Pathology (ESP), International Society of Nephrology (ISN), European Renal Association (ERA), Croatian Society of Nephrology, Dialysis and Transplantation, Sergei Saltykov Foundation, Croatian Renal Association, and Dubrava University Hospital. The local organizers were the Institute of Pathology of the School of Medicine, University of Zagreb, and the Nephropathology Working Group of the Croatian Society for Pathology and Forensic Medicine.

The conference was held in a hybrid format, live and virtually via Zoom. There was a total of 370 participants, of which 180 were live and 190 were virtual (Fig. 1, 2) The program included 27 invited lecturers who are renowned international experts in the field of kidney pathology, pediatric and adult nephrology, rheumatology, and clinical genetics, who presented the latest findings on various kidney diseases. A clinical-pathological conference was held every day, during which 17 interesting cases were presented and discussed. Additionally, the Chairs of the Research and Science Committee and the Education and Training Committee of the RPS presented the role and work of said committees. A total of 81 abstracts were accepted, of which 14 were selected for case presentations during clinicopathological conferences, and 61 were selected for poster presentation. Participants had the opportunity to vote for the best posters, and three authors were awarded prizes for the best posters.

A total of 19 scholarships were awarded, including 2 Helen Liapis awards, 10 RPS scholarships, and 7 ISN scholarships. It is important to state that some lecturers generously waived their fees for travel to Croatia, providing additional financial assistance for participants from low- and middle-income countries.

Opening Ceremony

As the host, Danica Galešić Ljubanović gave the opening words. After the opening speeches and introduction, Sven Seirwerth spoke about the history of the Institute of Pathology, University of Zagreb, School

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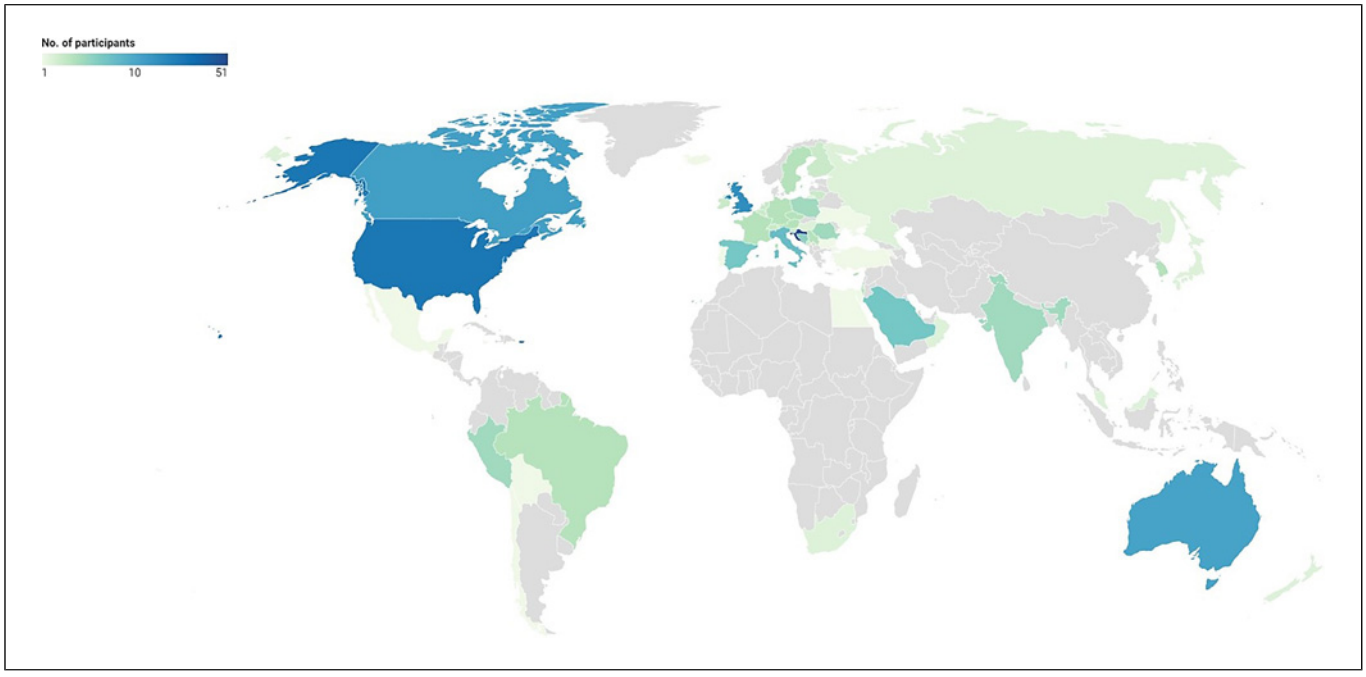

Fig. 1. Worldwide distribution of congress participants.

Fig. 2. Congress participants and lecturers on site.

of Medicine, and Matija Horaček presented the history of the Renal Pathology at the same institution. Helen Liapis gave a photographic overview of the RPS history including worldwide initiatives. Charles Jennette gave an inspiring lecture with messages to young colleagues after half a century as a nephropathologist. Their lectures are available at https://www.renalpathsoc.org/page-1075803.

The local organizers founded an award in honor of Mira Šćukanec Špoljar, Professor of Pathology, who was a pioneer of nephropathology in Croatia and made an indispensable contribution to the development of nephropathology in Croatia and the region. The first-time prize was awarded to Charles Jennette for his outstanding contributions to the development of nephropathology worldwide.

Session 1: Kidney Biopsy – An Overview

The first Congress session was an overview of kidney biopsies in general. Krešimir Galešić, a nephrologist from Zagreb, spoke about the history, safety, and importance of kidney biopsy and concluded his lecture by remarking that there was no nephrology without nephropathology. Joris J. Roelofs spoke about the essentials of a diagnostic approach and the reporting of kidney biopsies [1, 2]. Surya V. Seshan gave an overview about classification systems of glomerular diseases [2]. Glomerular disease classifications are an evolving process which makes them amenable for periodic future modifications, based on multiple factors such as validation studies, features of clinical relevance, progress in further morphologic granularity of individual lesions or descriptors, and the development of more refined definitions and applications of advanced techniques (such as mass spectrometry, digital and computational

pathology). Some common classifications, scoring systems, and other algorithmic approaches include renal lesions in lupus nephritis, IgA nephropathy, ANCA-associated crescentic glomerulonephritis (GN), diabetic kidney disease, membranoproliferative GN, organized deposits, and others. She stated that awareness of the current progress in the classification systems and their clinical relevance for diagnosis, prognosis, and therapy is needed, earning us a place at the table in the multidisciplinary team of patient care. Amelie Dendooven spoke about kidney biopsy registries and coding systems, results of the Kidney Biopsy Codes (KBC) for Pathologist Project (https://kibico.org/), how the comprehensive coding system was made, and how KBC team plans to collaborate with SNOMED international to make a subset in SNOMED CT [3]. The last lecture in the first session was dedicated to digital transformation in nephropathology. Arvydas Laurinavicius spoke about how digital and computational nephropathology enables workflow benefits to serve clinicians and patients, support and automation for pathologists, enhances accuracy, precision, and capacity of scoring and quantification machine learning to discover and assess subvisual features.

Session 2: IgA Nephropathy and IgA Vasculitis (Henoch-Schönlein Purpura)

Mark Haas began this session with an update on IgAN and IgAV. He spoke about pathologic classification of IgAV and presented international study findings which suggest that MEST-C scoring should be included in kidney biopsy reports of IgAV. Results of colocalization of immune reactants within glomerular immune complex deposits using confocal Immunofluorescent microscopy were presented [4, 5]. Agnieszka Perkowska-Ptasińska gave a lecture about IgAV, concluding that the pathogenesis is multifactorial, depending on genetic and environmental factors. She indicated that the prognosis is excellent in most cases, although less favorable in adult patients and that the kidney is the only organ in which involvement has an impact on long-term prognosis both in children and in adults. Renate Kain presented exceptional cases of glomerular disease with IgA deposits, including IgA deposits in ANCA-associated vasculitis (AAV) and IgA deposits in postinfectious GN with the take home message that the evaluation of mesangial IgA deposits requires using all diagnostic investigations (LM, IHC/IF, EM), as well as the clinical context and history to determine the diagnosis and therapeutic approach [6].

Session 3: Vasculitides and the Kidney and Membranous Nephropathy

The session started with Ingeborg Bajema's overview and classification of systemic vasculitides. She presented how the international validation study and meta-analysis in Berden's classification showed no difference of kidney outcome between crescentic and mixed classes after adjusting for differences in patient populations, treatment, and for interobservers agreement [7, 8]. She concluded that both the classification and the risk score were designed on the basis of clinical and histological data from an era in which there was a fairly standardized treatment for AAV and that monitoring adjusted long-term outcomes of patients with ANCA-related GN should go hand in hand with modifications in the classification and the risk score. Charles Jennette reviewed anti-glomerular basement membrane antibody disease (anti-GBM) and how dialysis dependency, low percentage of normal glomeruli and a large extent of interstitial infiltrate are associated with poor kidney outcome [9]. He showed atypical cases of anti-GBM disease including dual positive anti-GBM and ANCA GN, anti-GBM GN with immune complex GN, alloimmune anti-GBM GN in patients with genetic type IV collagen mutations who received a kidney transplant, and atypical anti-GBM GN with unusual or undetectable anti-GBM autoantibody [10]. Augusto Vaglio talked about how pediatric and adult-onset AAV have strikingly similar phenotypes (extrarenal and renal features, including histology) and that approximately 30% of children with AAV develop kidney failure, but treatment-induced remission may be sustained and long-term kidney function can be preserved in responding patients. He presented data on ADA2 deficiency as a monogenic form of PAN that involves small- and medium-sized kidney arteries [11–13]. Sanjeev Sethi presented new antigens in membranous nephropathy (MN) including EXT1/EXT2 (present in MN patients with autoimmune disease), NELL-1 (with no associated disease or association with drugs and malignancy), Sema3B (a unique type of primary MN more likely to be present in pediatric patients), PCDH7 (antigen in small subset of MN patients that are negative for all the known antigens), Protocadherin FAT1 (patients with hematopoietic stem cell transplant), NDNF

(target antigen in syphilis), and PCSK6 (likely target antigen in NSAID-MN) [14–18].

Following this session, Shana Coley, representing the RPS Research and Scientific Committee and Nicolas Kozakowski, representing the RPS Education and Training Committee, presented updates on RPS committees' activity. The session ended with a clinicopathologic conference in which six cases were presented.

Session 4: Genetics of Kidney Disease

In this session, Danica Galešić Ljubanović (conference host) spoke about diseases due to mutations of the collagen type IV genes, how there is a great variability among those disorders, and how they are considered as a spectrum of disease with thin glomerular basement membrane (GBM) nephropathy on one side and "classic" Alport syndrome on the other side with many disorders in between, including genetic FSGS [19]. She also spoke about issues regarding GBM measurements. Astrid Weins gave a lecture about the genetics of nephrotic syndrome and spoke about anti-nephrin-positive minimal change disease [20]. She concluded that the situation is much more complex than we thought, that it is important for us to critically think about individual patients with nephrotic syndrome, and that our ultimate goal in this disease should be to establish genetic and acquired predisposing factors, disease initiation factors, and disease progression factors. Zoltan Prohaszka spoke about how complement dysregulation is related to multiple factors (common or rare inherited, and acquired), how C5 inhibitors control the terminal pathway but leave proximal complement (opsonization, anaphylatoxin C3a, cell activation, proliferation, frustrated phagocytosis) unaffected, and that novel, proximal complement inhibitors are currently being evaluated [21]. Nine Knoers spoke about massive parallel sequencing-based genetic testing, how it found its place in routine clinical diagnostics of monogenic kidney diseases/CKD with important implications for diagnostic yield and management, and how genetic testing and kidney biopsy are complementary diagnostic tests [22]. A "genetics-first" approach may be considered for establishing diagnosis in patients with early-onset CKD, in whom clear-cut nongenetic diagnoses have been excluded [22]. Kidney biopsy results provide valuable diagnostic and therapeutic information when genetic testing is inconclusive, or when the kidney disease is thought to be due to nongenetic factors, and also allow assessment of disease progression and secondary processes related and unrelated to underlying genetic disease.

Session 5: Tubulointerstitial Diseases

Lois Arend gave an overview of the most common tubulointerstitial diseases. She stated that there is considerable overlap in tubular and interstitial disease in many different conditions and that careful consideration and correlation with the clinical scenario are required. Kerstin Amann gave a lecture about autosomal dominant tubulointerstitial kidney disease (ADTKD). ADTKD is considered the third most frequent inherited kidney disorder, after ADPKD and Alport syndrome, with a frequency of about 3% in CKD patients [23, 24]. ADTKD is a group of diseases where morphological information (although of great importance) is limited (limited reaction patterns of the kidney). Molecular biology and genetics are needed to better classify and perhaps also treat these renal diseases. She stated that it is a responsibility of the renal pathologist to ask for additional genetic tests where appropriate, understanding that, as the natural history is poorly defined, patients with ADTKD face challenges related to delayed diagnosis, inappropriate workup, family burden, lack of medical knowledge, and absence of specific therapy [25]. Carmen Avila-Casado spoke about chronic kidney disease of unknown origin (CKDu) or Mesoamerican nephropathy [26]. CKDu affects different regions of the world and is characterized by primary tubulointerstitial disease. The definitive diagnosis hinges on the demonstration of compatible histopathological changes on kidney biopsy in the absence of known etiological factors. Clinical indications for kidney biopsy in non-proteinuric kidney diseases such as CKDu are not standardized. Kidney biopsy is useful in endemic areas to exclude other known causes of CKDu (which have specific treatments), assess the severity of the disease, and integrate a systematic approach.

Session 6: Kidney Biopsy in the Elderly Population and Pregnancy

Jorge Fonseca-Correa commenced this session with a lecture about biopsy in the elderly and very elderly from a nephrologist's perspective. He concluded that kidney biopsy in older adults is a safe and effective procedure important for diagnosis, treatment, and prognosis and that age should not be a limitation. He stated that the

Table 1. The survey on congress quality filled out by 202 participants

Statements	The proportion of participants who agree with the statement
The program was well structured	97.03%
The content of program allowed me to update my knowledge in renal pathology	98.51%
Sufficient time was allocated for each topic	93.56%
The take home message for the lectures were clearly defined	97.52%
The 5th IRPC meeting promotes networking and collaboration	89.11%
Did the 5th IRPC meet your expectations?	96.53%

presentation of disease may be different from usual and that biopsy changes management in up to 70% of patients [27]. Anila Abraham Kurien presented a pathologist's perspective on the same matter. She spoke about how the world population is expected to double by 2050 and how it is difficult to distinguish age-related from disease-related changes in the kidney [28]. Many of the diseases diagnosed in that time of life are treatable and potentially reversible. Even in patients whose renal biopsy does not show lesions that can modify the therapy, it can inform with respect to prognosis and/or avoid unnecessary treatment. Maria Picken gave an update on monoclonal gammopathies, stating that the role of kidney biopsy in patients with monoclonal gammopathy of undetermined significance (MGUS) is to link the kidney disease with the clone responsible for the monoclonal immunoglobulin. This would change the diagnosis from MGUS to monoclonal gammopathy of renal significance (MGRS). Additionally, in patients with no known MGUS, a diagnosis of MGRS provides an opportunity to identify a pathogenic clone and effect appropriate treatment [29, 30]. She stated that the classification of MGRS is evolving as our diagnostic precision and treatment options expand. Laura Magee spoke about hypertension in pregnancy and how pre-eclampsia is a disorder of endothelial cell dysfunction and is multisystem in its manifestations. The session ended with a clinicopathologic conference where seven cases were presented.

Session 7: Transplant Kidney Pathology

In the last session, Candice Roufosse talked about how the pathology of antibody-mediated rejection (AMR) is a well-defined phenotype that was not changed at the Banff 2022 Meeting, and how the Banff AMR definition is complex and may be difficult to implement. However, the Banff 2022 Meeting defined within the "No AMR" diagnosis two phenotypes for further investigation: microvascular injury-positive, DSA-negative, C4d-negative, and probable AMR [31]. The Banff 2022 also proposes step-wise new approaches to diagnosis: morphology to causality and activity and chronicity scores [32]. Mark Haas gave an update on T-cell-mediated rejection (TCMR) concluding that, contrary to some prior published opinions based on molecular data, TCMR (including subclinical TCMR) often leads to scarring and late graft loss [33]. He stated that perhaps some of the confusion here relates to there being markedly reduced expression of transcripts comprising the TCMR classifier late in the course of TCMR, yet there is continued expression of injury and atrophy-fibrosis transcripts [34]. He spoke about how the risk for development of TCMR, and particularly persistent/recurrent TCMR, is associated with the number of eplet molecular HLA DR/DQ mismatches and that it is therefore important that patients with intermediate to high mismatch scores not be under-immunosuppressed. Nicolas Kozakowski talked about how the pathology of late graft loss is challenging [35] and how ABMR and GN are driving forces, leading to graft loss [36]. Helmut Hopfer spoke about borderline rejection. He emphasized the need to acknowledge the alloimmune nature of inflammation and tubulitis, regardless of its severity, how the identification of clinically relevant risk markers beyond the established Banff scores is challenging, and the importance of recognizing and reporting the scores in routine practice. The session ended with a clinicopathologic conference where four cases were presented.

Reactions to Congress

The organizers are honored that the conference went according to plan and exceeded expectations. The participants expressed great satisfaction with the program, organization, and hospitality, and in the survey filled out by 202 participants, they gave the congress an average rating of 9/10 (shown in Table 1).

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Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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