

Summary of the kidney review

1. Extensive background and experimental systems for kidney heart and liver rejection
 - a. Extensive annotation of gene changes as transcript sets.
2. Analytical tools, including cross validation and archetypal analysis.
3. Gene expression changes in herds – need Classifiers
4. Molecular landscape.
 - a. Top Genes and pathways reveal the biology.
5. Archetypal analysis of rejection currently identifies six states
6. Molecular features of recent parenchymal increased injury and of atrophy fibrosis.
7. **The report**
 - a. Discrepancies: Agreement with histology is limited to some extent by the noise in histology and inter-observer disagreement.
8. Recent and ongoing developments
 - a. Time course.
 - b. What does rejection do to parenchymal injury.
 - c. No adherence. Survival. DSA negative ABMR.
 - d. What lies beneath: subtle ABMR
9. Dissecting kidney injury and its relationship to function and survival.
10. dd-cfDNA correlates with active ABMR.
11. An integrated view

Key references

1. Madill-Thomsen KS, Bohmig GA, Bromberg J, Einecke G, Eskandary F, Gupta G, et al. Relating molecular T cell-mediated rejection activity in kidney transplant biopsies to time and to histologic tubulitis and atrophy-fibrosis. *Transplantation* 2022;107(5):1102-1114.
2. Halloran PF, Madill-Thomsen KS, Pon S, Sikosana MLN, Bohmig GA, Bromberg J, et al. Molecular diagnosis of ABMR with or without donor-specific antibody in kidney transplant biopsies: differences in timing and intensity but similar mechanisms and outcomes *Am J Transplant*. 2022;22(8):1976-91.
3. Halloran PF, Böhmig GA, Bromberg J, Einecke G, Eskandary FA, Gupta G, et al. Archetypal Analysis of Injury in Kidney Transplant Biopsies Identifies Two Classes of Early AKI. *Frontiers in Medicine*. 2022;9(Article 817324):1-12.
4. Madill-Thomsen KS, Bohmig GA, Bromberg J, Einecke G, Eskandary F, Gupta G, et al. Donor-Specific Antibody Is Associated with Increased Expression of Rejection Transcripts in Renal Transplant Biopsies Classified as No Rejection. *J Am Soc Nephrol*. 2021;32(11):2743-58.
5. Halloran PF, Reeve J, Madill-Thomsen KS, Demko Z, Prewett A, Billings P, et al. The Trifecta Study: Comparing Plasma Levels of Donor-derived Cell-Free DNA with the Molecular Phenotype of Kidney Transplant Biopsies. *J Am Soc Nephrol*. 2022;33(2):387-400.
6. Halloran PF, Reeve J, Madill-Thomsen KS, Demko Z, Prewett A, Gauthier P, et al. Antibody-mediated rejection without detectable donor-specific antibody releases donor-derived cell-free DNA: results from the Trifecta study. *Transplantation*. 2022;In press.
7. Halloran PF, Reeve J, Madill-Thomsen KS, Kaur N, Ahmed E, Cantos C, et al. Combining donor-derived cell-free DNA fraction and quantity to detect kidney transplant rejection using molecular diagnoses and histology as confirmation. *Transplantation*. 2022;June 29, 2022 - Volume - Issue - 10.1097/TP.0000000000004212 doi: 10.1097/TP.0000000000004212.
8. Halloran PF, Bohmig GA, Bromberg JS, Budde K, Gupta G, Einecke G, et al. Discovering novel injury features in kidney transplant biopsies associated with TCMR and donor aging. *Am J Transplant*. 2021;21(5):1725-39.

9. Einecke G, Reeve J, Gupta G, Bohmig GA, Eskandary F, Bromberg JS, et al. Factors associated with kidney graft survival in pure antibody-mediated rejection at the time of indication biopsy: Importance of parenchymal injury but not disease activity. *Am J Transplant.* 2021;21(4):1391-401.
10. Madill-Thomsen K, Perkowska-Ptasinska A, Bohmig GA, Eskandary F, Einecke G, Gupta G, et al. Discrepancy analysis comparing molecular and histology diagnoses in kidney transplant biopsies. *Am J Transplant.* 2020;20(5):1341-50.
11. Reeve J, Bohmig GA, Eskandary F, Einecke G, Gupta G, Madill-Thomsen K, et al. Generating automated kidney transplant biopsy reports combining molecular measurements with ensembles of machine learning classifiers. *Am J Transplant.* 2019;19(10):2719-31.
12. Famulski KS, Reeve J, de Freitas DG, Kreepala C, Chang J, Halloran PF. Kidney transplants with progressing chronic diseases express high levels of acute kidney injury transcripts. *Am J Transplant.* 2013;13(3):634-44.
13. Famulski KS, de Freitas DG, Kreepala C, Chang J, Sellares J, Sis B, et al. Molecular phenotypes of acute kidney injury in kidney transplants. *J Am Soc Nephrol.* 2012;23(5):948-58.
14. Reeve J, Bohmig GA, Eskandary F, Einecke G, Lefaucheur C, Loupy A, et al. Assessing rejection-related disease in kidney transplant biopsies based on archetypal analysis of molecular phenotypes. *JCI Insight.* 2017;2(12):e94197.