

# Stanford

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## Alan C. Pao

Associate Professor of Medicine (Nephrology) and, by courtesy, of Urology  
Medicine - Nephrology

### CLINICAL OFFICE (PRIMARY)

- **Nephrology Division**

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### Bio

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### CLINICAL FOCUS

- Kidney Stones
- Nephrology

### ACADEMIC APPOINTMENTS

- Associate Professor - University Medical Line, Medicine - Nephrology
- Associate Professor - University Medical Line (By courtesy), Urology
- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Maternal & Child Health Research Institute (MCHRI)

### HONORS AND AWARDS

- Phi Beta Kappa, Stanford University (1994)
- Dr. Lee B. Harrison Scholarship, Washington University School of Medicine (1997)
- John S. Miller Award, University of Texas Southwestern Medical Center (2001)
- SPARK Scholar, Stanford University (2010, 2021)
- Elected member, Research on Calculus Kinetics (ROCK) Society (kidney stone research society) (2022)

### PROFESSIONAL EDUCATION

- Board Certification: Nephrology, American Board of Internal Medicine (2016)
- Fellowship: UCSF Dept of Nephrology (2006) CA
- Residency: University of Texas Southwestern Medical Center (2001) TX
- M.D., Washington University, Medicine (1998)
- B.S., Stanford University, Biological Sciences (1994)

## LINKS

- Stanford Kidney Stone Clinic: <https://med.stanford.edu/kidneystones.html>

## Research & Scholarship

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### CURRENT RESEARCH AND SCHOLARLY INTERESTS

We are broadly interested in how the kidneys control salt, water, and electrolyte homeostasis in the body. Our disease focus is on kidney stone disease. We use cultured kidney cells, transgenic mice, human plasma/urine samples, and electronic health record data to study the pathogenesis of kidney stone disease. Our therapeutic focus is on the development of small molecule compounds that can be used for kidney stone prevention.

## Teaching

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### STANFORD ADVISEES

#### Postdoctoral Faculty Sponsor

Kaleb Thomas

### GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Medicine (Masters Program)

## Publications

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### PUBLICATIONS

- **Representation of Real-World Adults With Chronic Kidney Disease in Clinical Trials Supporting Blood Pressure Treatment Targets.** *Journal of the American Heart Association*  
Li, J., An, J., Huang, M., Zhou, M., Montez-Rath, M. E., Niu, F., Sim, J. J., Pao, A. C., Charu, V., Odden, M. C., Kurella Tamura, M.  
2024; e031742
- **Clinical Outcomes after a Kidney Stone Event in Kidney Transplant Recipients.** *Clinical journal of the American Society of Nephrology : CJASN*  
Ganesan, C., Liu, S., Montez-Rath, M., Leppert, J. T., Pao, A. C.  
2024
- **The Nephrologist's Role in the Management of Kidney Cancer: A Renaissance.** *American journal of kidney diseases : the official journal of the National Kidney Foundation*  
Ganesan, C., Pao, A. C., Leppert, J. T.  
2023
- **Treatment and Control of Hypertension Among Adults With Chronic Kidney Disease, 2011 to 2019.** *Hypertension (Dallas, Tex. : 1979)*  
Martinez, J. D., Thomas, I. C., Montez-Rath, M. E., Pao, A. C., Fung, E., Charu, V., Sim, J. J., An, J., Odden, M. C., Kurella Tamura, M.  
2023
- **Hypocitraturia and Risk of Bone Disease in Patients With Kidney Stone Disease.** *JBMR plus*  
Ganesan, C., Thomas, I. C., Montez-Rath, M. E., Chertow, G. M., Leppert, J. T., Pao, A. C.  
2023; 7 (9): e10786
- **A widely distributed gene cluster compensates for uricase loss in hominids.** *Cell*  
Liu, Y., Jarman, J. B., Low, Y. S., Augustijn, H. E., Huang, S., Chen, H., DeFeo, M. E., Sekiba, K., Hou, B. H., Meng, X., Weakley, A. M., Cabrera, A. V., Zhou, et al  
2023; 186 (16): 3400-3413.e20
- **Response to Alkali Administration in Women and Men With and Without CKD.** *Kidney medicine*  
Pao, A. C., Shahzad, S. R., Song, S., Ganesan, C., Conti, S., Leppert, J., Cheung, A. K., Ix, J. H., Isakova, T., Wolf, M., Raj, D. S., Sprague, S. M., Fried, et al  
2023; 5 (7): 100670

- **Groundwater constituents and the incidence of kidney cancer.** *Cancer*  
Soerensen, S. J., Montez-Rath, M. E., Cheng, I., Gomez, S. L., Oh, D. L., Jackson, C., Li, J., Rehkopf, D., Chertow, G. M., Langston, M. E., Ganesan, C., Pao, A. C., Chung, et al  
2023
- **Kidney Stone Events after Kidney Transplant in the United States.** *Clinical journal of the American Society of Nephrology : CJASN*  
Ganesan, C., Holmes, M., Liu, S., Montez-Rath, M., Conti, S., Chang, T. C., Lenihan, C. R., Cheng, X. S., Chertow, G. M., Leppert, J. T., Pao, A. C.  
2023
- **Estimated Effect of Parathyroidectomy on Long-Term Kidney Function in Adults With Primary Hyperparathyroidism.** *Annals of internal medicine*  
Seib, C. D., Ganesan, C., Furst, A., Pao, A. C., Chertow, G. M., Leppert, J. T., Suh, I., Montez-Rath, M. E., Harris, A. H., Trickey, A. W., Kebebew, E., Tamura, M. K.  
2023
- **Breaking the Cycle of Recurrent Calcium Stone Disease.** *Advances in kidney disease and health*  
Malieckal, D. A., Ganesan, C., Mendez, D. A., Pao, A. C.  
2023; 30 (2): 164-176
- **Specialist Care, Metabolic Testing, and Testing Completeness Among U.S. Veterans with Urinary Stone Disease.** *Urology practice*  
Hsi, R. S., Valicevic, A. N., Patel, S. R., Oerline, M. K., Pao, A. C., Leppert, J. T., Hollingsworth, J. M., Shahinian, V.  
2023; 10 (1): 49-56
- **National Imaging Trends for Suspected Urinary Stone Disease in the Emergency Department.** *JAMA internal medicine*  
Ganesan, C., Stedman, M. R., Liu, S., Conti, S. L., Chertow, G. M., Leppert, J. T., Pao, A. C.  
2022
- **Chronic activation of vasopressin-2 receptors induces hypertension in Liddle mice by promoting Na<sup>+</sup> and water retention.** *American journal of physiology. Renal physiology*  
Stockand, J. D., Mironova, E. V., Xiang, H., Soares, A. G., Contreras, J., McCormick, J. A., Gurley, S. B., Pao, A. C.  
2022; 323 (4): F468-F478
- **Acid-Mediated Kidney Injury Across the Spectrum of Metabolic Acidosis.** *Advances in chronic kidney disease*  
Ravikumar, N. P., Pao, A. C., Raphael, K. L.  
2022; 29 (4): 406-415
- **Role of insulin resistance and the gut microbiome on urine oxalate excretion in ob/ob mice.** *Physiological reports*  
Xiang, H., Chen, H., Liu, Y., Dodd, D., Pao, A. C.  
2022; 10 (14): e15357
- **Kidney stone events following parathyroidectomy vs. non-operative management for primary hyperparathyroidism.** *The Journal of clinical endocrinology and metabolism*  
Seib, C. D., Ganesan, C., Arnow, K. D., Pao, A. C., Leppert, J. T., Barreto, N. B., Kebebew, E., Tamura, M. K.  
2022
- **Renal Morbidity Following Radical Cystectomy in Patients with Bladder Cancer.** *European urology open science*  
Schmidt, B., Velaer, K. N., Thomas, I., Ganesan, C., Song, S., Pao, A. C., Thong, A. E., Liao, J. C., Chertow, G. M., Skinner, E. C., Leppert, J. T.  
1800; 35: 29-36
- **Twenty-four-hour Urine Testing and Urinary Stone Disease Recurrence in Veterans** *UROLOGY*  
Song, S., Thomas, I., Ganesan, C., Velaer, K. N., Chertow, G. M., Pao, A. C., Leppert, J. T.  
2022; 159: 33-40
- **Urine oxalate and citrate excretion in patients with kidney stone disease: An ab initio clinical prediction.** *Physiological reports*  
Ganesan, C., Pao, A. C.  
2021; 9 (15): e14966
- **Risk of Postpartum Urinary Stone Disease in Women with History of Urinary Stone Disease During Pregnancy.** *Journal of endourology*  
Spradling, K., Zhang, C. A., Pao, A. C., Liao, J. C., Leppert, J. T., Elliott, C. S., Conti, S. L.  
2021

- **Association of parathyroidectomy with 5-year clinically significant kidney stone events in patients with primary hyperparathyroidism.** *Endocrine practice : official journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists*  
Seib, C. D., Ganesan, C., Arnow, K. D., Suh, I., Pao, A. C., Leppert, J. T., Tamura, M. K., Trickey, A. W., Kebebew, E.  
2021
- **Removing Race from eGFR calculations: Implications for Urologic Care.** *Urology*  
Wilson, F. L., Schmidt, B., White, L., Soerensen, S. J., Ganesan, C., Pao, A. C., Enemchukwu, E., Chertow, G. M., Leppert, J. T.  
2021
- **Osteoporosis, Fractures, and Bone Mineral Density Screening in Veterans With Kidney Stone Disease.** *Journal of bone and mineral research : the official journal of the American Society for Bone and Mineral Research*  
Ganesan, C., Thomas, I., Romero, R., Song, S., Conti, S., Elliott, C., Chertow, G. M., Tamura, M. K., Leppert, J. T., Pao, A. C.  
2021
- **Evaluation of Patient Treatment Preferences for 15-20mm Kidney Stones: A Conjoint Analysis.** *Journal of endourology*  
Spradling, K., Bhambhani, H. P., Chang, T. C., Pao, A. C., Liao, J. C., Leppert, J. T., Welk, B., Harris, C. R., Conti, S. L., Elliott, C. S.  
2020
- **Analysis of Primary Hyperparathyroidism Screening Among US Veterans With Kidney Stones.** *JAMA surgery*  
Ganesan, C., Weia, B., Thomas, I., Song, S., Velaer, K., Seib, C. D., Conti, S., Elliott, C., Chertow, G. M., Kurella Tamura, M., Leppert, J. T., Pao, A. C.  
2020
- **SLIPS-LAB-A bioinspired bioanalysis system for metabolic evaluation of urinary stone disease.** *Science advances*  
Li, H., Shkolyar, E., Wang, J., Conti, S., Pao, A. C., Liao, J. C., Wong, T. S., Wong, P. K.  
2020; 6 (21)
- **The Urine Albumin-Creatinine Ratio and Kidney Function after Nephrectomy.** *The Journal of urology*  
Sun, A. J., Thomas, I., Velaer, K. N., Ganesan, C., Song, S., Pao, A. C., Wagner, T. H., Brooks, J. D., Chertow, G. M., Leppert, J. T.  
2020: 101097JU000000000000001005
- **Urinary Stone Disease in Pregnancy: Current Management Practices in a Large National Cohort.** *Urology*  
Spradling, K. n., Sohlberg, E. M., Li, S. n., Zhang, C. A., Brubaker, W. D., Dallas, K. n., Pao, A. C., Liao, J. n., Leppert, J. T., Elliott, C. S., Chung, B. I., Min, G. E., Conti, et al  
2020
- **Urinary Stone Disease in Pregnancy: A Claims-Based Analysis of 1.4 Million Patients.** *The Journal of urology*  
Sohlberg, E. M., Brubaker, W. D., Zhang, C. A., Anderegg, L. D., Dallas, K., Song, S., Ganesan, C., Chertow, G., Pao, A., Liao, J., Leppert, J. T., Elliott, C. S., Conti, et al  
2019: 101097JU00000000000000657
- **Ultra-low-dose CT: An Effective Follow-up Imaging Modality for Ureterolithiasis.** *Journal of endourology*  
Cheng, R. Z., Shkolyar, E., Chang, T. C., Spradling, K., Ganesan, C., Song, S., Pao, A. C., Leppert, J. T., Elliott, C. S., To'o, K., Conti, S. L.  
2019
- **Prevalence of twenty-four hour urine testing in Veterans with urinary stone disease.** *PloS one*  
Ganesan, C. n., Thomas, I. C., Song, S. n., Sun, A. J., Sohlberg, E. M., Kurella Tamura, M. n., Chertow, G. M., Liao, J. C., Conti, S. n., Elliott, C. S., Leppert, J. T., Pao, A. C.  
2019; 14 (8): e0220768
- **Spirolactone plus patiromer: proceed with caution.** *Lancet (London, England)*  
Ganesan, C. n., Pao, A. C.  
2019; 394 (10208): 1486–88
- **Twenty-Four Hour Urine Testing and Prescriptions for Urinary Stone Disease-Related Medications in Veterans.** *Clinical journal of the American Society of Nephrology : CJASN*  
Song, S. n., Thomas, I. C., Ganesan, C. n., Sohlberg, E. M., Chertow, G. M., Liao, J. C., Conti, S. n., Elliott, C. S., Pao, A. C., Leppert, J. T.  
2019
- **Payer Type, Race/Ethnicity, and the Timing of Surgical Management of Urinary Stone Disease** *JOURNAL OF ENDOUROLOGY*  
Brubaker, W. D., Dallas, K. B., Elliott, C. S., Pao, A. C., Chertow, G. M., Leppert, J. T., Conti, S. L.

2019; 33 (2): 152–58

- **Unplanned Emergency Department Visits and Hospital Admissions Following Ureteroscopy: Do Ureteral Stents Make a Difference?** *UROLOGY*  
Mittakanti, H. R., Conti, S. L., Pao, A. C., Chertow, G. M., Liao, J. C., Leppert, J. T., Elliott, C. S.  
2018; 117: 44–49
- **PREOPERATIVE KIDNEY FUNCTION TRENDS: IMPROVING ESTIMATES OF BASELINE KIDNEY FUNCTION PRIOR TO KIDNEY CANCER SURGERY**  
Sun, A., Thomas, C., Ganesan, C., Sylman, J., Pao, A., Wagner, T., Brooks, J., Chertow, G., Leppert, J.  
ELSEVIER SCIENCE INC.2018: E362
- **Redefining the Stone Belt: Precipitation is Associated with Increased Risk of Urinary Stone Disease.** *Journal of endourology*  
Dallas, K. B., Conti, S. L., Liao, J. C., Sofer, M. n., Pao, A. C., Leppert, J. T., Elliott, C. S.  
2017
- **Crescentic Glomerulonephritis With Immunoglobulin G4-Related Disease.** *The American journal of the medical sciences*  
Raber, I. n., Ediriwickrema, A. n., Higgins, J. n., Kambham, N. n., Pao, A. C.  
2017; 354 (3): 236–39
- **An experimentum crucis in salt sensitivity.** *American journal of physiology. Renal physiology*  
Pao, A. C., Chang, T. I.  
2017; 312 (1): F190-F191
- **SGK1 regulation by miR-466g in cortical collecting duct cells** *AMERICAN JOURNAL OF PHYSIOLOGY-RENAL PHYSIOLOGY*  
Jacobs, M. E., Kathalia, P. P., Chen, Y., Thomas, S. V., Noonan, E. J., Pao, A. C.  
2016; 310 (11): F1251-F1257
- **There and back again: insulin, ENaC, and the cortical collecting duct.** *Physiological reports*  
Pao, A. C.  
2016; 4 (10)
- **Serum- and glucocorticoid-inducible kinase SGK2 regulates human organic anion transporters 4 via ubiquitin ligase Nedd4-2.** *Biochemical pharmacology*  
Wang, H., Xu, D., Toh, M. F., Pao, A. C., You, G.  
2016; 102: 120-129
- **Harvest and primary culture of the murine aldosterone-sensitive distal nephron.** *American journal of physiology. Renal physiology*  
Labarca, M., Nizar, J. M., Walczak, E. M., Dong, W., Pao, A. C., Bhalla, V.  
2015; 308 (11): F1306-15
- **Activation of ENaC by AVP contributes to the urinary concentrating mechanism and dilution of plasma.** *American journal of physiology. Renal physiology*  
Mironova, E., Chen, Y., Pao, A. C., Roos, K. P., Kohan, D. E., Bugaj, V., Stockand, J. D.  
2015; 308 (3): F237-43
- **Urine electrolyte composition and diuretic therapy in heart failure: back to the future?** *Circulation. Heart failure*  
Pao, A. C., Chertow, G. M.  
2014; 7 (5): 697-698
- **Update on the Guytonian view of hypertension.** *Current opinion in nephrology and hypertension*  
Pao, A. C.  
2014; 23 (4): 391-398
- **Prostaglandin E2 induces chloride secretion through crosstalk between cAMP and calcium signaling in mouse inner medullary collecting duct cells.** *American journal of physiology. Cell physiology*  
Rajagopal, M., Thomas, S. V., Kathalia, P. P., Chen, Y., Pao, A. C.  
2014; 306 (3): C263-78
- **Fulvene-5 inhibition of Nadph oxidases attenuates activation of epithelial sodium channels in A6 distal nephron cells** *AMERICAN JOURNAL OF PHYSIOLOGY-RENAL PHYSIOLOGY*  
Trac, D., Liu, B., Pao, A. C., Thomas, S. V., Park, M., Downs, C. A., Ma, H., Helms, M. N.  
2013; 305 (7): F995-F1005

- **Novel diuretic targets** *AMERICAN JOURNAL OF PHYSIOLOGY-RENAL PHYSIOLOGY*  
Denton, J. S., Pao, A. C., Maduke, M.  
2013; 305 (7): F931-F942
- **Landscape of ENaC regulation in the kidney** *AMERICAN JOURNAL OF PHYSIOLOGY-RENAL PHYSIOLOGY*  
Pao, A. C.  
2012; 303 (9): F1287-F1288
- **Prostaglandin E-2 mediates proliferation and chloride secretion in ADPKD cystic renal epithelia** *AMERICAN JOURNAL OF PHYSIOLOGY-RENAL PHYSIOLOGY*  
Liu, Y., Rajagopal, M., Lee, K., Battini, L., Flores, D., Gusella, G. L., Pao, A. C., Rohatgi, R.  
2012; 303 (10): F1425-F1434
- **SGK regulation of renal sodium transport** *CURRENT OPINION IN NEPHROLOGY AND HYPERTENSION*  
Pao, A. C.  
2012; 21 (5): 534-540
- **Differential effects of extracellular ATP on chloride transport in cortical collecting duct cells** *AMERICAN JOURNAL OF PHYSIOLOGY-RENAL PHYSIOLOGY*  
Rajagopal, M., Kathpalia, P. P., Widdicombe, J. H., Pao, A. C.  
2012; 303 (4): F483-F491
- **Prostaglandin E2 Activates Basal EP4 Receptors to Stimulate Chloride Secretion Via Both cAMP and Calcium Mediated Pathways**  
Rajagopal, M., Kathpalia, P. P., Pao, A. C.  
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- **βPix is a New Player in Renal Physiology.** *Frontiers in physiology*  
Hamilton, K. L., Pao, A. C.  
2012; 3: 268-?
- **Epithelial Sodium Channel Regulation by Cell Surface-associated Serum- and Glucocorticoid-regulated Kinase 1** *JOURNAL OF BIOLOGICAL CHEMISTRY*  
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2011; 286 (37): 32074-32085
- **Activation of P2Y(1) and P2Y(2) receptors induces chloride secretion via calcium-activated chloride channels in kidney inner medullary collecting duct cells** *AMERICAN JOURNAL OF PHYSIOLOGY-RENAL PHYSIOLOGY*  
Rajagopal, M., Kathpalia, P. P., Thomas, S. V., Pao, A. C.  
2011; 301 (3): F544-F553
- **The natriuretic mechanism of Gamma-Melanocyte-Stimulating Hormone** *PEPTIDES*  
Kathpalia, P. P., Charlton, C., Rajagopal, M., Pao, A. C.  
2011; 32 (5): 1068-1072
- **Expression and role of serum and glucocorticoid-regulated kinase 2 in the regulation of Na<sup>+</sup>/H<sup>+</sup> exchanger 3 in the mammalian kidney** *AMERICAN JOURNAL OF PHYSIOLOGY-RENAL PHYSIOLOGY*  
Pao, A. C., Bhargava, A., Di Sole, F., Quigley, R., Shao, X., Wang, J., Thomas, S., Zhang, J., Shi, M., Funder, J. W., Moe, O. W., Pearce, D.  
2010; 299 (6): F1496-F1506
- **Adenosine Activates A2b Receptors and Enhances Chloride Secretion in Kidney Inner Medullary Collecting Duct Cells** *HYPERTENSION*  
Rajagopal, M., Pao, A. C.  
2010; 55 (5): 1123-U89
- **Melamine nephrotoxicity: an emerging epidemic in an era of globalization** *KIDNEY INTERNATIONAL*  
Bhalla, V., Grimm, P. C., Chertow, G. M., Pao, A. C.  
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- **NH2 terminus of serum and glucocorticoid-regulated kinase 1 binds to phosphoinositides and is essential for isoform-specific physiological functions** *AMERICAN JOURNAL OF PHYSIOLOGY-RENAL PHYSIOLOGY*  
Pao, A. C., McCormick, J. A., Li, H., Siu, J., Govaerts, C., Bhalla, V., Soundararajan, R., Pearce, D.

2007; 292 (6): F1741-F1750

- **Disinhibitory pathways for control of sodium transport: regulation of ENaC by SGK1 and GILZ** *AMERICAN JOURNAL OF PHYSIOLOGY-RENAL PHYSIOLOGY*

Bhalla, V., Soundararajan, R., Pao, A. C., Li, H., Pearce, D.

2006; 291 (4): F714-F721

- **Serum- and glucocorticoid-regulated kinase 1 regulates ubiquitin ligase neural precursor cell-expressed, developmentally down-regulated protein 4-2 by inducing interaction with 14-3-3** *MOLECULAR ENDOCRINOLOGY*

Bhalla, V., Daidie, D., Li, H. Y., Pao, A. C., LaGrange, L. P., Wang, J., VANDEWALLE, A., Stockand, J. D., Staub, O., Pearce, D.

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McCormick, J. A., Bhalla, V., Pao, A. C., Pearce, D.

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