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# Department of Cellular and Integrative Physiology

Primary Faculty



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Professor

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## Research

I have had a long-standing interest in kidney function in health and disease. In my laboratory, I mainly use kidney clearance and micropuncture techniques to study whole kidney and single nephron functions in small laboratory animals (rats, salamanders). My most recent studies have dealt with polycystic kidney disease. This inherited disorder affects about 500,000 Americans and millions more worldwide. In rats with autosomal-dominant polycystic kidney disease, we demonstrated that dietary treatment with alkalinizing citrate salts dramatically slows progression of the disease. Whether this treatment would also work in patients is not known. Current and future plans are to use the two-photon microscope to examine glomerular permeability to macromolecules in Munich-Wistar rats and in the salamander *Necturus*. We will test the hypothesis that electrical charge significantly affects the filterability of macromolecules. I also plan to continue collaborating with researchers in the Nephrology

Division. Using kidney micropuncture, we have recently been able to transfect proximal tubule cells with an adenovirus vector and express a green fluorescent protein. My wife, Judith A. Tanner, Ph.D., works with me.

## Selected Recent Publications

Tanner GA, Evan AP: Glomerular and proximal tubular morphology after single nephron obstruction. *Kidney Int* 36:1050-1060, 1989.

Tanner GA, McAteer JA: Measurement of cell volume and fluid transport in MDCK cysts by video microscopy. *J Tiss Culture Methods* 13:235-240, 1991.

Tanner GA, Maxwell MR, McAteer JA: Fluid transport in a cultured cell model of kidney epithelial cyst enlargement. *J Am Soc Nephrol* 2:1208-1218, 1992.

Macias WL, McAteer JA, Tanner GA, Fritz AL, Armstrong W McD: NaCl transport by Madin Darby canine kidney cyst epithelial cells. *Kidney Int* 42:308-319, 1992.

Rhoades RA, Tanner GA (eds): *Medical Physiology*. Boston: Little, Brown, 1995.

Tanner GA, McQuillan PF, Maxwell MR, Keck JK, McAteer JA: An in vitro test of the cell stretch-proliferation hypothesis of renal cyst enlargement. *J Am Soc Nephrol* 6:1230-1241, 1995.

Tanner GA, Gretz N, Connors BA, Evan AP, Steinhausen M: Role of obstruction in autosomal dominant polycystic kidney disease in rats. *Kidney Int* 50:873-886, 1996.

Tanner GA, Gretz N, Shao Y, Evan AP, Steinhausen M: Organic anion secretion in polycystic kidney disease. *J Am Soc Nephrol* 8:1222-1231, 1997.

Tanner GA: Potassium citrate/citric acid intake improves renal function in rats with polycystic kidney disease. *J Am Soc Nephrol* 9:1242-1248, 1998.

Tanner GA, Vijayalakshmi K, Tanner JA: Effects of potassium citrate/citric acid intake in a mouse model of polycystic kidney disease. *Nephron* 84:270-273, 2000.

Tanner, GA, Tanner JA. Citrate therapy for polycystic kidney disease in rats. *Kidney Int* 58:1859-1869, 2000.

Tanner GA, Tanner JA. Chronic caffeine consumption exacerbates hypertension in rats with polycystic kidney disease. *Am J Kidney Disease* 38:1089-1095, 2001.

Tanner GA, Tielker MA, Connors BA, Phillips CL, Tanner JA, Evan AP. Atubular glomeruli in a rat model of polycystic kidney disease. *Kidney Int* 62:1947-1957, 2002.

Dunn KW, Sandoval RM, Kelly KJ, Dagher PC, Tanner GA, Atkinson SJ, Bacallao RL, Molitoris BA. Functional studies of the kidney of living animals using multi-color two-photon microscopy. *Am*

*J Physiol Cell Physiol* 283:C905-916, 2002.

Tanner GA, Tanner JA. Dietary citrate treatment of polycystic kidney disease in rats. *Nephron Physiol* 93:14-20, 2003.

Rhoades RA, Tanner GA (eds). *Medical Physiology*, 2nd ed. Baltimore: Lippincott Williams & Wilkins, 2003.

Tanner GA, Sandoval RM, Dunn KW. Two-photon in vivo microscopy of sulfonefluorescein secretion in normal and cystic rat kidneys. *Am J Physiol Renal Physiol* 286:F152-F160, 2004.

## History

- Cornell University, Ithaca, NY. B.A. in Zoology, 1959
- Harvard University, Cambridge, MA. Ph.D. in Physiology, 1964
- PHS Postdoctoral Fellow, Cornell Univ. Medical College, NYC, 7/64 - 6/67 (Training in kidney micropuncture with Drs. G. Giebisch and E. Windhager)
- Assistant Professor of Physiology, Indiana U. Sch. Med., 7/67 - 6/72
- Associate Professor of Physiology, Indiana U. Sch. Med., 7/72 - 6/78
- Visiting Professor, I. Physiologisches Institut, Heidelberg U., Germany, 7/74 - 6/75, 6/95 - 9/95 (with Dr. M. Steinhausen)
- Professor of Physiology, Indiana U. Sch. Med., 7/78 - present

## Honors and Society Memberships

- Amoco Foundation Award for Distinguished Teaching at Indiana University, Phi Beta Kappa
- Member of American Physiological Society, American Society of Nephrology, International Society of Nephrology, Polycystic Kidney Research Foundation, Sigma Xi
- 2002 Indiana University Trustees Award for Teaching

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