

**BIOGRAPHICAL SKETCH**

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.  
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NAME Arun J Sanyal	POSITION TITLE Chairman, Div. of Gastroenterology, Hepatology and Nutrition, Professor of Medicine		
eRA COMMONS USER NAME ajsanyal			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Patna University, India	I. Sc.	1974	Zoology
Maulana Azad Medical College	M.B.B.S.	1981	Medicine
All India Institute of Medical Science, India	M.D.	1984	Medicine

Please refer to the application instructions in order to complete sections A, B, and C of the Biographical Sketch.

**A. Positions and Honors.****Positions and Employment**

1981-1984: Residency in Internal Medicine, All India Institute of Medical Sciences, New Delhi, India  
 1984-1987: Residency in Internal Medicine, Texas Tech Univ Health Sciences Ctr, Amarillo, Texas  
 1987-1990: Fellowship in Gastroenterology, Virginia Commonwealth University, Richmond, VA  
 1990-1996: Assistant Professor of Internal Medicine, Gastroenterology and Hepatology, Virginia Commonwealth University  
 1996-2001: Associate Professor of Internal Medicine, Gastroenterology and Hepatology, Virginia Commonwealth University (Tenured)  
 2001-current: Professor of Internal Medicine, Virginia Commonwealth University  
 2000-current: Chair, Div. of GI/Hepatology and Assoc Chair for Research, Dept. of Internal Medicine, VCU

**Board Certifications:**

Internal Medicine: 1987

Gastroenterology: 1989

**Other Experience and Memberships**

1987-1990: NIH training grant recipient (mentor: Edward Moore)  
 1987-1992: Effects of premicellar bile acids on intestinal iron and calcium absorption (PI)  
 1991-1997: Clinical Studies on the use of TIPS for portal hypertension and variceal hemorrhage (PI)  
 1996-2001: North American Study for treatment of refractory ascites (PI) DK 51523-05  
 1999-2004: Studies of nonalcoholic steatohepatitis (PI) DK 02755-02  
 2000-2005: Studies on the mechanisms of TIPS stenosis (PI) DK 56331-01  
 2002-2009: Chair, Steering committee, NIDDK NASH Clinical Research Network  
 2005-current Member, CAQ committee for Advanced Hepatology, American Board of Internal Medicine  
 2005-current Member, NIH liaison committee, American Association for Study of Liver Diseases  
 2006 Member, Data Safety and Monitoring Board, NIDA  
 2006-current Member, Editorial Board, Hepatology

**Honors:**

1993 American College of Gastroenterology, Young investigator award  
 1997-1999: Member, Clinical research committee, Am Assoc for Study of Liver Diseases  
 1997-2002: Member, Educational affairs committee, American College of Gastroenterology  
 2001-2003: Secretary, American Association for Study of Liver Diseases  
 2007-2010 Councilor (elected to be President in 2010), American Association for Study of Liver Diseases  
 2002 and 2006 State of the art lecturer, Digestive Diseases Week  
 1999-2007 Invited speaker (AGA, AASLD, ACG, FASEB, UCLA, Harvard, Johns Hopkins, NIAAA, NIDDK)

**Reviewer**

2000, 2001, 2003, 2005, 2007 Adhoc member NIH/NIDDK GMA2 and center grant review study section  
 2000-2002, 2005: VA Merit review study section

**A. Selected peer-reviewed publications from last 10 yrs (out of total of 138, in chronological order).**

1. **Sanyal AJ**, Freedman AM, Luketic VA, Purdum PP, III, Shiffman ML, Cole PE, Tisnado J, Simmons S. Transjugular intrahepatic portosystemic shunts compared with endoscopic sclerotherapy for the prevention of recurrent variceal hemorrhage. A randomized, controlled trial. *Ann Intern Med* 1997;126:849-857.
2. **Sanyal AJ**, Freedman AM, Luketic VA, Purdum PP, III, Shiffman ML, DeMeo J, Cole PE, Tisnado J. The natural history of portal hypertension after transjugular intrahepatic portosystemic shunts. *Gastroenterology* 1997;112:889-898.
3. Stravitz RT, **Sanyal AJ**, Pandak WM, Vlahcevic ZR, Beets JW, Dawson PA. Induction of sodium-dependent bile acid transporter messenger RNA, protein, and activity in rat ileum by cholic acid. *Gastroenterology* 1997;113:1599-1608.
4. Strom SC, Fisher RA, Thompson MT, **Sanyal AJ**, Cole PE, Ham JM, Posner MP. Hepatocyte transplantation as a bridge to orthotopic liver transplantation in terminal liver failure. *Transplantation* 1997;63:559-569.
5. **Sanyal AJ**, Mirshahi F. A simplified method for the isolation and culture of endothelial cells from pseudointima of transjugular intrahepatic portosystemic shunts. *Lab Invest* 1998;78:1469-1470.
6. **Sanyal AJ**, Contos MJ, Yager D, Zhu YN, Willey A, Graham MF. Development of pseudointima and stenosis after transjugular intrahepatic portosystemic shunts: characterization of cell phenotype and function. *Hepatology* 1998;28:22-32.
7. **Sanyal AJ**, Reddy KR. Vegetative infection of transjugular intrahepatic portosystemic shunts. *Gastroenterology* 1998;115:110-115.
8. Marcos A, Fisher RA, Ham JM, Shiffman ML, Sanyal AJ, Luketic VA, Sterling RK, Posner MP. Right lobe living donor liver transplantation. *Transplantation* 1999;68:798-803.
9. **Sanyal AJ**, Mirshahi F. Endothelial cells lining transjugular intrahepatic portosystemic shunts originate in hepatic sinusoids: implications for pseudointimal hyperplasia. *Hepatology* 1999;29:710-718.
10. Liu J, Gao B, Mirshahi F, **Sanyal AJ**, Khanolkar AD, Makriyannis A, Kunos G. Functional CB1 cannabinoid receptors in human vascular endothelial cells. *Biochem J* 2000;346 Pt 3:835-840.
11. Batkai S, Jarai Z, Wagner JA, Goparaju SK, Varga K, Liu J, Wang L, Mirshahi F, Khanolkar AD, Makriyannis A, Urbaschek R, Garcia N, Jr., Sanyal AJ, Kunos G. Endocannabinoids acting at vascular CB1 receptors mediate the vasodilated state in advanced liver cirrhosis. *Nat Med* 2001;7:827-832.
12. Contos MJ, Cales W, Sterling RK, Luketic VA, Shiffman ML, Mills AS, Fisher RA, Ham J, **Sanyal AJ**. Development of nonalcoholic fatty liver disease after orthotopic liver transplantation for cryptogenic cirrhosis. *Liver Transpl* 2001;7:363-373.
13. **Garcia N, Jr.**, Jarai Z, Mirshahi F, Kunos G, Sanyal AJ. Systemic and portal hemodynamic effects of anandamide. *Am J Physiol Gastrointest Liver Physiol* 2001;280:G14-G20.
14. **Sanyal AJ**, Campbell-Sargent C, Mirshahi F, Rizzo WB, Contos MJ, Sterling RK, Luketic VA, Shiffman ML, Clore JN. Nonalcoholic steatohepatitis: association of insulin resistance and mitochondrial abnormalities. *Gastroenterology* 2001;120:1183-1192.
15. **Mofrad P**, Contos MJ, Haque M, Sargeant C, Fisher RA, Luketic VA, Sterling RK, Shiffman ML, Stravitz RT, Sanyal AJ. Clinical and histologic spectrum of nonalcoholic fatty liver disease associated with normal ALT values. *Hepatology* 2003;37:1286-1292.
16. **Sanyal AJ**, Contos MJ, Sterling RK, Luketic VA, Shiffman ML, Stravitz RT, Mills AS. Nonalcoholic fatty liver disease in patients with hepatitis C is associated with features of the metabolic syndrome. *Am J Gastroenterol* 2003;98:2064-2071.
17. **Sanyal AJ**, Genning C, Reddy KR, Wong F, Kowdley KV, Benner K, McCashland T. The North American Study for the Treatment of Refractory Ascites. *Gastroenterology* 2003;124:634-641.
18. Shiffman ML, Ferreira-Gonzalez A, Reddy KR, Sterling RK, Luketic VA, Stravitz RT, **Sanyal AJ**, Garrett CT, De Medina M, Schiff ER. Comparison of three commercially available assays for HCV RNA using the international unit standard: implications for management of patients with chronic hepatitis C virus infection in clinical practice. *Am J Gastroenterol* 2003;98:1159-1166.
19. Sterling RK, Contos MJ, **Sanyal AJ**, Luketic VA, Stravitz RT, Wilson MS, Mills AS, Shiffman ML. The clinical spectrum of hepatitis C virus in HIV coinfection. *J Acquir Immune Defic Syndr* 2003;32:30-37.
20. Stewart CA, **Sanyal AJ**. Grading portal gastropathy: validation of a gastropathy scoring system. *Am J Gastroenterol* 2003;98:1758-1765.

21. Heuman DM, Abou-Assi SG, Habib A, Williams LM, Stravitz RT, **Sanyal AJ**, Fisher RA, Mihas AA. Persistent ascites and low serum sodium identify patients with cirrhosis and low MELD scores who are at high risk for early death. *Hepatology* 2004;40:802-810.
22. **Sanyal AJ**, Mofrad PS, Contos MJ, Sargeant C, Luketic VA, Sterling RK, Stravitz RT, Shiffman ML, Clore J, Mills AS. A pilot study of vitamin E versus vitamin E and pioglitazone for the treatment of nonalcoholic steatohepatitis. *Clin Gastroenterol Hepatol* 2004;2:1107-1115.
23. Shiffman ML, Stravitz RT, Contos MJ, Mills AS, Sterling RK, Luketic VA, **Sanyal AJ**, Cotterell A, Maluf D, Posner MP, Fisher RA. Histologic recurrence of chronic hepatitis C virus in patients after living donor and deceased donor liver transplantation. *Liver Transpl* 2004;10:1248-1255.
24. Sterling RK, Wilson MS, **Sanyal AJ**, Luketic VA, Stravitz RT, Contos MJ, Mills AS, Shiffman ML. Impact of highly active antiretroviral therapy on the spectrum of liver disease in HCV-HIV coinfection. *Clin Gastroenterol Hepatol* 2004;2:432-439.
25. Stravitz RT, Shiffman ML, **Sanyal AJ**, Luketic VA, Sterling RK, Heuman DM, Ashworth A, Mills AS, Contos M, Cotterell AH, Maluf D, Posner MP, Fisher RA. Effects of interferon treatment on liver histology and allograft rejection in patients with recurrent hepatitis C following liver transplantation. *Liver Transpl* 2004;10:850-858.
26. Campbell MS, Brensinger CM, **Sanyal AJ**, Gennings C, Wong F, Kowdley KV, McCashland T, Reddy KR. Quality of life in refractory ascites: transjugular intrahepatic portal-systemic shunting versus medical therapy. *Hepatology* 2005;42:635-640.
27. Kleiner DE, Brunt EM, Van Natta M, Behling C, Contos MJ, Cummings OW, Ferrell LD, Liu YC, Torbenson MS, Unalp-Arida A, Yeh M, McCullough AJ, **Sanyal AJ**. Design and validation of a histological scoring system for nonalcoholic fatty liver disease. *Hepatology* 2005;41:1313-1321.
28. Fontana RJ, **Sanyal AJ**, Mehta S, Doherty MC, Neuschwander-Tetri BA, Everson GT, Kahn JA, Malet PF, Sheikh MY, Chung RT, Ghany MG, Gretch DR. Portal hypertensive gastropathy in chronic hepatitis C patients with bridging fibrosis and compensated cirrhosis: results from the HALT-C trial. *Am J Gastroenterol* 2006;101:983-992.
29. **Sanyal AJ**, Fontana RJ, Di Bisceglie AM, Everhart JE, Doherty MC, Everson GT, Donovan JA, Malet PF, Mehta S, Sheikh MY, Reid AE, Ghany MG, Gretch DR, Halt C. The prevalence and risk factors associated with esophageal varices in subjects with hepatitis C and advanced fibrosis. *Gastrointest Endosc* 2006;64:855-864.
30. **Sanyal AJ**, Banas C, Sargeant C, Luketic VA, Sterling RK, Stravitz RT, Shiffman ML, Heuman D, Cotterell A, Fisher RA, Contos MJ, Mills AS. Similarities and differences in outcomes of cirrhosis due to nonalcoholic steatohepatitis and hepatitis C. *Hepatology* 2006;43:682-689.
31. Choudhury J, Mirshahi F, Murthy KS, Yager DR, **Sanyal AJ**. Physiologic concentrations of leptin increase collagen production by non-immortalized human hepatic stellate cells. *Metabolism* 2006;55:1317-1322.
32. Heuman DM, Mihas AA, Habib A, Gilles HS, Stravitz RT, **Sanyal AJ**, Fisher RA. MELD-XI: a rational approach to "sickest first" liver transplantation in cirrhotic patients requiring anticoagulant therapy. *Liver Transpl* 2007;13:30-37.
33. Shiffman ML, Mihas AA, Millwala F, Sterling RK, Luketic VA, Stravitz RT, **Sanyal AJ**. Treatment of chronic hepatitis C virus in african americans with genotypes 2 and 3. *Am J Gastroenterol* 2007;102:761-766.
34. Sterling RK, Lyons CD, Stravitz RT, Luketic VA, **Sanyal AJ**, Carr ME, Smith TJ, Hackney MH, Contos MJ, Mills SA, Kuhn JG, Nolte ME, Shiffman ML. Percutaneous liver biopsy in adult haemophiliacs with hepatitis C virus: safety of outpatient procedure and impact of human immunodeficiency virus coinfection on the spectrum of liver disease. *Haemophilia* 2007;13:164-171.
35. Puri P, Baillie R, Weist M, Mirshahi F, Choudhury J, Cheung OP, Sargeant CA, Costos MJ and **Sanyal AJ**. A lipidomic analysis of nonalcoholic fatty liver disease. *Hepatology* 2007; epub.
36. Cheung OP, Kapoor A, Puri P, Sistrun S, Luketic VA, Sargeant C, Contos M, Shiffman M, Stravitz RT, Sterling, RK and **Sanyal AJ**. The impact of fat distribution on the severity of nonalcoholic fatty liver disease and the metabolic syndrome. *Hepatology*, epub, 2007
37. Puri P, Mirshahi F, Cheung O, Natarajan R, Maher JW, Kellum JM and **Sanyal AJ**. Activation and dysregulation of the unfolded protein response in nonalcoholic fatty liver disease. *Gastroenterology*, 2007, accepted for publication.

**Invited Review and Practice Guidelines.**

38. Sanyal AJ. AGA technical review on nonalcoholic fatty liver disease. Gastroenterology 2002;123:1705-1725.
39. Sanyal AJ. Mechanisms of Disease: pathogenesis of nonalcoholic fatty liver disease. Nat Clin Pract Gastroenterol Hepatol 2005;2:46-53.
40. Caldwell SH, Hoffman M, Lisman T, Macik BG, Northup PG, Reddy KR, Tripodi A, Sanyal AJ. Coagulation disorders and hemostasis in liver disease: pathophysiology and critical assessment of current management. Hepatology 2006;44:1039-1046.
41. Garcia-Tsao, G, Sanyal AJ, Carey WC, Grace ND. Combined AASLD-ACG guidelines for the prevention and management of variceal hemorrhage. Hepatology, epub, September 2007.

**Books:** Portal Hypertension, Eds Sanyal AJ and Shah V, Humana Press, 2005

**C. Research Support.**

**Ongoing Research Support**

**K24 DK02755-07 Sanyal (PI)** 9/1/00 – 8/30/10

NIH/NIDDK

Clinical Studies in liver disease

The major goals of this project is to protect Dr. Sanyal's time to allow him to conduct patient-oriented research.

Role: PI (50% effort)

**U01 DK 61731-04 Sanyal (PI)**

NIH/NIDDK

The NASH Clinical Research Network

The major goals of this project are to define the natural history of nonalcoholic fatty liver disease and to find a cure for nonalcoholic steatohepatitis. A pilot and feasibility study under this network is to quantify the amount of de novo lipogenesis in subjects with nonalcoholic fatty liver disease.

Role: Site-PI, Chair of the Steering Committee of the NASH Clinical Research Network (10% effort)

**T-32 DK 07150 Sanyal (PI)** 7/1/03-6/30/08

NIH/NIDDK

Training grant in Digestive Disorders

The major goals of this grant are to foster the training of postdoctoral candidates in research and prepare them for a career in academic medicine.

Role: PI (15%-cost shared by Dept. of Internal Medicine)

**R21 AA 01573-01a1, Sanyal (PI)** 7/1/06-6/30/08

NIAAA

The role of biliary microlithiasis in alcohol-induced pancreatitis

The goals of this project are to define the prevalence of biliary microlithiasis in subjects with alcohol-induced pancreatitis and to perform a phase II trial of ursodeoxycholic acid for the treatment of alcohol-induced pancreatitis as a means of preventing recurrent flares of pancreatitis.

Role (PI) (15%)

**Completed Research Support**

**DK 51523-03 Sanyal (PI)** NIDDK 9/30/96 – 9/29/01

North American Study for Treatment of Refractory Ascites (NASTRA)

Study compared treatment with Ursodial alone versus Ursodial plus Methotrexate in patients with Primary Biliary Cirrhosis.

**RO1 DK56331-01 Sanyal (PI)** NIH/NIDDK 1/1/00 – 12/31/05

Hepatic Neovascularization and Genesis of TIPS Stenosis

The major goals of this project are to define the cellular and molecular mechanisms responsible for the development of TIPS stenosis.

Role: PI

**NIH/NIDDK-98-4 HALT-C trial Sanyal (PI for portal hypertension substudy)** 5/1/00 – 4/30/07

NIH/NIDDK Hepatitis C Clinical Trial The major goals of this project are to study the effects of long-term interferon therapy on the development of portal hypertension. Role: PI

Principal Investigator/Program Director (Last, First, Middle): Sanyal, Arun Jayant