CURRICULUM VITAE

June, 2011

A. General Information

- 1. Gerald M. Loughlin, M.D., M. Sc.
- 2. Nancy C. Paduano Professor and Chairman Department of Pediatrics New York Weill Cornell Medical Center

Pediatrician –in –Chief Phyllis and David Komansky Center for Children's Health New York-Presbyterian Hospital

Senior Associate Dean for International Clinical Planning Weill Cornell Medical College

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- 3. Citizenship: USA
- 4. a. Birth: 5/13/47
 - b. New York City
 c.127-36-9641
 d. Married
 e. Family information;
 Spouse Barbara A. Lynch Loughlin
 Children: Ceila E. Loughlin, M.D. (married to Pete Leuchtmann, M.D.)
 Shaye L. Loughlin JD (married to William Brennan DDS)

B. Educational Background

B.S., University of Notre Dame South Bend, Indiana, 1965-69

M.D., University of Rochester Medical School Rochester, New York, 1969-73

Masters of Science in Business Health Care Finance and Administration Johns Hopkins University School of Professional Studies November 1998

C. Professional Positions and Employment

1. Post-doctoral Training:

Intern in Pediatrics, Arizona Medical Center Tucson, Arizona, 1973-74

Resident in Pediatrics, Arizona Medical Center Tucson, Arizona, 1974-75

Chief Resident (3 months), Arizona Medical Center Tucson, Arizona, 1975

Pulmonary Fellow, Arizona Medical Center Tucson, Arizona, 1975-77

2. Academic Positions

Assistant Professor, Department of Pediatrics Division of Pediatric Pulmonary University of Florida College of Medicine 1977-82

Associate Professor, Department of Pediatrics, Division of Pulmonary Disease/Cystic Fibrosis University of Florida College of Medicine 1982-84

Associate Professor, Department of Pediatrics The Johns Hopkins University School of Medicine 1984 to 1994

Director, Eudowood Division of Pediatric Respiratory Sciences The Johns Hopkins University School of Medicine 1984 - 2002

Clinical Associate Professor of Pediatrics Department of Pediatrics University of Maryland School of Medicine 1995 to present

Professor of Pediatrics, Department of Pediatrics The Johns Hopkins University School of Medicine 1995 -2002

Vice-Chairman for Clinical Practice Department of Pediatrics The Johns Hopkins University School of Medicine 1996 -2002

Nancy C Paduano Professor and Chairman Department of Pediatrics Joan and Sanford I. Weill College of Medicine Cornell University September 1, 2002 - present

3. Hospital Positions:

Associate Director, Pediatric Pulmonary Center University of Florida College of Medicine 1977-82

Director, Pediatric Pulmonary Center University of Florida College of Medicine 1982-84

Director, Cystic Fibrosis Center University of Florida College of Medicine 1982-84

Pulmonary Consultant - Large Animal Veterinary Hospital University of Florida School of Veterinary Medicine 1980-84

Director, Phase B Curriculum Department of Pediatrics, University of Florida College of Medicine 1980-82

Director, Pediatric Pulmonary Physiology Laboratory

Department of Pediatrics University of Florida College of Medicine 1977-84

Associate Director Pediatric Clinical Research Unit The Johns Hopkins University School of Medicine 1991-1999

Co-Director, Cystic Fibrosis Center The Johns Hopkins University School of Medicine 1984-1998

Director, Pediatric Sleep Disorders Center The Johns Hopkins University School of Medicine 1984-1994

Director, Intermediate Care Program The Johns Hopkins Children's Center 1987-89

Director, Pediatric Respiratory Therapy The Johns Hopkins Children's Center 1986-96

Co-Director, Gambrill Bronchoscopy Laboratory The Johns Hopkins University School of Medicine 1985-89

Director, Department of Pediatrics Clinical Practice Association 1997 – 2002

Pediatrician–in-Chief Phyllis and David Komansky Center for Children's Health New York- Presbyterian Hospital Weill Cornell Medical Center 2002- present

President of the Medical Board New York-Presbyterian Hospital 2010-2011 Chair, Practice Operations Committee Weill Cornell Medical College Physician's Organization 2008 – present

Elected member – Executive Committee Weill Cornell Physician's Organization 2007 - present

4. Other Employment:

Senior Vice-President for Medical Affairs Mount Washington Pediatric Hospital North Arundel Health System 1998 - 2002 (under a contract with Johns Hopkins)

D: Licensure and Certification:

Florida Board of Medical Examiners 1977–1984 (voluntarily resigned license)

Maryland Board of Medical Examiners 1984-present

Diplomat, American Board of Pediatrics – 1979 (re-certified 1995)

American Board of Pediatrics Sub-board of Pediatric Pulmonary Certified – 1986, re-certified 1994 and 2001

Malpractice: MCIC through Weill Cornell Medical College

E. Professional memberships

American Thoracic Society American Academy of Pediatrics American Academy of Pediatrics, Maryland Chapter Maryland Thoracic Society American Sleep Disorders Association

Member, Sub-board for Pediatric Pulmonary American Board of Pediatrics (1990-1996) Chairman, Sub-board for Pediatric Pulmonary American Board of Pediatrics (1995-1996)

SOCIETY COMMITTEES:

Program Committee for the Scientific Assembly on Pediatrics, American Thoracic Society Annual Meeting, 1980-81, 1984-88

Pediatric Pulmonary Disease Committee Florida Pediatric Society, 1980-84

Subcommittee on Home Care of the Adult-Pediatric Disease Committee, American Lung Association 1981-86

Lung Disease Committee, American Lung Association 1984-86

Awards and Grants Committee American Lung Association of Maryland 1984-1993

Long Range Planning Committee, Pediatric Assembly American Thoracic Society, 1985 to 1992 Chairman - 1989 to 1992

Chairman, Nominating Committee, Pediatric Assembly American Thoracic Society, 1985-86, 1995-96

March of Dimes Health Professionals Advisory Committee, 1985-90

Coordinating Center for Home and Community Care Board of Directors, 1987 to 1992

Clinical Research Review Committee Cystic Fibrosis Foundation, 1987-1994

Nominating Committee American Thoracic Society, 1988-90

ATS/ALA Research Fellowship Review Committee 1988 - 1991

Executive Committee Maryland Thoracic Society, 1990-1998

President Maryland Thoracic Society, May 1995-97

Chairman, Research Coordinating Committee Maryland Lung Association, 1993- 1998

Co-Chairman, Consensus Conference on Indications and Standards for Cardio-respiratory Sleep Studies in Children. American Thoracic Society November, 1990

BOARD OF DIRECTORS:

Board of Directors, American Thoracic Society 1983-86

Board of Directors, Pediatrics at Home The Johns Hopkins Health System 1993 to 2002

Board of Directors American Lung Association of Maryland, 1995- 1998

Board of Governors The Johns Hopkins University School of Medicine Clinical Practice Association 1997-1999

Board of Directors Mount Washington Pediatric Hospital 1997 – 2005 Emeritus – 2005 - present

F. Honors and Awards:

Outstanding Teacher Award from the Housestaff Department of Pediatrics, University of Florida, 1979

Schaffer Award for the Outstanding Teacher from the Housestaff, Department of Pediatrics The Johns Hopkins Children's Center, 1985 George Wills Comstock Award from the American Lung Association of Maryland, 1998

G. Institutional / Hospital Affiliation

Attending Physician, The Johns Hopkins Hospital, Baltimore, Md. The Johns Hopkins Medical Institutions 1984-2002

Consultant, Mount Washington Pediatric Hospital, Baltimore, Md. 1984-2002

Pediatrician-in-Chief, New York- Presbyterian/ Weill Cornell Medical Center

H. Current Institutional Responsibilities

Chairman Department of Pediatrics Member of the Medical Board, New York Hospital Executive Committee, Physicians Organization – 2007 - present

I. Research Support:

Recipient of Clinical Fellowship from the American Thoracic Society/American Lung Association 1976-77

Recipient of a Research Grant from the Cystic Fibrosis Foundation, 1978-81

Recipient of "Seed Money" grant from the Division of Sponsored Research, University of Florida

Recipient of New Investigator Research Award from the NHLBI Section of NIH, 1981-84

Recipient of a Research Grant from the American Lung Association, 1980-81

Recipient of a Research Grant from the American Heart Association, 1981-83

Pediatric Clinical Research Unit Associate Director 1995-1999 (20% time commitment)

J. Extramural Professional Responsibilities

Ad hoc reviewer for a variety of pediatric and respiratory journals (Pediatrics, Journal of Pediatrics, American Journal of Respiratory and Critical Care Medicine, Chest, Sleep, Pediatric Research, Thorax)

NIH Committees:

Ad Hoc member of a study section reviewing grants on Asthma Control Programs in Minority Groups National Heart, Lung and Blood Institute. 1989

Member, Task Force on Research and Education for the Prevention and Control of Respiratory Diseases National Heart, Lung and Blood Institute. 1989-90

Member, Task Force on Future Directions in SIDS Research, National Institute for Child Health and Human Development, 1989

Ad hoc member, Study Section, reviewing demonstration and education grants on prevention of lung disease, NHLBI, July, 1993, 2000 and 2002

Ad hoc member, Study Section, reviewing Pulmonary Academic Awards, NHLBI, 1998

Consultant, The *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) section for Biodefense, the Obstetric and Pediatric Pharmacology Branch, September 2008.

Consultant, NICHD Bio-defense Advisory Group 2009 - present

External Reviewer

Pediatric Pulmonary Section, Arkansas Children's Hospital, University of Arkansas-2001

Department of Pediatrics, Yong Loo Lin School of Medicine, National University of Singapore, April, 2009

Department of Pediatrics, Medical University of South Carolina, July, 2009

K. Bibliography:

Lightner E, Allen H, Loughlin G: Neonatal hyperthyroidism and heart failure: A differential approach. <u>Am J Dis Child</u> 131:68-70, 1977.

Loughlin GM, Taussig LM, Strunk RC, Kohnen P, Murphy S: Atypical good pastures syndrome in children. J Peds 93:181, 1978.

Matson J, **Loughlin GM**, Strunk RC: Myocardial ischemia complicating the use of isoproterenol in asthmatic children. <u>J Peds</u> 92:776-778, 1978.

Loughlin GM, Taussig LM: Pulmonary function in children with a history of laryngotracheobronchitis. <u>J Peds</u> 94:356, 1979.

Felman AH, Loughlin GM, Leftridge CA, Cassisi N: Radiologic evaluation of upper airway airway obstruction during sleep in children. <u>Am J Roetgenol</u> 133:213, 1979.

Cloutier MM, Loughlin GM: Chronic cough in children -- a manifestation of increased airway reactivity. <u>Pediatrics</u> 67:6, 1981.

Loughlin GM, Cota K, Taussig LM: The relationship between flow transients and bronchial lability in cystic fibrosis. <u>Chest</u> 79:206, 1981.

Loughlin GM, Wynne JW, Victorica BE: Sleep apnea as a possible cause of pulmonary hypertension in Down's syndrome. <u>J Peds</u> 98:435, 1981.

Wagener JS, Taussig LM, DeBenedetti C, Lemen RJ, Loughlin GM: Pulmonary function in juvenile rheumatoid arthritis. J Peds 99:108, 1981.

Plaxico DT, **Loughlin GM**: Nasopharyngeal reflux and neonatal apnea. <u>Am J Dis Child</u> 135:793, 1981.

Loughlin GM: Cystic Fibrosis. Curr Rev Research Lesson 15, 4:115-118, 1982.

Loughlin GM, Gerenscer GA, Crowder MA, Boyd RL, Mangos JA: Fluid fluxes in the ferret trachea. <u>Experientia</u> 38:1451, 1982.

Gerenscer GA, **Loughlin GM**: Extracellular transport properties of aplysia californica intestine. <u>Comp Biochem Physiol</u> 74A:701, 1983.

Pagtakhan RD, Bjelland JC, Landau LI, **Loughlin GM**, Seeley G and Taussig LM: Sex differences in growth patterns of the airways and lung parenchyma in children. <u>J Appl Physiol</u> 56:1204, 1984.

Schnapf B, Banks RM, Silverstein JA, Chesrown SE, Rosenblood A, Loughlin GM: Abnormal lung function in children with IDDM. <u>ARRD</u> 130:930, 1984.

Hutchison AA, McNichol KJ, **Loughlin GM**: The effect of age on pulmonary epithelial permeability in unanesthetized lambs. <u>Ped Pul</u> 1:52-57, 1985.

Barnes SD, Grob, CS, Lachman BS, Marsh, BR, Loughlin GM: Psychogenic upper airway obstruction presenting as refractory wheezing. <u>J Peds</u> 109:1067-1070, 1986.

Sauder RA, Chesrown SE, Loughlin GM: Clinical application of trans-epithelial potential difference measurements in cystic fibrosis. J Peds 111:353-358, 1987.

Zeitlin P, Loughlin GM, Guggino W: Ion transport in cultured fetal and adult rabbit tracheal epithelium. <u>Am J Phys</u>: (Cell Phys) 254, C691, 1988.

Hudak B, Allen MC, Hudak ML, **Loughlin GM**: Home O_2 therapy for chronic lung disease in extremely low birthweight infants. <u>AJDC</u> 143:357-360, 1989.

Zeitlin PL, Wagner M, Markakais D, **Loughlin GM** and Guggino WB: Steroid Hormones: Modulators of Na+ absorption and Cl- secretion in cultured tracheal epithelia. <u>Proc Nat'l Acad Sci</u> 86:2502-2505, 1989.

Barnes SD, Leclair J, Forman MS, Townsend TR, **Loughlin GM** and Charache P: Comparison of nasopharyngeal aspirate and nasal brush for detection of RS. <u>Ped Inf Dis</u> 8:598-601, 1989.

Flotte TR and Loughlin GM: Use of troleandomycin (TAO) in young children with steroiddependent asthma. <u>Pediatric Pulmonology</u> 10:178-182, 1991.

Carroll JL, and **Loughlin GM**: Diagnostic criteria for obstructive sleep apnea syndrome in children. <u>Pediatric Pulmonology</u> 14:71-74, 1992.

McColley SA, April MM, Carroll JL, Naclerio RM, **Loughlin GM**: Predictors of respiratory compromise (RC) after adenotonsillectomy (T & A) in children with obstructive sleep apnea. <u>Arch</u> <u>Otolaryngol Head Neck Surg</u> 118:940-943, 1992.

Lemen RJ, Purcel GS, **Loughlin GM**, Thompson RJ, Wall MA: Task force on research and education for the prevention and control of respiratory disease: Pediatric Lung Disease <u>Chest</u> 102:232S-242S, 1992 (supplement).

Quigley PM, Yeager AM, Loughlin GM. The effects of bone marrow transplantation on pulmonary function in children. <u>Ped Pulmon</u> 18:361-367, 1994.

Tomares ST, Flotte TR, Tunkel DE, Pao M, and Loughlin GM. Real time laryngoscopy with olfactory challenge for diagnosis of psychogenic stridor. <u>Ped Pulmon</u> 16; 259-262, 1993.

Perlman EJ, Lederman HM, Taylor GA, Fasano MB, **Loughlin GM**, and Zeitlin PL. "Bronchitis" obliterans and prolonged transient hypogammaglobulinemia in a child. <u>Ped Pulmon</u> 16; 375-379, 1993.

Marcus CL, McColley SA, Carroll JL, **Loughlin GM**, Smith PL, Schwartz AR. Upper airway collapsibility in children with the obstructive sleep apnea syndrome. <u>J Appl Physiol</u> 1994; 77: 918-924.

Marcus CL, Carroll JL, McColley SA, **Loughlin GM**, Curtis S, Pyzik P, Naidu S. Polysomnographic characteristics of patients with Rett syndrome. <u>J Pediatr</u> 1994; 125:218-224.

Marcus CL, Carroll JL, Koerner CB, Hamer A, Lutz J, **Loughlin GM**. Determinants of growth in children with the obstructive sleep apnea syndrome. <u>J Pediatr</u> 1994; 125:556-562.

Carroll JL, McColley SA, Marcus CL, Curtis S, and **Loughlin GM**: Inability of clinical history to distinguish primary snoring from obstructive sleep apnea syndrome in children. <u>Chest</u>, 1995; 152:1297-1301.

Marcus CL, Carroll JL, Bamford O, Pyzik P, and **Loughlin GM**: Supplemental oxygen during sleep in children with sleep-disordered breathing. <u>Am J Respir Crit Care Med</u> 1995; 152:1297-301.

Marcus CL, Curtis S, Koerner CB, Joffe A, Serwint JR, and Loughlin GM: Evaluation of pulmonary function and polysomnography in obese children and adolescents. <u>Pediatr Pulmonol</u> 1996; 21:176-183.

Quigley PM, Haller JA, Jelus KL, **Loughlin GM**, and Marcus CL: Cardiorespiratory function before and after corrective surgery in pectus excavatum. <u>J Pediatr</u> 1996; 128:638-43.

Helfaer MA, McColley SA, Pyzik PL, Tunkel DE, Nichols DG, Baroody FM, April MM, Maxwell LG, and **Loughlin GM**. Polysomnography after adenotonsillectomy in mild pediatric obstructive sleep apnea. <u>Crit Care Med</u> 1996; 24:1323-1327.

Tunkel DE, McColley SA, Baroody FM, Marcus CL, Carroll JL, Loughlin GM. Polysomnography in the evaluation of readiness for decannulation in children. <u>Arch Otolaryngol Head Neck Surg.</u> 1996;122:721-724.

Haller JA, Colombani PM, Humphries CT, Azizkhan RG, **Loughlin GM**. Chest wall constriction after too extensive and too early operations for pectus excavatum. <u>Ann Thorac Surg</u> 1996;61:1618-25.

Marcus CL, **Loughlin GM**. Effect of sleep deprivation on driving safety in housestaff. <u>Sleep</u> 1996; 19:763-766.

McColley SA, Carroll JL, Curtis S, **Loughlin GM**, Sampson HA. High prevalence of allergic sensitization in children with habitual snoring and obstructive sleep apnea. Chest 111:170-173,1997

Marcus CL., Hamer A., Loughlin GM., Natural history of primary snoring in children. Pediatr Pulmonol 26:6-11,1998.

Mogayzel PJ, Carroll JL., Loughlin GM., Hurko O., Francamano CA., Marcus CL. Sleep disordered breathing in children with achondroplasia. J Pediatr 132:667-671, 1998.

Gerenscer GA. Loughlin GM, Crowder MA. Chloride transport in the ferret trachea. Comp Biochem Physiol A Mol Integr Physiol 122: 93-97,1999.

Haller JA, **Loughlin GM**. Cardiorespiratory function is significantly improved following corrective surgery for severe pectus excavatum: proposed treatment guidelines. J Cardiovasc Surg (Torino) 41:125-130, 2000.

Blaisdell CJ, Goodman S, Clark K, Casella JF, **Loughlin GM**. Pulse oximetry is a poor predictor of hypoxemia in stable children with sickle cell disease. Arch Pediatr Adolesc Med 154:900-903, 2000.

Lefton-Grief MA, Crawford TO, Winkelstein JA, Loughlin GM, Koerner CB, Zahurak M, Lederman HM. Oropharyngeal dysphagia and aspiration in patients with ataxia-telangectasia. J Pediatr 136:225-231, 2000.

Leftton-Geif MA, Carroll JL, Loughlin GM. Long-term follow-up or oropharyngeal dysphagia in children without apparent risk factors. Pediatr Pulmonol 2006

Books

1. Loughlin GM and Eigen HE, eds. Lung Disease in Infants and Children: Diagnosis and Management. Williams and Wilkens, Baltimore, MD, 1993.

Loughlin GM, Carroll JL, Marcus CL, eds. Sleep and Breathing in Children: a developmental approach. In: Lung Biology in Health and Disease. Marcel Dekker, Inc, New York, 2000.
 Marcus CL, Carroll JL, Donnelly DF, Loughlin GM eds. Sleep in Children 2nd edition: Developmental Changes in Sleep Patterns. In Lung Biology in Health and Disease, Vol 223. Informa Healthcare, New York 2008.

4. Marcus CL, Carroll JL, Donnelly DF, **Loughlin GM** eds. Sleep in Children 2nd edition: Developmental Changes in Breathing Patterns during Sleep. In Lung Biology in Health and Disease, Vol 224 . Informa Healthcare, New York 2008

Chapters and Reviews

1. Loughlin G, Taussig L: Recent advances in the diagnosis and management of laryngotracheobronchitis and epiglottitis. <u>Ariz Med</u> 23:6, 1976.

2. Loughlin GM, Taussig LM: Upper airway obstruction. <u>Semin Res Med</u> 1:131-146, 1979.

3. Loughlin GM: Respiratory consequences of dysfunctional swallowing and aspiration. <u>Dysphagia</u> 3; 1989.

4. Loughlin GM: Bronchitis. In: Disorders of the Respiratory Tract in Children, (Chernick V, Kendig EL eds), May 1983; 4th edition, 1989; 5th edition, 1996; 6th edition, 1998, 7th Edition -2006.

5. Loughlin GM, Carroll JL: Unexplained Infant Death and Apparent Life Threatening Events. In: Oski FA, DeAngelis C, Feigin RD, and Warshaw JB (eds.), Principles and Practice of Pediatrics, J.B. Lippincott Company, Philadelphia, 1989, 2nd edition 1994; 3rd edition, 1998, 4th Edition 2005.

6. Loughlin GM. Pulmonary Edema. In: Current Pediatric Therapy. (Gellis SM and Kagan BM, eds). 13th Ed, Saunders 1990.

7. Loughlin GM and McColley S. Control of ventilation in children with chronic lung disease. In: Control of Breathing in Children. (Hunt CB, Beckerman R, and Brouillette R, eds). Williams and Wilkins, 1992.

8. Loughlin GM: Obstructive sleep apnea in children. In: Advances in Pediatrics. Vol. 39, 1992.

9. Carroll JL, Marcus CL, **Loughlin GM**. Disorders of breathing control in infants and children. Pediatrics in Review, 14(2):51-66, 1993.

10. Carroll JL and **Loughlin GM**. Sudden Infant Death Syndrome. Pediatrics in Review 14(3): 83-94, 1993.

11. Loughlin GM and Lefton-Greif M. Respiratory consequences of dysfunctional swallowing. Advances in Pediatrics Vol. 41, 1994.

12. Carroll JL, Loughlin GM: Primary snoring in children. Principles and Practice of Sleep Medicine, Kryger M. (ed.), 1995.

13. Carroll JL, **Loughlin GM**: Obstructive sleep apnea in children: Clinical Features. Principles and Practice of Sleep Medicine, Kryger M. (ed.), 1995.

14. Carroll JL, Loughlin GM: Obstructive sleep apnea in children: Diagnosis and Management. Principles and Practice of Sleep Medicine, Kryger M. (ed.), 1995.

15. Loughlin GM and Carroll JL: Breathing during sleep in infants and children with lung disease. Principles and Practice of Sleep Medicine, Kryger M. (ed.), 1995.

16. Lefton-Greif MA, Loughlin GM. Specialized studies in pediatric dysphagia. Seminars in Speech and Language 17(4):311-330, November 1996.

17. Loughlin GM. Bronchitis and Bronchiolitis. In: Current Pediatric Therapy. Gellis SM and Kagan BM, eds., 15th edition 1995; 16th edition 1998.

18. Loughlin GM, Obstructive Sleep Apnea in Children: Diagnosis and management, In Sleep and Breathing in Children: a developmental approach, GM Loughlin, JL Carroll and CL Marcus, eds. In Lung Biology in Health and Disease, Marcel Dekker Inc. New York, 2000.

19. Loughlin, GM Bronchiolitis and Obstructive Sleep Apnea, In, Essence of Office Pediatrics, JA Stockman and JA Lohr, eds. WB Saunders, New York, 2000.

20. Loughlin, GM, Sleep Disorders in Asthma, Bronchopulmonary Dysplasia, and Cystic Fibrosis, In Sleep Disturbance in Disorders of Development, Wiggs L, ed. MacKeith Press, London, 2001.

21. **Loughlin GM**, Gastroesophageal reflux during sleep, In Sleep and Breathing in Children: a developmental approach, CL Marcus, JL Carroll David F Donnelly, and Gerald M. Loughlin, MD eds. In Lung Biology in Health and Disease, Marcel Dekker Inc. New York, 2008.

22. Loughlin CE and **Loughlin GM**. Habit Cough, In Pediatric Aerodigestive Disorders, KE Haver, MT Brigger, SC Hardy, CJ Hartnick eds. Plural Publishing, San Diego, 2009.

Educational Activities:

TEACHING RESPONSIBILITIES (Johns Hopkins):

Clinical teaching - Residents, fellows and medical students Department of Pediatrics 1984 to 2002

Faculty - Advanced Clinical Skills Course for 3rd year medical students: 1991-1993

Faculty - Pathophysiology: 1987-2002

Faculty – Physiology – clinical correlations: 1989-1998