

Stanford



Peter Kao

Associate Professor of Medicine (Pulmonary and Critical Care Medicine)

Medicine - Pulmonary & Critical Care Medicine

 Curriculum Vitae available Online

CLINICAL OFFICES

- **Pulmonary and Critical Care Clinic**

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Bio

CLINICAL FOCUS

- Pulmonary Disease
- Pulmonology (Lung) and Critical Care

ACADEMIC APPOINTMENTS

- Associate Professor, Medicine - Pulmonary & Critical Care Medicine
- Member, Bio-X
- Member, Cardiovascular Institute

PROFESSIONAL EDUCATION

- Fellowship: Stanford University School of Medicine Registrar (1992) CA
- Residency: Stanford University School of Medicine Registrar (1990) CA
- Internship: Stanford University School of Medicine Registrar (1989) CA
- Medical Education: Columbia University College of Physicians and Surgeons (1988) NJ
- Board Certification: Pulmonary Disease, American Board of Internal Medicine (1994)
- A.B.-A.M., Harvard University , Chemistry and Physics (1979)
- Ph.D., Columbia University , Biochemistry (1986)
- M.D., Columbia University P&S , Medicine (1988)

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

RESEARCH INTERESTS:

Our research program has several active projects:

1.) Pulmonary Vascular Disease # We are studying experimental hypertensive pulmonary vascular disease, aiming to determine the pathophysiologic mechanisms of disease progression, and to identify and develop novel antiproliferative strategies for prevention and treatment. Our group is the first to show that hydrophobic statins such as simvastatin, effectively prevent fatal pulmonary hypertension in rats, and reverse established pulmonary hypertension with neointimal vascular occlusion. The mechanisms of simvastatin's efficacy involve inhibition of proliferation and induction of apoptosis of vascular smooth muscle cells. A translational effort to human clinical trials has been initiated at Stanford. Colleague Dr. John Faul (Assistant Professor, PCCM) is directing a randomized, placebo-controlled clinical trial of simvastatin for treatment of Primary Pulmonary Hypertension in the Stanford University Chest Clinic.

2.) Lung Inflammation and Regeneration # We are funded by the NIH to study the regulation of cytokine gene expression in bronchial epithelial cells. Inflammatory cytokines contribute to host defenses against pathogens introduced through the airways. Excessive host inflammation in the airways contributes to airway diseases such as asthma and COPD, and inappropriate host inflammatory responses contribute to bronchiectasis in cystic fibrosis and in nontuberculous mycobacterial disease. Together with colleague Dr. Stephen Ruoss (Associate Professor, PCCM), we are characterizing the role of cystic fibrosis gene mutations in susceptibility to nontuberculous mycobacterial pulmonary infections.

We are characterizing lung stem cells capable of self-renewal and of promoting lung regeneration after injury. For this project, we are collaborating with Dr. Judy Shizuru (Associate Professor, Bone Marrow Transplantation, Stanford), and Dr. Chris Contag, expert in imaging (Associate Professor, Pediatrics and Microbiology, Stanford). We are using transgenic donor mice, marked with reporter genes, to identify and enriching stem cells capable of homing to and repopulating lung endothelium and epithelium. This project is funded by the Beckman Center (Stanford).

3. Lung surfactant rheology and cellular oxidative stress - We are studying the biophysical properties of lung surfactant in collaboration with Dr. Gerry Fuller, Professor of Chemical Engineering (Stanford). Dr. Fuller's group has a unique instrument capable of measuring the dynamic viscosity of surfactants. Our aims in this collaboration are to establish how hydrophobic surfactant proteins B and C contribute to lowering the surface tension and viscosity of lung surfactant in health and disease. These studies are relevant for the pathogenesis of interstitial lung diseases and pulmonary fibrosis. The studies are funded by the Bio-X Committee at Stanford.

4.) Novel Gene Regulators NF45 and NF90 # We are funded by the NIH to continue studies of two novel transcription factors cloned by Dr. Peter Kao in 1994. These proteins were isolated based on the regulation of the IL-2 gene in T-lymphocytes. They are widely distributed and are now recognized to regulate transcription, mRNA splicing, nuclear export, and protein translation. In order to further characterize their biologic functions, our group is the first to generate mice with targeted disruptions (knockouts) of NF45 and NF90. Currently we are characterizing the phenotypes of these mice, focusing on changes in patterns of gene regulation.

Teaching

COURSES

2017-18

- Human Physiology: BIO 112, HUMBIO 133 (Win)
- Respiration: MED 50Q (Aut)
- Yesplus: Meditation practices for wellbeing: MED 130 (Aut, Win)

2016-17

- Human Physiology: BIO 112, HUMBIO 133 (Win)
- Respiration: MED 50Q (Aut)
- Yesplus: Meditation practices for wellbeing: MED 130 (Aut, Win)

2015-16

- Human Physiology: BIO 112, HUMBIO 133 (Win)
- Respiration: MED 50Q (Aut)
- Yesplus: Meditation practices for wellbeing: MED 130 (Aut, Win)

2014-15

- Community Leadership: MED 135 (Aut, Win, Spr)
- Human Health and Disease II: INDE 221 (Spr)
- Human Physiology: BIO 112, HUMBIO 133 (Win)
- Respiration: MED 50Q (Aut)
- The Practice of Happiness: MED 130 (Aut)

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Medicine (Masters Program)

Publications

PUBLICATIONS

- **NF90 regulates inducible IL-2 gene expression in T cells** *JOURNAL OF EXPERIMENTAL MEDICINE*
Shi, L., Godfrey, W. R., Lin, J., Zhao, G., Kao, P. N.
2007; 204 (5): 971-977
- **Dynamic binding of Ku80, Ku70 and NF90 to the IL-2 promoter in vivo in activated T-cells** *NUCLEIC ACIDS RESEARCH*
Shi, L., Qiu, D., Zhao, G., Corthesy, B., Lees-Miller, S., Reeves, W. H., Kao, P. N.
2007; 35 (7): 2302-2310
- **Thrombin-activatable procarboxypeptidase B regulates activated complement C5a in vivo** *BLOOD*
Nishimura, T., Myles, T., Piliposky, A. M., Kao, P. N., Berry, G. J., Leung, L. L.
2007; 109 (5): 1992-1997
- **Aerosolized amikacin for treatment of pulmonary Mycobacterium avium infections: an observational case series.** *BMC pulmonary medicine*
Davis, K. K., Kao, P. N., Jacobs, S. S., Ruoss, S. J.
2007; 7: 2-?
- **Prospective analysis of cystic fibrosis transmembrane regulator mutations in adults with bronchiectasis or pulmonary nontuberculous mycobacterial infection** *CHEST*
Ziedalski, T. M., Kao, P. N., Henig, N. R., Jacobs, S. S., Ruoss, S. J.
2006; 130 (4): 995-1002
- **Simvastatin enhances bone morphogenetic protein receptor type II expression** *BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS*
Hu, H., Sung, A., Zhao, G. H., Shi, L. F., Qiu, D. M., Nishimura, T., Kao, P. N.
2006; 339 (1): 59-64
- **Lung surfactant gelation induced by epithelial cells exposed to air pollution or oxidative stress** *AMERICAN JOURNAL OF RESPIRATORY CELL AND MOLECULAR BIOLOGY*
Anseth, J. W., Goffin, A. J., Fuller, G. G., Ghio, A. J., Kao, P. N., Upadhyay, D.
2005; 33 (2): 161-168
- **Granzyme B is dispensable for immunologic tolerance to self in a murine model of systemic lupus erythematosus** *ARTHRITIS AND RHEUMATISM*
Graham, K. L., Thibault, D. L., Steinman, J. B., Okeke, L., Kao, P. N., Utz, P. J.
2005; 52 (6): 1684-1693
- **NF90 regulates cell cycle exit and terminal myogenic differentiation by direct binding to the 3'-untranslated region of MyoD and p21(WAF1/CIP1) mRNAs** *JOURNAL OF BIOLOGICAL CHEMISTRY*
Shi, L. F., Zhao, G. H., Qiu, D. M., Godfrey, W. R., Vogel, H., Rando, T. A., Hu, H., Kao, P. N.
2005; 280 (19): 18981-18989
- **NF45/ILF2 tissue expression, promoter analysis, and interleukin-2 transactivating function** *EXPERIMENTAL CELL RESEARCH*
Zhao, G. H., Shi, L. F., Qiu, D. M., Hu, H., Kao, P. N.
2005; 305 (2): 312-323
- **Simvastatin treatment of pulmonary hypertension - An observational case series** *CHEST*
Kao, P. N.

2005; 127 (4): 1446-1452

- **Longitudinal transcriptional analysis of developing neointimal vascular occlusion and pulmonary hypertension in rats** *PHYSIOLOGICAL GENOMICS*
Vaszar, L. T., Nishimura, T., Storey, J. D., Zhao, G. H., Qiu, D. M., Faul, J. L., Pearl, R. G., Kao, P. N.
2004; 17 (2): 150-156
- **Members of the NF90/NFAR protein group are involved in the life cycle of a positive-strand RNA virus** *EMBO JOURNAL*
Isken, O., Grassmann, C. W., Sarisky, R. T., Kann, M., Zhang, S., Grosse, F., Kao, P. N., Behrens, S. E.
2003; 22 (21): 5655-5665
- **Simvastatin rescues rats from fatal pulmonary hypertension by inducing apoptosis of neointimal smooth muscle cells** *CIRCULATION*
Nishimura, T., Vaszar, L. T., Faul, J. L., Zhao, G. H., Berry, G. J., Shi, L. F., Qiu, D. M., Benson, G., Pearl, R. G., Kao, P. N.
2003; 108 (13): 1640-1645
- **Selective regulation of gene expression by nuclear factor 110, a member of the NF90 family of double-stranded RNA-binding proteins** *JOURNAL OF MOLECULAR BIOLOGY*
Reichman, T. W., Parrott, A. M., Fierro-Monti, I., Caron, D. J., Kao, P. N., Lee, C. G., Li, H., Mathews, M. B.
2003; 332 (1): 85-98
- **Effect of a surgical aortocaval fistula on mono crotaline-induced pulmonary hypertension** *CRITICAL CARE MEDICINE*
Nishimura, T., Faul, J. L., Berry, G. J., Kao, P. N., Pearl, R. G.
2003; 31 (4): 1213-1218
- **Immunosuppressive and anti-inflammatory mechanisms of triptolide, the principal active diterpenoid from the Chinese medicinal herb Tripterygium wilfordii Hook. f.** *Drugs in R&D*
Qiu, D., Kao, P. N.
2003; 4 (1): 1-18
- **Simvastatin attenuates smooth muscle neointimal proliferation and pulmonary hypertension in rats** *AMERICAN JOURNAL OF RESPIRATORY AND CRITICAL CARE MEDICINE*
Nishimura, T., Faul, J. L., Berry, G. J., Vaszar, L. T., Qiu, D. M., Pearl, R. G., Kao, P. N.
2002; 166 (10): 1403-1408
- **High prevalence of autoimmune thyroid disease in pulmonary arterial hypertension** *10th Annual Meeting of the American-Association-of-Clinical-Endocrinologists*
Chu, J. W., Kao, P. N., Faul, J. L., Doyle, R. L.
AMER COLL CHEST PHYSICIANS.2002: 1668-73
- **40-O-(2-hydroxyethyl)-rapamycin attenuates pulmonary arterial hypertension and neointimal formation in rats** *AMERICAN JOURNAL OF RESPIRATORY AND CRITICAL CARE MEDICINE*
Nishimura, T., Faul, J. L., Berry, G. J., Veve, I., Pearl, R. G., Kao, P. N.
2001; 163 (2): 498-502
- **Triptolide attenuates pulmonary arterial hypertension and neointimal formation in rats** *AMERICAN JOURNAL OF RESPIRATORY AND CRITICAL CARE MEDICINE*
Faul, J. L., Nishimura, T., Berry, G. J., BENSON, G. V., Pearl, R. G., Kao, P. N.
2000; 162 (6): 2252-2258
- **Anti-inflammatory effects of triptolide in human bronchial epithelial cells** *AMERICAN JOURNAL OF PHYSIOLOGY-LUNG CELLULAR AND MOLECULAR PHYSIOLOGY*
Zhao, G. H., Vaszar, L. T., Qiu, D. M., Shi, L. F., Kao, P. N.
2000; 279 (5): L958-L966
- **Protein-arginine methyltransferase I, the predominant protein-arginine methyltransferase in cells, interacts with and is regulated by interleukin enhancer-binding factor 3** *JOURNAL OF BIOLOGICAL CHEMISTRY*
Tang, J., Kao, P. N., Herschman, H. R.
2000; 275 (26): 19866-19876
- **Autoantibodies define a family of proteins with conserved double-stranded RNA-binding domains as well as DNA binding activity** *JOURNAL OF BIOLOGICAL CHEMISTRY*
Satoh, M., Shaheen, V. M., Kao, P. N., Okano, T., Shaw, M., Yoshida, H., Richards, H. B., Reeves, W. H.

- 1999; 274 (49): 34598-34604
- **Erythromycin inhibits transcriptional activation of NF-kappa B, but not NFAT, through calcineurin-independent signaling in T cells** *ANTIMICROBIAL AGENTS AND CHEMOTHERAPY*
Aoki, Y., Kao, P. N.
1999; 43 (11): 2678-2684
 - **Tick-borne pulmonary disease - Update on diagnosis and management** *CHEST*
Faul, J. L., Doyle, R. L., Kao, P. N., Ruoss, S. J.
1999; 116 (1): 222-230
 - **Nuclear factor-90 of activated T-cells: A double-stranded RNA-binding protein and substrate for the double-stranded RNA-dependent protein kinase, PKR** *BIOCHEMISTRY*
Langland, J. O., Kao, P. N., Jacobs, B. L.
1999; 38 (19): 6361-6368
 - **PG490 (triptolide) cooperates with tumor necrosis factor-alpha to induce apoptosis in tumor cells** *JOURNAL OF BIOLOGICAL CHEMISTRY*
Lee, K. Y., Chang, W. T., Qiu, D. M., Kao, P. N., Rosen, G. D.
1999; 274 (19): 13451-13455
 - **Immunosuppressant PG490 (triptolide) inhibits T-cell interleukin-2 expression at the level of purine-box/nuclear factor of activated T-cells and NF-kappa B transcriptional activation** *JOURNAL OF BIOLOGICAL CHEMISTRY*
Qiu, D. M., Zhao, G. H., Aoki, Y., Shi, L. F., Uyei, A., Nazarian, S., Ng, J. C., Kao, P. N.
1999; 274 (19): 13443-13450
 - **Mycobacterium avium-intracellulare pulmonary infection in HIV-negative patients without preexisting lung disease - Diagnostic and management limitations** *CHEST*
Huang, J. H., Kao, P. N., Adi, V., Ruoss, S. J.
1999; 115 (4): 1033-1040
 - **Diaphragmatic paralysis due to Lyme disease** *EUROPEAN RESPIRATORY JOURNAL*
Faul, J. L., Ruoss, S., Doyle, R. L., Kao, P. N.
1999; 13 (3): 700-702
 - **CsA-sensitive purine-box transcriptional regulator in bronchial epithelial cells contains NF45, NF90, and Ku** *AMERICAN JOURNAL OF PHYSIOLOGY-LUNG CELLULAR AND MOLECULAR PHYSIOLOGY*
Aoki, Y., Zhao, G. H., Qiu, D. M., Shi, L. F., Kao, P. N.
1998; 275 (6): L1164-L1172
 - **Leukotriene B-4 mediates histamine induction of NF-kappa B and IL-8 in human bronchial epithelial cells** *AMERICAN JOURNAL OF PHYSIOLOGY-LUNG CELLULAR AND MOLECULAR PHYSIOLOGY*
Aoki, Y., Qiu, D. M., Zhao, G. H., Kao, P. N.
1998; 274 (6): L1030-L1039
 - **Analyses of the NRAMP1 and IFN-gamma R1 genes in women with Mycobacterium avium-intracellulare pulmonary disease** *AMERICAN JOURNAL OF RESPIRATORY AND CRITICAL CARE MEDICINE*
Huang, J. H., Oefner, P. J., Adi, V., Ratnam, K., Ruoss, S. J., Trako, E., Kao, P. N.
1998; 157 (2): 377-381
 - **DNA-dependent protein kinase interacts with antigen receptor response element binding proteins NF90 and NF45** *JOURNAL OF BIOLOGICAL CHEMISTRY*
Ting, N. S., Kao, P. N., Chan, D. W., Lintott, L. G., Lees-Miller, S. P.
1998; 273 (4): 2136-2145
 - **Cyclosporin A-sensitive calcium signaling represses NF kappa B activation in human bronchial epithelial cells and enhances NF kappa B activation in Jurkat T-cells** *BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS*
Aoki, Y., Kao, P. N.
1997; 234 (2): 424-431
 - **Human airway epithelial cells express interleukin-2 in vitro** *AMERICAN JOURNAL OF PHYSIOLOGY-LUNG CELLULAR AND MOLECULAR PHYSIOLOGY*
Aoki, Y., Diu, D. M., Uyei, A., Kao, P. N.

1997; 272 (2): L276-L286

- **PURIFICATION BY DNA AFFINITY-CHROMATOGRAPHY OF 2 POLYPEPTIDES THAT CONTACT THE NF-AT DNA-BINDING SITE IN THE INTERLEUKIN-2 PROMOTER** *JOURNAL OF BIOLOGICAL CHEMISTRY*
Corthesy, B., Kao, P. N.
1994; 269 (32): 20682-20690
- **CLONING AND EXPRESSION OF CYCLOSPORINE-A-SENSITIVE AND FK506-SENSITIVE NUCLEAR FACTOR OF ACTIVATED T-CELLS - NF45 AND NF90** *JOURNAL OF BIOLOGICAL CHEMISTRY*
Kao, P. N., Chen, L., Brock, G., Ng, J., Kenny, J., SMITH, A. J., Corthesy, B.
1994; 269 (32): 20691-20699
- **ACETYLCHOLINE-RECEPTOR BINDING-SITE CONTAINS A DISULFIDE CROSS-LINK BETWEEN ADJACENT HALF-CYSTINYL RESIDUES** *JOURNAL OF BIOLOGICAL CHEMISTRY*
Kao, P. N., Karlin, A.
1986; 261 (18): 8085-8088
- **Identification of the alpha subunit half-cystine specifically labeled by an affinity reagent for the acetylcholine receptor binding site.** *journal of biological chemistry*
Kao, P. N., Dwork, A. J., KALDANY, R. R., SILVER, M. L., Wideman, J., Stein, S., Karlin, A.
1984; 259 (19): 11662-11665
- **THE ACTIVE GUANIDINIUM GROUP OF SAXITOXIN AND NEOSAXITOXIN IDENTIFIED BY THE EFFECTS OF PH ON THEIR ACTIVITIES ON SQUID AXON** *PFLUGERS ARCHIV-EUROPEAN JOURNAL OF PHYSIOLOGY*
Kao, P. N., JAMESKRACKE, M. R., Kao, C. Y.
1983; 398 (3): 199-203