Stanford

# Patricia Jones

The Dr. Nancy Chang Professor, Emerita

Biology

### CONTACT INFORMATION

- **Alternate Contact**

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## Bio

### ACADEMIC APPOINTMENTS

- Emeritus Faculty, Acad Council, Biology
- Professor, Biology

### ADMINISTRATIVE APPOINTMENTS

- Director, PhD Program in Immunology, Stanford University, (1988-1994)
- Chair, Faculty Senate, Stanford University, (1993-1994)
- Chair, Department of Biological Sciences, Stanford University, (1994-1997)
- Associate Dean of Research, Stanford University, (1998-2000)
- Vice Provost for Faculty Development and Diversity, Stanford University, (2000-2010)
- Director, Stanford Immunology, (2011-2017)

### HONORS AND AWARDS

- Founder's Prize, Texas Instruments Foundation (1984)
- Hoagland Prize for Undergraduate Teaching, Stanford University (1987)
- Duca Family University Fellow in Undergraduate Education, Stanford University (2002)
- Immunology Program Faculty Mentor Award, Stanford University (2003)
- Dr. Nancy Chang Professorship in Humanities and Sciences, Stanford University (2004)
- Distinguished Fellow of the American Association of Immunologists, American Association of Immunologists (2022)

### PROFESSIONAL EDUCATION

- PhD, The Johns Hopkins University , Biology/Immunology (1974)

# Research & Scholarship

## CURRENT RESEARCH AND SCHOLARLY INTERESTS

Dr. Jones' research focused on genetic, molecular, and cellular mechanisms that regulate innate and adaptive immune responses. As immune responses can be harmful, they are highly regulated in their occurrence, magnitude, and duration. Her most recent work focused on innate immune and inflammatory responses, triggered by conserved microbial components. Her research group discovered a novel mechanism that regulates innate responses of mammalian macrophages, dendritic cells, and other cells to microbial pathogens, resulting in generation of anti-microbial responses and production of cytokines and other proteins that contribute to innate, inflammatory, and adaptive immune responses. Dr. Jones' group discovered that the signaling pathways activated by the binding of microbial components to Toll-like receptors (TLR), leading to activation of the transcription factor NF-kB as well as MAPK pathways, is negatively-regulated by the protein phosphatase calcineurin. This inhibitory role of calcineurin, which helps to keep signaling downstream of TLR off in resting macrophages and other cells, is opposite to calcineurin's activating role in T and B lymphocytes following activation by antigen. Reflecting calcineurin's inhibitory role in macrophages, the signaling pathway downstream of TLR is activated by calcineurin inhibitors, such as cyclosporine A and FK506, that have long been used as immunosuppressants to block undesired T cell immune responses, such as those mediating organ transplant rejection.

To understand the physiological role of calcineurin in regulating innate immune responses in vivo, the Jones lab explored the effect of inhibiting calcineurin in mice, using two experimental models. In the first model, mice received multiple injections of the calcineurin inhibitor FK506. In the second model, transgenic mice were created using the Cre-lox system that are deficient in the expression of calcineurin in myeloid cells. In both models mice were tested to see whether the resulting reduction in calcineurin activity led the activation of innate responses or alternatively, as has been observed with multiple exposures to microbial components such as bacterial lipopolysaccharide (LPS), to de-sensitization (a reduction in responsiveness referred to as LPS tolerance). In both models of reduced calcineurin activity, mice did not show upregulation of innate immune responses. In contrast, macrophages from these mice showed reduced responses to innate stimuli in vitro, and when challenged with a lethal dose of LPS (a model for septic shock) these mice showed partial protection. Thus, chronic inhibition of calcineurin activity leads to the induction of negative feedback pathways that limit the potential harmful effects of innate immune and inflammatory responses. These findings suggested that people chronically-treated with calcineurin inhibitor immunosuppressants, such as organ transplant recipients, may be suppressed in their innate as well as adaptive immune responses, perhaps contributing to the well-known increase in their susceptibility to infection.

# Teaching

## COURSES

**2020-21**

- Molecular and Cellular Immunology: BIO 230 (Aut)

## GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Biology (School of Humanities and Sciences) (Phd Program)
- Immunology (Phd Program)

# Publications

## PUBLICATIONS

- **Introduction to the special issue on Stanford Immunology.** *Immunologic research*
  Jones, P. P., Nadeau, K. C.
  2014; 58 (2-3): 161-163
- **The early history of Stanford Immunology.** *Immunologic research*
  Jones, P. P., Herzenberg, L. A.

2014; 58 (2-3): 164-178

- **Calcineurin inactivation leads to decreased responsiveness to LPS in macrophages and dendritic cells and protects against LPS-induced toxicity in vivo** *INNATE IMMUNITY*
  Jennings, C., Kusler, B., Jones, P. P.
  2009; 15 (2): 109-120

- **Calcineurin negatively regulates TLR-Mediated activation pathways** *JOURNAL OF IMMUNOLOGY*
  Kang, Y. J., Kusler, B., Otsuka, M., Hughes, M., Suzuki, N., Suzuki, S., Yeh, W., Akira, S., Han, J., Jones, P. P.
  2007; 179 (7): 4598-4607

- **Inhibitor kappa B and nuclear factor kappa B in granulocyte-macrophage colony-stimulating factor antagonism of dexamethasone suppression of the macrophage response to Aspergillus fumigatus conidia** *42nd Annual Meeting of the Infectious-Diseases-Society-of-America*
  Choi, J. H., Brummer, E., Kang, Y. J., Jones, P. P., Stevens, D. A.
  UNIV CHICAGO PRESS.2006: 1023–28

- **Identification of an IFN-gamma responsive region in an intron of the invariant chain gene** *EUROPEAN JOURNAL OF IMMUNOLOGY*
  Cao, Z. A., Moore, B. B., Quezada, D., Chang, C. H., Jones, P. P.
  2000; 30 (9): 2604-2611

- **Calcineurin and vacuolar-type H+-ATPase modulate macrophage effector functions** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Conboy, I. M., Manoli, D., Mhaiskar, V., Jones, P. P.
  1999; 96 (11): 6324-6329

- **The invariant chain gene intronic enhancer shows homology to class II promoter elements** *JOURNAL OF IMMUNOLOGY*
  Moore, B. B., Cao, Z. A., McRae, T. L., Woo, C. H., Conley, S., Jones, P. P.
  1998; 161 (4): 1844-1852

- **Evidence that the autoimmune antigen myelin basic protein (MBP) Ac1-9 binds towards one end of the major histocompatibility complex (MHC) cleft** *JOURNAL OF EXPERIMENTAL MEDICINE*
  Lee, C., Liang, M. N., Tate, K. M., Rabinowitz, J. D., Beeson, C., Jones, P. P., McConnell, H. M.
  1998; 187 (9): 1505-1516

- **Novel genetic regulation of T helper 1 (Th1)/Th2 cytokine production and encephalitogenicity in inbred mouse strains** *JOURNAL OF EXPERIMENTAL MEDICINE*
  Conboy, I. M., DeKruyff, R. H., Tate, K. M., Cao, Z. A., Moore, T. A., Umetsu, D. T., Jones, P. P.
  1997; 185 (3): 439-451

- **Early biochemical signals arise from low affinity TCR-ligand reactions at the cell-cell interface** *JOURNAL OF EXPERIMENTAL MEDICINE*
  Beeson, C., Rabinowitz, J., Tate, K., Gutgemann, I., Chien, Y. H., Jones, P. P., DAVIS, M. M., McConnell, H. M.
  1996; 184 (2): 777-782

- **INACTIVATION OF E(ALPHA) AND E(BETA) EXPRESSION IN INBRED AND WILD MICE BY MULTIPLE DISTINCT MUTATIONS, SOME OF WHICH PREDATE SPECIATION WITHIN MUS SPECIES** *INTERNATIONAL IMMUNOLOGY*
  TACCHINICOTTIER, F., Mayer, W. E., Begovich, A. B., Jones, P. P.
  1995; 7 (9): 1459-1471

- **INTERACTIONS AMONG POLYMORPHIC AND CONSERVED RESIDUES IN MHC CLASS-II PROTEINS AFFECT MHC-PEPTIDE CONFORMATION AND T-CELL RECOGNITION** *INTERNATIONAL IMMUNOLOGY*
  Tate, K. M., Lee, C., Edelman, S., CARSWELLCRUMPTON, C., Liblau, R., Jones, P. P.
  1995; 7 (5): 747-761

- **THE MINIMAL POLYMORPHISM OF CLASS-II E-ALPHA CHAINS IS NOT DUE TO THE FUNCTIONAL NEUTRALITY OF MUTATIONS** *IMMUNOGENETICS*
  Chu, Z. T., CARSWELLCRUMPTON, C., COLE, B. C., Jones, P. P.
  1994; 40 (1): 9-20

- **EVIDENCE THAT THE MECHANISM OF PRENATAL GERM-CELL DEATH IN THE MOUSE IS APOPTOSIS** *EXPERIMENTAL CELL RESEARCH*
  Coucouvanis, E. C., SHERWOOD, S. W., CARSWELLCRUMPTON, C., Spack, E. G., Jones, P. P.
  1993; 209 (2): 238-247

- **CHANGES IN PROTOONCOGENE EXPRESSION CORRELATED WITH GENERAL AND SEX-SPECIFIC DIFFERENTIATION IN MURINE PRIMORDIAL GERM-CELLS** *MECHANISMS OF DEVELOPMENT*
  Coucouvanis, E. C., Jones, P. P.
  1993; 42 (1-2): 49-58

- **TEMPORAL-ORDER OF DNA-REPLICATION IN THE H-2 MAJOR HISTOCOMPATIBILITY COMPLEX OF THE MOUSE** *MOLECULAR AND CELLULAR BIOLOGY*
  Spack, E. G., LEWIS, E. D., Paradowski, B., SCHIMKE, R. T., Jones, P. P.
  1992; 12 (11): 5174-5188

- **COMBINED EFFECTS OF TUMOR NECROSIS FACTOR-ALPHA, PROSTAGLANDIN-E2, AND CORTICOSTERONE ON INDUCED IA EXPRESSION ON MURINE MACROPHAGES** *JOURNAL OF IMMUNOLOGY*
  Zimmer, T., Jones, P. P.
  1990; 145 (4): 1167-1175

- **TRANSCRIPTIONAL CONTROL OF THE INVARIANT CHAIN GENE INVOLVES PROMOTER AND ENHANCER ELEMENTS COMMON TO AND DISTINCT FROM MAJOR HISTOCOMPATIBILITY COMPLEX CLASS-II GENES** *MOLECULAR AND CELLULAR BIOLOGY*
  Zhu, L., Jones, P. P.
  1990; 10 (8): 3906-3916

- **CHARACTERIZATION OF THE MOLECULAR DEFECTS IN THE MOUSE E-BETA-F AND E-BETA-Q GENES - IMPLICATIONS FOR THE ORIGIN OF MHC POLYMORPHISM** *JOURNAL OF IMMUNOLOGY*
  Begovich, A. B., Vu, T. H., Jones, P. P.
  1990; 144 (5): 1957-1964

- **SEQUENCE ELEMENTS REQUIRED FOR ACTIVITY OF A MURINE MAJOR HISTOCOMPATIBILITY COMPLEX CLASS-II PROMOTER BIND COMMON AND CELL-TYPE-SPECIFIC NUCLEAR FACTORS** *MOLECULAR AND CELLULAR BIOLOGY*
  Dedrick, R. L., Jones, P. P.
  1990; 10 (2): 593-604

- **EVOLUTION OF CLASS-II GENES - ROLE OF SELECTION IN BOTH THE MAINTENANCE OF POLYMORPHISM AND THE RETENTION OF NONEXPRESSED ALLELES** *IMMUNOLOGIC RESEARCH*
  Jones, P. P., Begovich, A. B., TACCHINICOTTIER, F. M., Vu, T. H.
  1990; 9 (3): 200-211

- **POLYMORPHIC RESIDUES ON THE I-A-BETA CHAIN MODULATE THE STIMULATION OF T-CELL CLONES SPECIFIC FOR THE N-TERMINAL PEPTIDE OF THE AUTO-ANTIGEN MYELIN BASIC-PROTEIN** *JOURNAL OF IMMUNOLOGY*
  Davis, C. B., Mitchell, D. J., Wraith, D. C., Todd, J. A., Zamvil, S. S., McDevitt, H. O., Steinman, L., Jones, P. P.
  1989; 143 (7): 2083-2093

- **THE ROLE OF POLYMORPHIC I-AK BETA-CHAIN RESIDUES IN PRESENTATION OF A PEPTIDE FROM MYELIN BASIC-PROTEIN** *JOURNAL OF EXPERIMENTAL MEDICINE*
  Davis, C. B., Buerstedde, J. M., McKean, D. J., Jones, P. P., McDevitt, H. O., Wraith, D. C.
  1989; 169 (6): 2239-2244

- **MOLECULAR DEFECTS IN THE NON-EXPRESSED H-2 E-ALPHA GENES OF THE F-HAPLOTYPES AND Q-HAPLOTYPES** *JOURNAL OF IMMUNOLOGY*
  Vu, T. H., Begovich, A. B., TACCHINICOTTIER, F. M., Jones, P. P.
  1989; 142 (8): 2936-2942

- **COMPLETE SEQUENCE OF THE MURINE INVARIANT CHAIN (II) GENE** *NUCLEIC ACIDS RESEARCH*
  Li, Z., Jones, P. P.
  1989; 17 (1): 447-448

- **DEFECTIVE E-BETA EXPRESSION IN 3 MOUSE H-2 HAPLOTYPES RESULTS FROM ABERRANT RNA SPLICING** *JOURNAL OF IMMUNOLOGY*
  TACCHINICOTTIER, F. M., Jones, P. P.
  1988; 141 (10): 3647-3653

- **MOLECULAR-BASIS FOR THE DEFECTIVE EXPRESSION OF THE MOUSE E-BETA-W17 GENE** *JOURNAL OF IMMUNOLOGY*
  Vu, T. H., TACCHINICOTTIER, F. M., Day, C. E., Begovich, A. B., Jones, P. P.

1988; 141 (10): 3654-3661

- **HELPER T-CELLS SPECIFIC FOR PROTEIN ANTIGENS - ROLE OF SELF MAJOR HISTOCOMPATIBILITY COMPLEX AND IMMUNOGLOBULIN GENE-PRODUCTS** *ADVANCES IN EXPERIMENTAL MEDICINE AND BIOLOGY*
  Janeway, C. A., Bottomly, K., Jones, B., Jones, P. P., Lerner, E. A., Matis, L. A., MCNICHOLAS, J. M., Murphy, D. B., SCHWARTZ, R. H.
  1982; 150: 53-71

- **MOUSE IMMUNOGLOBULIN ALLOTYPES - CHARACTERIZATION AND USE IN CELLULAR IMMUNOLOGY** *ANNALES D IMMUNOLOGIE*
  HERZENBE, L. A., Jones, P. P., HERZENBE, L. A.
  1974; C125 (1-2): 71-83

- **LYMPHOCYTE COMMITMENT TO IG ALLOTYPE AND CLASS** *ANNALES D IMMUNOLOGIE*
  Jones, P. P., TACIEREU, H., HERZENBE, L. A.
  1974; C125 (1-2): 271-276