

# RANDALL GLENN WORTH

DIVISION OF HEMATOLOGY & ONCOLOGY  
UNIVERSITY OF PENNSYLVANIA SCHOOL OF MEDICINE  
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## EDUCATION

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1994 – 1999	Wayne State University	Detroit, MI
<i>Ph.D./Biology; Minor-Immunology</i>		
<i>Advisor: Dr. Howard R. Petty</i>		
1988 - 1992	University of Charleston	Charleston, WV
B.S./Biology		

## AWARDS

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### *Grants*

Arthritis Foundation – Research Investigator Award – \$150,000 (7/1/05-6/30/07)

Arthritis Foundation National Office – Post-doctoral fellowship - \$99500 over 3 yrs (2002-2005)

Arthritis Foundation Eastern Pennsylvania Chapter – Post-doctoral fellowship for 1 yr \$25000 (2001-2002)

National Institute of Health Rheumatology Post-doctoral training grant (2000)

Student Award Program Grant – Blue Cross and Blue Shield of Michigan Foundation \$3000 (1998)

### *Honors*

International Society of Experimental Hematology – Travel award for attending annual meeting in Tokyo, Japan. (2001)

Outstanding Graduate Teaching Assistant (1995,1997) – Wayne State Univ.

Graduate Research Assistantship – Wayne State Univ. (1997-1998)

Excellence in Research Award for Students – 2nd Place Blue Cross and Blue Shield of Michigan Foundation (1997)

## RESEARCH EXPERIENCE

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- 2003 – Present      University of Pennsylvania      Philadelphia, PA  
*Research Associate*
- Investigator: Dr. Alan D. Schreiber
- 2000 – 2003      University of Pennsylvania      Philadelphia, PA  
*Post-doctoral fellow*
- Investigator: Dr. Alan D. Schreiber
- May – Dec 1999      Wayne State University      Detroit, MI  
*Post-doctoral fellow*
- Investigator: Dr. Howard R. Petty

## TEACHING EXPERIENCE

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- 2002 – Present      University of Pennsylvania      Philadelphia, PA  
*Biology Instructor*
- BIOL480 – Advanced Cell Biology – Lecture      Winter 2003, 2004
  - BIOL221 – Molec. Biology & Genetics – Lecture      Fall 2002, 2003, 2004
- 1994 - 1999      Wayne State University      Detroit, MI  
*Graduate Teaching/Research Assistant*
- BIO2870 - Human Anatomy & Physiology – Laboratory Sections
  - BIO5610 - Embryology – Laboratory Sections

## PROFESSIONAL MEMBERSHIPS

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- American Association for the Advancement of Science
- American Society for Cell Biology
- Sub-Committee on Post-Doctoral Training – American Society for Cell Biology
- Chi Beta Phi – Epsilon Chapter Scientific Honorary
- Joint Steering Committee for Public Policy

## PUBLICATIONS

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### Articles

**Worth, R.G.**, L. Mayo-Bond, J.G.J. van de Winkle, R.F. Todd III, H.R. Petty. 1996. CR3 ( $\alpha\text{M}\beta\text{2}$ ; CD11b/CD18) restores IgG-dependent phagocytosis in transfectants expressing a phagocytosis defective Fc $\gamma$ RIIA (CD32) tail minus mutant. *J. Immunol.* 157:5660-5665.

Petty, H.R., **R.G. Worth**, A.L. Kindzelskii. 2000. Imaging sustained dissipative patterns in the metabolism of individual living cells. *Phys. Rev. Lett.* 84:2754-2757.

Ben-Ozer, E.Y., N.S. Warra, R.M. Esper, **R.G. Worth**, A.L. Kindzelskii, M.J. McCabe, A.J. Rosenspire, H.R. Petty. 2000. Mercuric chloride damages cellular DNA by a non-apoptotic mechanism. *Mut. Res.* 470:19-27.

**Worth, R.G.**, R.M. Esper, N.S. Warra, A.J. Rosenspire, R.F. Todd III, H.R. Petty. 2001. Mercury Inhibition of Neutrophil Activity: Evidence of Aberrant Cellular Signaling and Incoherent Cellular Metabolism. *Scan. J. Immunol.* 53:49-55.

**Worth, R.G.**, L. Mayo-Bond, M.-K. Kim, J.G.J. van de Winkel, R. F. Todd III, H.R. Petty, A.D. Schreiber. 2001. The cytoplasmic domain of Fc $\gamma$ RIIA (CD32) participates in phagolysosome formation. *Blood* 98:3429-3434.

Petty, H.R., **Worth, R.G.**, R.F. Todd III. 2002. Interactions of integrins with their partner proteins in leukocyte membranes. *Immunol. Res.* 25:75-95.

**\*Worth, R.G.**, M-K. Kim, A.L. Kindzelskii, H.R. Petty, A.D. Schreiber. 2003. A novel signal sequence within Fc $\gamma$ RIIA controls calcium wave propagation patterns: Apparent role in phagolysosome fusion. *Proc. Nat. Acad. Sci. USA*, 100:4533-4538. \* Reviewed in Research Roundup, "Calcium waves in membrane fusion", *J. Cell Biol.* 161:221 (2003)

Kim, M-K, P.-H. Hwang, Z.-Y. Huang, B.A. Jones, N. Sato, S. Hunter, T.-H Kim-Han, **R.G. Worth**, Z.K. Indik, A.D. Schreiber. 2003. Fc $\gamma$  receptor transmembrane domains: Role in cell surface expression,  $\gamma$  chain interaction and phagocytosis. *Blood*. 101:4479-4484.

**Worth, R.G.**, M-K. Kim, B.A. Jones, A.B. Daniels, R. Dickstein, S. Hunter, P. Chien, A.D. Schreiber. 2003. Differing structural requirements for Fc $\gamma$ RIIA mediated signaling events. *Allergy Clin. Immunol. Int'l.* Supplement 2, p197-200.

Huang, Z-Y, S. Hunter, M.-K. Kim, P. Chien, **R.G. Worth**, Z.K. Indik, and A.D. Schreiber. 2004. The monocyte Fc $\gamma$  receptors Fc $\gamma$ RI/ $\gamma$  and Fc $\gamma$ RIIA differ in their interaction with syk and src-related tyrosine kinases. *J. Leuk.*

*Biol.* 76:491-499.

**Worth, R.G.**, B.A. Jones, and A.D. Schreiber. 2004 Fcγ receptor structure, function and role in immune complex mediated autoimmune disease. *Blood*. In press.

**Worth, R.G.**, C.D. Chien, P. Chien, M.P. Reilly, S.E. McKenzie, and A.D. Schreiber. Human platelet FcγRIIA mediates binding and endocytosis of IgG-containing immune complexes. Submitted.

Knight, S, **R.G. Worth**, A.D. Schreiber, A. Dancis. Activation of yeast iron transporter SIT1 after phagocytosis by human neutrophils. In prep.

**Worth, R.G.**, A.B. Daniels, R. Dickstein, M.-K. Kim, A.D. Schreiber. A molecular model for FcγRIIA-mediated secretion: Evidence of a role for cytoplasmic tyrosine residues. In prep.

#### **Book Chapter**

**Worth, R.G.**, A.D. Schreiber. Fc receptors and phagocytosis. In. Molecular Mechanisms of Phagocytosis. Landes Publishers. In press. Online version: <http://www.eurekah.com/chapter.php?chapid=2201&bookid=138&catid=36>

## **PRESENTATIONS**

### **Oral Presentations**

**Worth, R.G.**, J.C. Krauss, L. Mayo-Bond, J.G.J. van de Winkel, R.F. Todd III and H.R. Petty. 1995. Co-expression of CR3 (CD11b/CD18) restores IgG-dependent phagocytosis in transfectants expressing a phagocytosis-defective FcγRIIA (CD32) tail-minus mutant. *Proc. 9<sup>th</sup> Intl. Congress Immunol.* P.539. Oral Presentation

**Worth, R.G.** M.-k. Kim, L. Mayo-Bond, R.F. Todd III, H.R. Petty, A.D. Schreiber. 2000. Lysosomal fusion following FcγRIIA phagocytosis is mediated by a novel cytoplasmic motif. *Blood. 96:1909.* Oral Presentation

**Worth, R.G.**, M-K. Kim, A.L. Kindzelskii, H.R. Petty, A.D. Schreiber. 2002. Phagolysosome fusion is mediated by a cytoplasmic calcium routing station. *Blood. 100:547* Oral presentation.

### **Abstracts**

**Worth, R.G.**, R.M. Esper, N.S. Warra, A.J. Rosenspire, R.F. Todd III and H.R. Petty. 1999. Mercury inhibits neutrophil polarization and phagocytosis: potential links with cell metabolism and integrins. *FASEB J.* 13:A310

Petty, H.R., **R.G. Worth**, A.L. Kindzelskii. 2000. Imaging sustained dissipative patterns in living cells and their response during transmembrane signaling. *Biophys. J.* 78:250A.

**Worth, R.G.**, A.B. Daniels, R. Dickstein, M-k. Kim, A.D. Schreiber. 2001. A molecular model for studying FcγRIIA-mediated secretion. *FASEB J.* 115:A685.

**Worth, R.G.**, M-k. Kim, A.D. Schreiber. 2001. The novel FcγRIIA motif, L-T-L, enhances phagolysosome fusion in receptors that do not mediate phagolysosome fusion. *Proc. ISEH* p72

Gharavi, H.G, M-k. Kim, J.A. Billett, **R.G. Worth**, A.D. Schreiber. 2001. Potential role of a non-ITAM (immunoglobulin activation motif) tyrosine containing sequence (Y1ETA) of FcγRIIA with Syk kinase in Fcγ receptor mediated phagocytosis. *Blood*. 98:A50.

**Worth, R.G.**, P. Chien, M.P. Reilly, S.E. McKenzie, A.D. Schreiber. 2001. Platelet FcγRIIA is capable of binding and internalizing IgG complexes. *Blood*. 98:A2168.

**Worth, R.G.**, M-k. Kim, A.D. Schreiber. 2001. The novel FcγRIIA motif, L-T-L, provides a specific mechanism for phagolysosome fusion of IgG coated targets. *Mol. Biol. Cell*. 12:1097.

Reilly, M.P., S. Woodard, C. Chien, **R. Worth**, P. Chien, A.D. Schreiber, S.E. McKenzie. 2002. Paradoxical relationship between immune thrombocytopenia and glomerulonephritis in spontaneously autoimmune FcγRIIA transgenic mice. *Ped. Res*. 51:1404

Huang, Z-Y, D.R. Barreda, **R.G. Worth**, J.W. Booth, M-K. Kim, P. Chien, Z.K. Indik, A.D. Schreiber. 2005. Differential role for Src related tyrosine kinases, Syk kinase and PI3 kinase in Fc-gamma receptor induced phagocytosis and endocytosis. *FASEB* 19:A322.

## **PATENTS**

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Schreiber, A., **Worth, R.**, Petty, H. Tripeptide of FcγRIIA. Application No: **20020127209**

## **TECHNIQUES**

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Splenic Macrophage Isolation from mice

Leukocyte/Platelet Separation – Ficol Hypaque, Gel Purification

Cell Culture/Transfection – NIH-3T3, CHO, Cos, P388-D1, RBL-2H3

Dell Precision Workstation – Networking, Board Installation, WindowsNT

DNA Synthesis, Cloning and Mutation

Flow Cytometry (B-D FACScan/ FACScalibur)

Fluorescence microscopy – Zeiss axiovert 35/135/135TV

Imaging spectrophotometry – Princeton Instruments

Immunolectron microscopy – gold labeling

Immunoprecipitation/SDS-PAGE/Western Blot

Microscopy imaging – Perceptics, Scion, Princeton Instruments

Polymerase Chain Reaction (PCR)

Transfection – FuGene 6, Electroporation, DEAE Dextran

Transmission electron microscopy – Philips 201/301

## REFERENCES

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Dr. Alan D. Schreiber, Assistant Dean of Research and Research Training, Professor of Medicine, University of Pennsylvania School of Medicine, Suite 705 BRB II/III, 421 Curie Blvd., Philadelphia, PA 19104 (215) 573-4700 [schreibr@mail.med.upenn.edu](mailto:schreibr@mail.med.upenn.edu)

Dr. Howard R. Petty, Professor of Microbiology & Immunology, Professor of Ophthalmology, Kellog Eye Center, University of Michigan School of Medicine, 1000 Wall Street, Ann Arbor, MI 48105 (734) 647-0384 [hpetty@umich.edu](mailto:hpetty@umich.edu)

Dr. Robert F. Todd III, Associate Vice-President of Research, Professor of Medicine, University of Michigan School of Medicine, 7216 CCGC, 1500 E. Medical Center Dr., Ann Arbor, MI 48109 (734) 764-8100 [robtodd@umich.edu](mailto:robtodd@umich.edu)