

Richard A. Cone

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Education:

SB in Physics (1958)	Massachusetts Institute of Technology
Ph.D in Physics (1963)	University of Chicago

Professional Experience

1985-	Professor of Biology, Johns Hopkins University
1973-	Professor of Biophysics, Johns Hopkins University
1969-1973	Associate Professor of Biophysics, John Hopkins University
1964-1969	Assistant Professor of Biology, Harvard University
1960, 1961	Summer Fellow, Woods Hole Oceanographic Institute.

Board Memberships:

2010-	Chair, Faculty Advisory Board for the Undergraduate Major in Public Health, JHU
2007-2011	Faculty Advisory Board for the Johns Hopkins University Press
2003-2014	Chair of the Board, ReProtect, Inc.
1995-1998	Director, Ultrafem, Inc., New York.
1994-2002	Co-Founder and Managing Director, ReProtect, LLC, Baltimore.
1988-1989	Director Downtown Baltimore Childcare, Inc.
1972-1973	Advisory Board, The National Eye Institute, NIH.

Honors and Awards:

National Science Foundation Fellowship for Undergraduate Teaching
Cole Award, Biophysics Society, for Membrane Biophysics
Mellon Foundation Award for Interdisciplinary Teaching

Patents:

- 1) US 5,592,949 Device for acid buffering and method for inactivation of pathogens, T.R.Moench and R.A.Cone, inventors; issued 1/14/97, assigned to ReProtect, LLC.
- 2) US 5,617,877 Method for acidifying an ejaculate of semen, T.R.Moench and R.A.Cone, inventors, issued 4/8/97, assigned to ReProtect, LLC.
- 3) US 6,045,786 Topical application of antibodies for prophylaxis against sexually transmitted diseases and pregnancy. R.A.Cone and K.J.Whaley, inventors, issued 4/4/00, assigned to Johns Hopkins Univ.
- 4) US 6,216,697 Device and Method for simultaneously delivering beneficial agents to both cervical and vaginal lumen sides of a vagina. Moench T, Cone R, and Whaley, K inventors, issued 04/17/01, assigned jointly to Johns Hopkins Univ. and ReProtect, Inc.

- 5) US 6,355,235 Topical Application for Contraception and for Prophylaxis against AIDS and other sexually transmitted diseases. Cone R, Whaley K, 3/12/02, assigned to Johns Hopkins University.
- 6) US 6,474,338 Device and Method for simultaneously delivering beneficial agents to both cervical and vaginal lumen sides of a vagina. Moench T, Cone R, and Whaley, K, inventors, issued 11/05/02, assigned jointly to Johns Hopkins Univ. and ReProtect.

Recent invited talks:

- “Anthropology of Science”, Department of Anthropology, New York Univ. March, 2015.
- “Vaginal Acidity *in vivo* when Lactobacilli Dominate the Microbiota”. International Conference on Vaginal Microbiome and Bacterial Vaginosis, June 18-19, 2014, Hamilton NJ:
- “Vaginal mucus, microbiota, and pandemics” The Annual Sheehan Lecture at University of North Carolina, December 5, 2014:
- “Effect of the vaginal environment on HIV infected leukocytes”. NIH workshop on “Trojan Horse” HIV-infected cells, Boston, October 19, 2013

Selected recent publications:

- 1) Lai SK, O'Hanlon DE, Harrold S, Man ST, Wang YY, Cone R, Hanes J. Rapid transport of large polymeric nanoparticles in fresh undiluted human mucus. Proc Natl Acad Sci U S A. 2007 Jan 23. PMC1785284
- 2) Lai SK, Wang YY, Hida K, Cone R, Hanes J. Nanoparticles reveal that human cervicovaginal mucus is riddled with pores larger than viruses. Proc Natl Acad Sci U S A. 2009 Dec 16. PMC2818964.
- 3) O'Hanlon DEO, Lanier BR, Moench TR and Cone RA: Cervicovaginal fluid and semen block the microbicidal activity of hydrogen peroxide produced by vaginal lactobacilli. BMC Infect. Dis. 2010 May 19;10:120.
- 4) Moench TR, Mumper RJ, Hoen, TE, Sun M, Cone RA: Microbicide excipients can greatly increase susceptibility to genital herpes transmission in the mouse. BMC Infect. Dis. BMC Infect Dis. 2010 Nov 18;10:331.
- 5) Ensign LM, Tang BC, Wang YY, Tse TA, Hoen T, Cone R, Hanes J. Mucus-penetrating nanoparticles for vaginal drug delivery protect against herpes simplex virus. Sci Transl Med. 2012 Jun 13;4(138):138ra79.
- 6) O'Hanlon DE, Moench TR, Cone RA. In vaginal fluid, bacteria associated with bacterial vaginosis can be suppressed with lactic acid but not hydrogen peroxide. BMC Infect Dis. 2011 Jul 19;11:200.
- 7) Moench TR, O'Hanlon DE, Cone RA. Evaluation of microbicide gel adherence monitoring methods. Sex Transm Dis. 2012 May;39(5):335-40.
- 8) Ensign LM, Schneider C, Suk JS, Cone R, Hanes J. Mucus penetrating nanoparticles: biophysical tool and method of drug and gene delivery. Adv Mater. 2012 Jul 24;24(28):3887-94. Review.
- 9) Ensign LM, Tang BC, Wang YY, Tse TA, Hoen T, Cone R, Hanes J. Mucus-penetrating nanoparticles for vaginal drug delivery protect against herpes simplex virus. Sci Transl Med. 2012 Jun 3;4(138):138ra79
- 10) Ensign LM, Cone R, Hanes J. Oral drug delivery with polymeric nanoparticles: the gastrointestinal mucus barriers. Adv Drug Deliv Rev. 2012 May 1;64(6):557-70.

- 11) Ensign LM, Hoen TE, Maisel K, Cone RA, Hanes JS. Enhanced vaginal drug delivery through the use of hypotonic formulations that induce fluid uptake. *Biomaterials*. 2013 Sep;34(28):6922-9.
- 12) Xu Q, Boylan NJ, Suk JS, Wang YY, Nance EA, Yang JC, McDonnell PJ, Cone RA, Duh EJ, Hanes J. Nanoparticle diffusion in, and microrheology of, the bovine vitreous ex vivo. *J Control Release*. 2013 Apr 10;167(1):76-84.
- 13) O'Hanlon DE, Moench TR, Cone RA. Vaginal pH and microbicidal lactic acid when lactobacilli dominate the microbiota. *PLoS One*. 2013 Nov 6;8(11):e80074.
- 14) Aldunate M, Tyssen D, Johnson A, Zakir T, Sonza S, Moench T, Cone R, Tachedjian G. Vaginal concentrations of lactic acid potentially inactivate HIV. *J Antimicrob Chemother*. 2013 Sep;68(9):2015-25.
- 15) Wang YY, Kannan A, Nunn KL, Murphy MA, Subramani DB, Moench T, Cone R, Lai SK. IgG in cervicovaginal mucus traps HSV and prevents vaginal herpes infections. *Mucosal Immunol*. 2014 Sep;7(5):1036-44.
- 16) Ensign LM, Lai SK, Wang YY, Yang M, Mert O, Hanes J, Cone R. Pretreatment of Human Cervicovaginal Mucus with Pluronic F127 Enhances Nanoparticle Penetration without Compromising Mucus Barrier Properties to Herpes Simplex Virus. *Biomacromolecules*. 2014 Dec 8;15(12):4403-9.
- 17) Cone RA. Vaginal microbiota and sexually transmitted infections that may influence transmission of cell-associated HIV. *J Infect Dis*. 2014 Dec 15;210 Suppl 3:S616-21.
- 18) Maisel K, Chattopadhyay S, Moench T, Hendrix C, Cone R, Ensign LM, Hanes J. Enema ion compositions for enhancing colorectal drug delivery. *J Control Release*. 2015 Apr 30;209:280-287.

Current Grant Support:

1U19AI113127 (Hendrix, PI) 7/01/2014 – 6/30/2019
 NIAID, NIH

Development of Rectal Enema As Microbicide (DREAM)

This is a program project to develop a rectal enema to deliver an anti-retroviral drug to prevent rectal transmission of HIV.

5U19AI096398 (Anderson PI) 8/01/2012 - 7/31/2017
 NIAID, NIH

Monoclonal Antibody-based Multipurpose Vaginal Microbicides.

The primary goal of the project is to optimize the design of plant-based monoclonal antibodies that facilitate trapping of sperm and viruses in human cervicovaginal mucus.

R33AI094519 (Hanes and Cone, co-PIs) 7/01/2013 - 6/30/2016
 NIAID, NIH

Developing Mucus Penetrating Particles for Rectal Microbicides

R01AI119012 (Brotman, PI) 02/05/2016 – 01/31/21
 NIH/NIAID

Lubricant Use and the Vaginal Microbiome

My role is to investigate the mechanisms by which sexual lubricants trigger episodes of bacterial vaginosis