Presentations

Oral

09/2013 – Understanding the Link Between HBV Capsid Maturation and Virion Secretion, Pathology and Laboratory Medicine Seminar Series, Madison, WI
01/2013 – Understanding the Link Between HBV Capsid Maturation and Virion Secretion, Institute for Molecular Virology Seminar Series, Madison, WI
09/2012 – Determining Residues within the Core Protein that Contribute to the Secretion of Virions Containing Mature and Immature Genomes, International Meeting on Molecular Biology of Hepatitis B Viruses, Oxford, England
07/2012 – Understanding How HBV Capsids and Envelope Proteins Interact to Form a Virion, American Society of Virology Annual Meeting, Madison, WI
06/2011 – Understanding How Hepadnavirus Capsids Acquire an Envelope, McArdle Symposium on Cancer, Madison, WI
10/2010 – Understanding How Hepadnaviruses Discriminate Between Capsids Containing Immature and Mature Genomes to Facilitate Envelopment and Secretion of Virions, International Meeting on Molecular Biology of Hepatitis B Viruses, Taipei, Taiwan
12/2007 – Design Principles for Molecular Animations, American Society of Cell Biologists Annual Meeting, Washington, D.C.
10/2006 – The Use of Science and Technology for Reducing Methamphetamine Use in Teens and Young Adults, Iowa Leadership Conference, Ames, IA
11/2006 – The Use of Science and Technology for Reducing Methamphetamine Use in Teens and Young Adults, Drake University Science Colloquium Series, Des Moines, IA

Poster

10/2011 – Mapping Residues Within the L and C Proteins that Contribute to Secretion of Virions Containing Mature and Immature Genomes, International Meeting on Molecular Biology of Hepatitis B Viruses, Orlando, Florida
11/2009 – Using Avian Hepadnaviruses to Study Virion Secretion, McArdle Symposium on Cancer, Madison, WI
2/2007 – Design Principles for Molecular Animations, Biophysical Society 52nd Annual Meeting, Long Beach, California
12/2007 – Design Principles for Molecular Animations, American Society of Cell Biologists Annual Meeting, Washington, D.C.
7/2007 – Visualizations in Science & Technology, Gordon Research Conference, Smithfield, RI
8/2006 – Addiction Education Using Science Technology, Human Computer Interaction Symposium, Ames, IA
7/2006 – Addiction Education Using Science and Technology, Women in Science and Engineering Symposium, Ames, IA

Cellular and Molecular Pathology Graduate Program, Joanne Thornton, 3170-10K MFCB, 1685 Highland Avenue, Madison, WI 53705

CMP Cellular and Molecular Pathology

Natalie Greco

Program of the Dissertation Defense Seminar
for the Degree of Doctor of Philosophy
in Cellular and Molecular Pathology

"Investigating Hepadnaviral Capsid Envelopment and Virion Production"

CLINICAL SCIENCES CENTER

Thursday, December 11, 2014

1:00pm G5/113 CSC

Research conducted in the lab of
Dan Loeb, PhD
Department of Oncology

UNIVERSITY OF WISCONSIN – MADISON

Natalie Greco

Education

University of Wisconsin-Madison 2008 -
PhD in Cellular and Molecular Pathology
Distributed Minor

Southern Illinois University Spring 2008
Computer Science Coursework

Drake University 2003-2007
B.S. in Biochemistry, Cellular and Molecular Biology, Minor in Chemistry

Publications

Greco N, Hayes MH, Loeb DD. 2014. SGHBV Envelope and Capsid Proteins Independently Contribute to its Ability to Package Capsids Containing ssDNA in Virions. J. Virol

Greco N and Loeb DD. Identifying Residues within the DHBV L Protein that Contribute to Virion Morphogenesis and Selective Packaging of Capsids Containing dsDNA in Virions - In preparation

Honors and Awards

2010-2012 – Cellular and Molecular Biology T32 Training Grant Recipient
2012, 2011 and 2010 – Vilas Travel Grant Recipient
2012 and 2010 – HBV Foundation Travel Grant Recipient
2003-2007 – Presidential Scholarship from Drake University
2003-2004 – Italian American Sports Hall of Fame Scholarship
2005 – inducted into the Beta Beta Beta Biological Honor Society

Other Experience & Professional Involvement

2012 – American Society of Virology Meeting audio-visual volunteer
2012 – Wisconsin Entrepreneurial Bootcamp (WEB) participant
2009-11 – CMP Graduate Program Recruitment Committee
2010 – Co-creator of an online virology course for the Wisconsin Center for Academically Talented Youth (WCATY) Online Academy, with elementary school teacher P. Boettcher
2009-10 – CMP Graduate Program Admissions Committee

DISSERTATION ABSTRACT

Hepadnaviruses selectively package capsids containing mature dsDNA genomes into virions. The research presented in this dissertation provides insight into this poorly understood aspect of viral replication. Snow goose hepatitis B virus (SGHBV) is the only known hepadnavirus that packages capsids containing immature ssDNA into virions. I found that cells replicating SGHBV produce virions containing ssDNA as efficiently as virions containing dsDNA and that they support high levels of virion production, compared to DHBV. I determined that SGHBV capsid protein (Cp) and large envelope protein (L) independently contribute to the ability of SGHBV to produce virions containing ssDNA with Cp making a larger contribution. Also, I found that L contributes to the high levels of virion production characteristic of SGHBV. I conferred these properties onto DHBV by substituting regions of the SGHBV proteins into corresponding DHBV proteins, allowing me to identify residues within Cp and L that are responsible for the different properties of these viruses.

I identified two amino acid residues of DHBV Cp that contribute to selective dsDNA virion production and may interact with the envelope proteins during virion formation. Additionally, I identified a region of DHBV L that contributes to selective dsDNA virion production. I found that this same region of L was also responsible for DHBV's relatively low levels of virion production. Future studies on the role of these residuesin virion production will broaden our understanding of this aspect of virus replication.

Finally, I found that HHBV envelope proteins cannot package DHBV or SGHBV capsids into virions. I used this incompatibility to identify residues of Cp involved in virion formation. I substituted a small segment of HHBV Cp into DHBV Cp and this restored the ability of HHBV envelope proteins to package DHBV capsids into virions. Residues within this segment likely interact with envelope proteins during virion morphogenesis. Interestingly, this segment contains the residues of Cp responsible for selective dsDNA virion production. A similar approach can be taken to identify regions of the envelope proteins involved in capsid packaging and virion production.

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