ACADEMIC BIOGRAPHY
of
Hector Fernando Valenzuela, Ph.D.

CURRENT DEPARTMENT

Department of Biology at Whittier College

EDUCATION

2005 **University of California Los Angeles**, Los Angeles, CA
Postdoctoral Fellow in Experimental Pathology
Glycosylation regulation of apoptosis by galectin-1.

2001 **University of California Los Angeles**, Los Angeles, CA
Ph.D. Degree in Experimental Pathology
Dissertation "Immunosenescence: Telomere and Telomerase Dynamics in Human T cells"

1994 **San Diego State University**, San Diego, CA
BS Degree in Biology

AWARDS and Professional Society Membership

Faculty

2010	Oxygen California Club (member)
2009	American Association of Immunologist Scientist Travel Award
2009	Whittier College Faculty Research Grant
2008	Whittier College Faculty Research Grant
2007-present	American Association of Immunologist (member)

Postdoctoral

2002-2004	National Institute of Health Tumor Cell Biology Fellowship at the University of California Los Angeles

Graduate Student

1998-2001	Minority Supplement from the National Institute of Health
1997-1998	Project 88 Fellowship (gratefully declined)
1994-1995	Project 88 Fellowship

Undergraduate Student

1994	Cum Laude upon graduating from San Diego State University
1993-1994	Undergraduate Howard Hughes Research Fellowship
1993	Phi Beta Kappa
1991-1993	Minority Access to Energy Related Careers Fellowship
1991-1992	Deans list from San Diego State University

PUBLICATIONS

Valenzuela, H.F., Pace, K.E., Cabrera, P.V., White R., Porvari, K., Kaija H., Vihko P. and Baum, L. (2007) O-Glycosylation regulates LNCaP prostate cancer cell susceptibility to apoptosis induced by galectin-1. *Cancer Research*. July 1, 67:(13) 6155-62.

Effros, R.B., Dagarag, M. and **Valenzuela, H.F.** (2003) In vitro senescence of immune cells. *Experimental Gerontology*. Nov-Dec 38 (11-12): 1243-9.

Panossian, L., Porter, V.R., **Valenzuela, H.F.**, Zhu, X., Reback, E., Masterman, D., Cummings, J.L. and Effros, R.B. (2003) Telomere shortening in T cells correlates with Alzheimer's disease status. *Neurobiology of Aging*. 1:77-84.

Valenzuela, H.F. and Effros, R.B. (2002) Divergent Telomerase and CD28 expression patterns in human CD4 and CD8 T cells following repeated encounters with the same antigenic stimulus. *Clinical Immunology* 105:117-125.

Valenzuela, H.F. and Effros, R.B. (1999) Telomeres and Replicative Senescence. *Methods in Molecular Medicine*. Vol. 38 Y.A. Barnett and C.R. Barnett, eds, Humana Press Inc. pp 63-67.

Effros, R.B. and **Valenzuela, H.F.** (1998) Immunosenescence: Analysis and Genetic Modulation of Replicative Senescence in T cells *Journal of Anti-Aging Medicine*, 1:305-313.

ABSTRACTS

Hector F. Valenzuela[1], Thomas Fuller[1], Jim Edwards[2], Danielle Finger[1] and Brenda Molgora[1] (2009) Cycloastragenol extends T cell proliferation by increasing telomerase activity.

Levroney E., Aguilar H., Gurney K., **Valenzuela H.F.**, Baum L.G., Benhur Lee B. (2003) Cell fusion and syncytia formation is mediated by oligosaccharide determinants of Nipah virus envelope F and G glycoproteins and can be blocked by lectins. Glycobiology. Abstract# 4A69D

Valenzuela, H.F. and Effros, R.B. (2000) Loss of telomerase inducibility in antigen specific memory T cells. FASEB journal 14:A991.

Porter, V.R., Panossian, L., **Valenzuela, H.F.**, Zhu, X.,Rausch, H.R., Cummings, J.L. and Effros, R.B. (2000) The role of telomere length and telomerase in the immunopathogenesis of Alzheimer's disease. Society for Neuroscience Annual Meeting. New Orleans, LA.

PRESENTATIONS

Presentations as a Student, Postdoctoral Fellow and Faculty mentor

Presentation as a Faculty Mentor

2009 Poster presentation at the Annual American Association of Immunologist Conference. **Cycloastragenol extends T cell proliferation by increasing telomerase activity** Hector F. Valenzuela, Thomas Fuller, Jim Edwards, Danielle Finger, Brenda Molgora and Collin Clifford. Mentor: Hector Valenzuela, Department of Biology, Whittier College

2007 Poster presentation at the Southern California Conference for Undergraduate Research (SCCUR). **The Effects of Resveratrol on the Gut Microbiota of mice** Esther Chan, Whittier College. Mentor: Hector Valenzuela, Department of Biology, Whittier College

Postdoctoral Fellow

2003 Poster presentation at the San Diego Glycobiology Symposium, San Diego, CA. **Valenzuela, H.F.,** Pace, K., Kaija, H., Vihko, P., and Baum, L.G.: Differential cell death regulation by galectin-1 in androgen dependent versus androgen independent prostate cancer cells.

2002 Oral presentation at the Conference on Basic Biology and Clinical Aspects of Immunosenescence, Palermo, Italy. **Valenzuela, H.F.** and Effros, R.B.: Divergent telomerase and CD28 expression patterns in human CD4 and CD8 T cells following repeated encounters with the same antigenic stimulus.

2002 Oral presentation at the Jonsson Comprehensive Cancer Center Genitourinary Oncology Intramural Research Conference, UCLA, Los Angeles, CA. **Valenzuela, H.F.,** Pace, K., and Baum, L.G.: Guerilla warfare in the prostate.

Graduate Student

2001 Oral presentation at the Cordova Conference on Immunology and Aging, Cordova, Italy. Effros, R.B. and **Valenzuela, H.F.** Loss of telomerase inducibility in antigen-specific memory T cells.

2000 Poster presentation at the American Association of Immunologist and Clinical Immunology Society Joint Annual Meeting, Seattle, WA. **Valenzuela, H.F.** and Effros, R.B.: Loss of telomerase inducibility in antigen-specific memory T cells.

1998 Poster presentation at the Gordon Conferences Biology of Aging, at Il Ciocco, Italy. **Valenzuela, H.F.** and Effros, R.B.: Studies on replicative senescence in human T cells.

1997 Poster presentation at the 17th International Congress of Biochemistry and Molecular Biology, San Francisco, CA. **Valenzuela, H.F.** and Effros, R.B.: T cell replicative senescence, CD28 and telomeres.

Undergraduate Student

1993 Poster presentation at MAERC annual symposium at Idaho Falls National Laboratory. **Valenzuela, H.F.**: Limiting nitrogen increases yields of Rhodospirillale's polyhydroxybutyrate production.

1993 Poster presentation at Minority Program Symposium sponsored by NIGMS, Atlanta. **Valenzuela, H.F.**: Limiting nitrogen increases yields of Rhodospirillale's polyhydroxybutyrate production.

1992 Oral presentation at MAERC annual symposium at Los Alamos National Laboratory, Los Alamos, NM. **Valenzuela, H.F.**: Isolation of polyhydroxybutyrate from Rhodospirillales.

RESEARCH EXPERIENCE

2007-Present The goals of my research are to study the age-related changes in T cell differentiation and function. There are many reports that have documented T cells changes in the elderly. However, it remains unclear why these cellular changes occur and how they influence the many functions of the immune response. Our laboratory has established a cell system that mimics T cell aging *in vitro*. This model system will be used to explore the age-related changes that affect T cells. My overall goals can be divided into two parts: 1) to determine the mechanism for memory T cells senescence and 2) to study the effect that memory T cell exhaustion has on the immune system.

2001-2005 Postdoctoral training in the laboratory of Dr. L. Baum, Department of Pathology and Laboratory Medicine, University of California Los Angeles, CA
Glycosylation regulates prostate cancer cell susceptibility to apoptosis induced by galectin-1. In the prostate, specific changes in cell surface glycosylation occur as prostate epithelial cells progress from normal to neoplastic[1]. The altered glycosylation may be explained by changes in enzyme expression levels of glycosyltransferases and glycosidases. These changes suggest that there may be altered cell recognition by endogenous lectins in prostate cancer.

Galectin-1 is a mammalian lectin that has a role in the regulation of cellular differentiation, proliferation, and apoptosis[2]. Galectin-1 can preferentially bind O-glycans and expression of Core 2 O-glycans is required for galectin-1 induced death of T cells. Galectin-1 is abundant in normal prostate stroma and is also expressed by androgen independent prostate cancer cells but not by normal prostate epithelial or androgen dependent prostate cancer cells. The androgen dependent prostate cancer cell LNCaP is susceptible to galectin-1 induced death. However, an androgen independent LNCaP subclone had a five fold decrease in C2GnT expression and is less sensitive to galectin-1 induced death. As androgen independence is associated with tumor progression and metastasis, this suggests that androgen-independent cells can express galectin-1, avoiding apoptosis and thus use galectin-1 for invasion and metastasis.
Our goal is to investigate how altered glycosylation confers apoptosis resistance to androgen independent cancer cells. We have used several androgen independent and dependent prostate cancer cell lines provided by the Vihko group at University of Helsinki, Finland and Charles Sawyer group at UCLA.

1994-2001 Doctoral training in the laboratory of Dr. R. Effros, Department of Pathology and Laboratory Medicine, University of California Los Angeles, CA

Analysis of replicative senescence of long-term human T cell cultures and the investigation of the roles of CD28 co-receptor and telomerase enzyme.
An essential feature of T lymphocyte activation is the induction of clonal expansion of reactive cells that function to control and/or eliminate foreign antigen. However, the massive clonal expansion of T lymphocytes is ultimately constrained, since all normal human somatic cells have an innate replicative limit that is dependent on telomere length. The studies described in this thesis focused on examining the long-term dynamics of telomerase activity and the mechanism of telomere shortening in human T cells and can be summarized into four points. Initial stimulation induced a dramatic increase of telomerase activity in PBMC, $CD4^+$ and $CD8^+$ T cell subsets, but repeated stimulation resulted in loss of telomerase activity in $CD8^+$ T cells, despite continued proliferation. The decline in telomerase inducibility in PBMC and $CD8^+$ T cells correlates with the loss of surface expression of the CD28 co-stimulatory receptor upon repeated antigenic stimulations. Additionally, we show that the induction of telomerase activity in T cells by CD3 and CD28 stimulation is significantly enhanced by estrogen. Finally, we demonstrate that ectopic expression of hTERT, the catalytic protein component of telomerase, induces high levels of telomerase activity, telomere length maintenance and extension of T cell lifespan. Collectively, these studies provide new insights into the mechanism(s) by which telomerase activity is regulated in human T cells that have been subjected to repeated antigenic stimulation.

1993-1994 Researcher in the laboratory of Dr. C.D. Tsoukas, Department of Biology, San Diego State University, San Diego, CA
Isolate and analyze the mRNA of CD21 full length and truncated isoforms from human T cells. The cell surface receptor CD21 is known to bind to the enzymatic fragment C3 and also to serve as a receptor for the Epstein-Barr virus (EBV). Data from our laboratory and others have challenged the view that this CD21 receptor was expressed only by B lymphocytes and follicular dendritic cells. Recent data suggested that CD21 receptor was also expressed by T cell lines and thymocytes. Furthermore, we discovered a soluble truncated form of CD21 receptor, which is likely due to alternative splicing of mRNA. The purpose of my research consisted in isolating and analyzing the mRNA of CD21 full length and truncated isoforms from human T cells.

Sum '92,'93 Researcher in the National Renewable Energy Laboratory, Golden, CO
Characterize and isolate the photosynthetic bacterial order Rhodospirilles for the highest production of the lipid polyester, polyhydroxbutyrate, a moldable bioplastic when grown with an artificial synthesis gas. This research had a dual purpose, the reduction of solid waste materials by gasification and converting the waste into biodegradable bioplastics using photosynthetic bacteria. When solid waste materials such as biomass, fossil fuels, and municipal waste are thermally gasified they are converted from a heterogeneous mixture of solids into a homogenous mixture of gases. This gas called "synthesis gas" can be utilized by the photosynthetic bacterial order Rhodospirillales as a carbon source to grow and produce lipid polyester called polyhydroxybutyrate (PHB). PHB is a moldable polymer (bioplastic) that resembles in physical properties the commonly used plastic polystyrene. My specific objective involved searching for the bacteria strain producing the highest ratio of PHB/cell dry weight under alternating day/night cycles.

1991-1993 Researcher in the laboratory of Dr. Z. Hanscom, Department of Biology, San Diego State University, San Diego, CA
Examine the effects of light and nutrient concentrations on *Nasturtium officinale* chemical defense. This research was concerned with the chemical defenses of watercress (*Nasturtium officinale*). Watercress possesses the glucosinolate-myrosinase system, which is regarded as a classic example of chemical defense for terrestrial crucifers. Damage to leaves results in myrosinase-mediated hydrolysis of phenylethyl glucosinolate to the toxic volatile phenylethyl isothiocyanate. The purpose of my individual research project was to measure the production of phenylethyl glucosinolate under various light and nutrient concentrations.

TEACHING

Summary of Courses Taught

Year	Fall	January	Spring	Summer
2003	Frontiers of Human Aging			
2004			Frontiers of Human Aging	
			Biology of Aging	
	Frontiers of Human Aging			
2005			Frontiers of Human Aging	
			Biology of Aging	
	Human Biology			Summer Study Skills Workshop
	General Biology			
2006			Human Biology	
			General Biology	
			(two courses) Microbiology	
	BIO 390-Genetics			
	BIO 151-Mol Cell Lab			
2007		INTD 170-Biology of Aging	BIO 343-Microbiology	INTD 170-Biology of Aging
			BIO 190-Human Biology	
	BIO 152-Biology of Organisms			
	BIO 300A-Human Anat & Phys			
	BIO 151-Mol Cell Lab			
	496-Undergraduate Research			
2008		INTD 170-Biology of Aging	BIO 300B-Human Anat & Phys	INTD 170-Biology of Aging
			BIO 343-Microbiology	
2008			496-Undergraduate Research	
	BIO 300A-Human Anat & Phys			
	BIO 151-Mol Cell Lab			
	INTD 100-FWS			
	496-Undergraduate Research			
2009			BIO 343-Microbiology	INTD 170-Biology of Aging
			BIO 190-Human Biology	
	BIO 493 Seminar for Seniors			
	BIO 300A-Human Anat & Phys			
	BIO 151-Mol Cell Lab			
	496-Undergraduate Research			

Description of Courses

"*BioGerontology*", Whittier College.
In this course we view aging from a mechanistic approach and study the various human organs systems and how the decline of function due to aging takes place. We review the molecular changes due to aging that affect gene expression and protein modification

emphasizing changes that lead to some common illnesses among the elderly. Mechanisms and alterations in longevity are also discussed.

"*Biology of Aging*", Whittier College.
We review basic theories of aging and methods used to study aging from the cellular level to organisms and populations. In addition, there is Service Learning component to the course where practical applications to theories discussed are engaged.

"*Human Anatomy and Physiology*", Whittier College.
Year-long team taught course with Dr. Erika Fradinger. This introductory course is designed to present gross and microscopic anatomy of the human body followed by the physiology of a normal working body. Laboratory section is greatly emphasized.

"*Biology of Organisms*", Whittier College.
We will review the molecular changes due to aging that affect gene expression and protein modification emphasizing changes that lead to some common illnesses among the elderly. Mechanisms and alterations in longevity will also be discussed.

"*Cell & Molecular Biology Lab*", Whittier College.
This course is an introduction to biology for the biology majors. This course begins to lay the foundation for what will become the core courses in the biology major emphasizing diversity evident throughout all living organisms at different levels of structure and function: molecular, cellular, organismal and population. I taught one laboratory section for this course.

"*Human Biology*", Whittier College.
An introductory course designed to provide the student with a basic understanding of the functioning of the human body as it relates to health problems.

"*Microbiology*", Whittier College.
This upper division course is designed to expand on the basic principles of microbial growth and metabolism, morphology, taxonomy, pathogenicity, immunity, and control. In addition to the textbook information, students are required to become informed in microbial scientific literature. The laboratory emphasizes independent research by the student. Techniques of isolation, cultivation and identification of microorganisms and molecular biology are stressed in lab.

"*Genetics*", Whittier College.
In this course, we discuss genetics as the study of genes through their variation and modes of transmission from generation to generation (Transmission genetics); gene structure and function (Molecular genetics); and gene behavior in populations (Population genetics).

"*Microbiology*", Mount St. Mary's College.
Basic principles of microbial growth and metabolism, morphology, taxonomy, pathogenicity, immunity, and control. Microorganisms as agents of disease and normal

inhabitants of man's environment. Techniques of isolation, cultivation and identification of these organisms.

"*Human Anatomy*", West LA College.
An introductory course designed to present gross, microscopic, developmental anatomy of the human body. Laboratory section included.

"*Human Biology*", Mount St. Mary's College.
An introductory course designed to provide the student with a basic understanding of the functioning of the human body as it relates to health problems. **Two sections.**

"*General Biology*", West LA College.
This course is an introduction to biology for the non-biology major emphasizing both unity and diversity evident throughout all living organisms at different levels of structure and function: molecular, cellular, organismal and population.

"*General Microbiology*", West LA College.
The course includes aspects of structure, metabolism, multiplication, genetics and classification of bacteria, fungi, protozoa, and viruses; the methods used to control these micro-organisms, the human body's natural defense mechanism, and some selected microbial pathogens. The laboratory portion of the course covers microscopic and cultural techniques for studying and identifying micro-organisms.

"*General Biology*", Mount St. Mary's College.
This course is an introduction to biology for the non-biology major emphasizing both unity and diversity evident throughout all living organisms at different levels of structure and function: molecular, cellular, organismal and population. **Included two laboratory sections**.

"*Summer Study Skills Workshop*", Mount St. Mary's College.
A bridge program for incoming freshman to become familiar with the campus and rigors of academic life. The course reviewed the basic concepts needed for General Biology, as well as, general study skills for science.

***"Frontiers of Human Aging: Biomedical, Social, and Policy Perspectives"* and "*Biology of Cellular Aging and Disease*",**
Year-long team taught interdisciplinary lecture. Fall and Winter quarters co-instructor. Spring quarter developed curriculum for in depth class seminar entitled "*Biology of Cellular Aging and Disease*".

Teaching Assistant/Lab Instructor. *Biology of Aging*, **University of California Los Angeles**, Los Angeles, CA

Teaching Assistant/Lab Instructor. *Molecular and Cell Biology*, **University of California Los Angeles**, Los Angeles, CA

Teaching Assistant, Taft Junior High School, San Diego, CA