Byong Chul Yoo

Curriculum Vitae

PERSONAL DATA

Date of Birth : August 3rd, 1971
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EDUCATION

Ph.D: November, 2001
Department of Biochemistry, University of Vienna, Vienna, Austria

MS: June, 1998
Department of Genetic Engineering, Sungkyunkwan University,
Graduate School, Seoul, Korea

BS: February, 1996
Department of Genetic Engineering, Sungkyunkwan University
Seoul, Korea

POSTGRADUATE & FACULTY APPOINTMENTS

Adjunct Professor:	From January 1, 2011 to Present Department of Genetic Engineering Sungkyunkwan University
Proteomics Core Chief:	From June 1, 2007 to Present Proteomics Core Research Institute, National Cancer Center, Korea
Branch Chief:	From September 1, 2004 to August 31, 2005 Colorectal Cancer Branch, Division of Common Cancers, Research Institute, National Cancer Center, Korea
Principal Investigator:	From November 1, 2002 to Present Colorectal Cancer Branch, Division of Common Cancers,

Research Institute, National Cancer Center, Korea

Research Fellow: From August 1, 2002 to October 31, 2002
Research Institute, National Cancer Center, Korea

Postdoc: From January 1, 2002 to May 31, 2002
Department of Pharmacology, School of Medicine,
Yale University

HONORS

1998 Fellowship from International Society for Amino Acids Research

2005 NCC Distinguished Publication Award 2005

2010 Meritorious Service Award in the 10th anniversary of the founding of NCC, Korea

2010 Evaluation Board for National Technology in the Ministry of Education, Science and Technology

PUBLICATION

Byeon SE, Yu T, Yang Y, Lee YG, Kim JH, Oh J, Jeong HY, Hong S, **Yoo BC**, Cho WJ, Hong S, Cho JY. (2013) Hydroquinone regulates hemeoxygenase-1 expression via modulation of Src kinase activity through thiolation of cysteine residues. *Free Radic Biol Med.* 2013 Jan 2. In Press

Kim SJ, Kim KH, Ahn ER, **Yoo BC**, Kim SY. (2013) Depletion of cathepsin D by transglutaminase 2 through protein cross-linking promotes cell survival. *Amino Acids.* 44(1):73-80.

Yu T, Moh SH, Kim SB, Yang Y, Kim E, Lee YW, Cho CK, Kim KH, **Yoo BC**, Cho JY, Yoo HS. (2013) HangAmDan-B, an Ethnomedicinal Herbal Mixture, Suppresses Inflammatory Responses by Inhibiting Syk/NF-κB and JNK/ATF-2 Pathways. *J Med Food.* 16(1):56-65.

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Kim SH, Kim KH, **Yoo BC**, Ku JL. (2012) Induction of LGR5 by H2O2 treatment is associated with cell proliferation via the JNK signaling pathway in colon cancer cells. *Int J Oncol.* 41(5):1744-50.

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Kim YJ, Park SJ, Choi EY, Kim S, Kwak HJ, **Yoo BC**, Yoo H, Lee SH, Kim D, Park JB, Kim JH. (2011) PTEN modulates miR-21 processing via RNA-regulatory protein RNH1. *PLoS One.* 6(12):e28308.

Park YS, Yoo CW, Lee SC, Park SJ, Oh JH, **Yoo BC**, Paik SS, Lee KG, Jin SY, Kim SC, Kim KP, Kim YH, Choi D, Kim HK. (2011) Lipid profiles for intrahepatic cholangiocarcinoma identified using matrix-assisted laser desorption/ionization mass spectrometry. *Clin Chim Acta.* 412(21-22):1978-82.

Choi JY, Jeong JM, **Yoo BC**, Kim K, Kim Y, Yang BY, Lee YS, Lee DS, Chung JK, Lee MC. (2011) Development of 68Ga-labeled mannosylated human serum albumin (MSA) as a lymph node imaging agent for positron emission tomography. *Nucl Med Biol.* 38(3):371-9.

Kim SJ, **Yoo BC**, Uhm CS, Lee SW. (2011) Posttranslational arginine methylation of lamin A/C during myoblast fusion. *Biochim Biophys Acta.* 1814(2):308-17. (Co-First authorship)

Byeon SE, Lee J, **Yoo BC**, Sung GH, Kim TW, Park HJ, Cho JY. (2011) p38-Targeted inhibition of interleukin-12 expression by ethanol extract from Cordyceps bassiana in lipopolysaccharide-activated macrophages. *Immunopharmacol Immunotoxicol.* 33(1): 90-6.

Kim C, Lim Y, **Yoo BC**, Won NH, Kim S, Kim G. (2010) Regulation of post-translational protein arginine methylation during HeLa cell cycle. *Biochim Biophys Acta.* 1800(9):977-85.

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Ju W, **Yoo BC**, Kim IJ, Kim JW, Kim SC, Lee HP. (2009) Identification of genes with differential expression in chemoresistant epithelial ovarian cancer using high-density oligonucleotide microarrays. Oncol Res. 18(2-3):47-56.

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Shin YK, **Yoo BC**, Hong YS, Chang HJ, Jung KH, Jeong SY, Park JG. (2009) Upregulation of glycolytic enzymes in proteins secreted from human colon cancer cells with 5-fluorouracil resistance. *Electrophoresis.* 30(12):2182-92. (Co-First authorship)

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Krapfenbauer K, **Yoo BC,** Fountoulakis M, Mitrova E, Lubec G (2002) Expression patterns of antioxidant proteins in brains of patients with sporadic Creutzfeldt-Jacob disease. *Electrophoresis* 23(15):2541-2547.

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Krapfenbauer K, **Yoo BC**, Cairns N, Lubec G. (1999) Differential display reveals deteriorated mRNA levels of NADH3 (complex I) in cerebellum of patients with Down syndrome. *J Neural Transm Suppl* 57:211-220.

Yoo BC, Kang MS, Kim S, Lee YS, Choi SY, Ryu CK, Park GH, Han JS. (1998) Partial purification of protein farnesyl cysteine carboxyl methyltransferase from bovine brain. *Exp Mol Med* 30(4):227-234.

Ph.D. THESIS

Title: Assessment of Gene and Protein Expression leading to Neurodegenerative Changes in Brains of Down Syndrome, Alzheimer's Disease and Creutzfeldt-Jacob Disease Patients using Differential Display and Proteomics

Abstract

Neurodegenerative diseases create many problems for the individuals who have it, for their families and for society in general. Much has happened in recent years to improve the well-being of the individuals with neurodegenerative diseases and their place in society, and more still needs to be done. Lots of scientific efforts have tried to explain the pathological mechanism and find specific therapy for neurodegenerative diseases. In fact, an explosion of scientific and clinical knowledge about the most prevalent neurodegenerative disease, Alzheimer's disease (AD), now provides a basis for selecting targets for treatment aimed at slowing progression of dementia or delaying the onset of or preventing AD. Furthermore, extensive studies have focused to elucidate DS pathogenesis since Down Syndrome (DS) is the most frequent genetic cause of mental retardation and shows closely AD-related neuropathological changes. Compared to other neurodegenerative diseases, the population of human prion diseases is very small. However, understanding of prion pathological mechanism has become a central issue for public health because of exponential increasing of the incidence of 'new variant' Creutzfeldt-Jakob disease (vCJD) in the United Kingdom.

To investigate the abnormally expressed genes and proteins leading neurodeganerative diseases and to extend our understanding of the pathological mechanism in neurodegenerative diseases, we assessed gene and protein expression in brains of patients with DS, AD and CJD using differential display and proteomics.

Through this assessment, we were able to find obviously that deranged mRNA levels of phospholipid transfer protein (PLTP I), cyclin D2 and NADH in DS and AD brain and altered protein expression levels of beta-soluble N-ethylmaleimide-sensitive factor attachment protein (SNAP), gamma-SNAP, synaptotagmin I (SYT I), voltage-dependent anion-selective channel protein (VDAC) 1, VDAC 2 and molecular chaperone proteins. Furthermore, we found that p25 (truncated form of cdk5 activator p35) is actually down-regulated in DS and AD brain using western blot analysis. Unlike in adult DS brain, protein levels of VDAC 1, VDAC 2, molecular chaperones did not change in fetal DS brain whereas T-complex protein 1 (TCP-1) was altered. Furthermore, expression levels of proteins involving in cholinergic, monoaminergic and serotoninergic systems in fetal DS brain were comparable to those of controls.

In CJD brain, eighty proteins were identified and quantified using proteomics. Amongst them, we found that dysregulated expressions of antioxidant protein 2, heat shock protein (HSP) 70 families, gamma enolase, SYT I, carbonic anhydrase II (CA II), NADH-ubiquinone oxidoreductase 75 kDa subunit, fructose-bisphosphate aldolase C, dehydropyrimidinase related protein-2 (DRP-2), aconitate hydratase, protein disufide isomerase (PDI), glutamine synthetase, alpha enolase, phosphoglycerate mutase and phosphoglycerate kinase I. Western bolt analysis revealed that p25 protein is also down-

regulated in CJD brain, however p35 was increased. Moreover, we investigated that two more antioxidant proteins, peroxiredoxin (Prx) I and Prx II in CJD brain at protein level using western blot. Prx I protein level showed a decrease whereas Prx II was not changed. Interestingly, we found that PDI protein expression was up-regulated in CJD brain and PDI could convert PrP^C into proteinase K resistance species.

Our assessment of gene and protein expression showed that many of genes and proteins were dysregulated in brains of patients with DS, AD and CJD. These findings implicated that many of cellular functions were disrupted in DS, AD and CJD brain, i.e., deranged cellular defence mechanism (altered expression of molecular chaperones and antioxidant proteins), disrupted energy metabolism (decreased levels of NADH mRNA and NADH-ubiquinone oxidoreductase 75 kDa subunit protein), abnormal cell cycle (deranged cyclin D2 and p25 proteins), and changed metabolic flux (dysregulated VDAC 1 and VDAC 2 proteins), and these abnormalities consequently caused neuronal loss (decreased protein expression of NSE, beta-SNAP, gamma-SNAP and SYT I) and reactive gliosis (increased CA II and GFAP proteins) leading neurodegeneration. Furthermore, up-regulated PDI protein expression in CJD brain and effect of PDI on PrP^C conversion process into proteinase K resistance species suggested the possibility that PDI may be target protein in CJD therapy.

Our findings might be helpful to extend our understanding of complex neuropathological mechanism at molecular level and the finding of PDI as a potential therapeutic target protein for CJD may shed light on the development of new medicine for curing CJD.