Value Proposition

Pressure Cycling Technology (PCT)

and

PBI SHREDDER SG3

1. Introduction to Pressure Cycling Technology (PCT)

a. *(Fundamentals of) High-pressure Instruments for Innovation and Discovery*
Dr. Edmund Ting (V.P. of Engineering)
Harvard Symposium May 21, 2010
http://www.pressurebiosciences.com/downloads/publications/2010-06/High-pressure-Instruments-for-Innovation-Discovery.pdf

b. *High Pressure in Life Sciences –Trends and Future Opportunities*
Dr. Alexander Lazarev (V.P. of R&D)
Harvard Symposium May 21, 2010
http://www.pressurebiosciences.com/downloads/publications/2010-06/High-Pressure-in-Life-Sciences.pdf

c. *Use of Ultrahigh Pressure on the Rise*
K. John Morrow
GEN: Genetic Engineering & Biotechnology Aug 1 2010 (Vol. 30, No. 14)
http://genengnews.com/gen-articles/use-of-ultrahigh-pressure-on-the-rise/3360/?page=3

d. *Chapter 1: Applications of Pressure Cycling Technology (PCT) in Proteomics*
Richard T. Schumacher, Chunqin Li, Nathan P. Lawrence, James Behnke, Feng Tao,
and Calvin Saravis
Separation Methods in Proteomics,
Edited by Gary B. Smejkal and Alexander Lazarev, CRC Press 2006
Personal Copy (No Hyperlink)

e. *Tired of the Same Old Grind*
Patricia E. Garrett, Feng Tao, Nathan Lawrence, Jay Ji, Richard T. Schumacher,
and Mark M. Manak
Targets Innovations in Genomics and Proteomics
November 2002. Vol.1, Number 5, pp. 147-176
http://www.pressurebiosciences.com/downloads/publications/paper11.pdf

f. *Applications of Ultra-high Pressure in Biotechnology*
Harvard Symposium May 21, 2010
http://www.pressurebiosciences.com/downloads/publications/2010-05/Harvard-Symposium-Program%20-Final.pdf

2. Enhanced Protein Extraction (Various Sample Types)

a. **Membrane Proteins**

The Effect of Pressure Cycling on Proteolytic Cleavage Efficiency, Reaction Time and Protein Sequence Coverage
Eric Bonneil1; Roger Biringer2; Julian Saba2; Andreas Huhmer2; Pierre Thibault1 1Institute for Research in Immunology and Cancer, Université de Montréal, Montréal, Canada 2Thermo Fisher Scientific, San Jose, CA
HUPO 2010
http://www.pressurebiosciences.com/pdf-new-2010/publications/HUPO-2010-poster.pdf

Membrane Protein Extraction and Biomarker Analysis from Solid Metastatic Ovarian Tumors with ProteoSolve™-TD Buffers and Pressure Cycling Technology
Luke V. Schneider, CSO, Target Discovery, Inc.
Harvard Symposium May 21, 2010
http://www.pressurebiosciences.com/downloads/publications/2010-06/LVS-Membrane-proteins.pdf

b. Hydrophobic Proteins

Improving the Efficiency and Throughput of an Enzymatic Digestion of Klotho using Pressure Cycling Technology (PCT)
Taha Reza, et al.
Thermo Fisher Scientific
MSACL 2011
Pre-Print Personal Copy (No Hyperlink)
Repeated in 5a

Soluble Forms of the Notch Ligands Delta1 and Jagged1 Promote in Vivo Tumorigenicity in NIH3T3 Fibroblasts with Distinct Phenotypes
Sumithra Urs,* Alice Roudabush,†Christine F. O'Neill,‡ Ilka Pinz,* Igor Prudovsky,*Doreen Kacer,* Yuefang Tang,* Lucy Liaw,*and Deena Small§ From the Center for Molecular Medicine,* Maine Medical Center Research Institute, Scarborough, Maine; Department of Animal and Nutritional Sciences and New Hampshire Veterinary Diagnostics Laboratory,† University of New Hampshire, Durham, New Hampshire; Department of Biochemistry,‡ Boston University, Boston Massachusetts; and Department of Biochemistry and Molecular Biology,§ University of New Hampshire, Durham, New Hampshire
Tumorigenesis and Neoplastic Progression: The American Journal of Pathology, Vol. 173, No. 3, September 2008. Copyright © American Society for Investigative Pathology
http://www.ncbi.nlm.nih.gov/pubmed/18688026

Chapter 30: Adipose tissue and protein extraction followed by MS-base proteomic profiling reveals constituents of oxidative stress in obesity
Emily A. Freeman, Vera Gross, Ilyana Romenofsky, Alexander Lazarev,
and Alexander R. Ivanov
Harvard School of Public Health Department of Genetics and Complex Diseases, Boston MA, The Harvard School of Public Health Proteomics Resource, and Pressure BioSciences, Inc.
Sample Preparation in Biological Mass Spectrometry", Ivanov, A.R, and A.V. Lazarev, editors;
Springer ©2011
Pre-Print Personal Copy (No Hyperlink)

c. Formalin-Fixed Paraffin-Embedded Tissue (FFPE)

See Section 5: PCT Pipeline

e. Ancient

Chapter 45: Revisiting Jurassic Park: The isolation of proteins from amber encapsulated organisms millions of years old
Gary B. Smejkal, George O. Poinar Jr., Pier Giorgio Righetti and Feixia Chu
University of New Hampshire, Hubbard Center for Genome Studies, Oregon State University, Department of Zoology, Politecnico di Milano, Department of Chemistry, Materials and Chemical Engineering, Harvard University, Harvard Catalyst, The Harvard Clinical and Translational Science Center, Laboratory for Innovative Translational Technologies.
Sample Preparation in Biological Mass Spectrometry", Ivanov, A.R, and A.V. Lazarev, editors; Springer ©2011
Pre-Print Personal Copy (No Hyperlink)

f. Ocular Tissue

Strategies to Recover Proteins from Ocular Tissues for Proteomics
Nikhil Patel, Ekta Solanki, Renata Picciani, Valerie Cavett, Jennifer A. Caldwell-Busby,
and Sanjoy K. Bhattacharya
PROTEOMICS Volume 8, Issue 5, pages 1055–1070, No. 5 March 2008
http://onlinelibrary.wiley.com/doi/10.1002/pmic.200700856/abstract

g. Greater Reproducibility

Development of Essential Sample Preparation Techniques in Proteomics Using Ultra-high Pressure
Alexander R. Ivanov
HSPH Proteomics Research Department of Genetics and Complex Diseases Harvard School of Public Health
Harvard Symposium May 21, 2010
http://www.pressurebiosciences.com/downloads/publications/2010-06/development-of-essential-sample.pdf

g. Systems Biology

Tissue Fractionation by Hydrostatic Pressure Cycling Technology: The Unified Sample Preparation Technique for Systems Biology Studies
Vera Gross, 1 Greta Carlson, 1 Ada T Kwan, 1 Gary Smejkal, 1 Emily Freeman, 2 Alexander R Ivanov, 2Alexander Lazarev1
1Pressure BioSciences, Inc., Woburn, MA; 2Harvard School of Public Health, Boston, MA
Journal of Biomolecular Techniques, Volume 19, issue 3, JULY 2008
http://www.pressurebiosciences.com/downloads/2009pdf/Gross_etal_BioTecniques2008_compressed.pdf

Unified Sample Preparation Approach Using Hydrostatic Pressure Cycling: Simultaneous Isolation of Proteins, Nucleic Acids and Lipids from a Single Sample
Vera S. Gross; Greta Carlson; Gary B. Smejkal; Ada T. Kwan; Timothy Straub; Alexander V. Lazarev
Pressure BioSciences, Inc., West Bridgewater, MA
USHUPO 2008
http://www.pressurebiosciences.com/downloads/posters/2008/USHUPO2008_T67.pdf

h. Differential Lysis

Improved Protocols for Isolation of Intact Mitochondria from Tissue Samples
Vera Gross1; Irina Stavrovskaya2; Sergei Baranov2; Greta Carlson1; Emily Freeman3; Alexander Ivanov3; Bruce Kristal2; Alexander Lazarev1
1Pressure BioSciences, Inc, South Easton, MA; 2Brigham and Women's Hospital; Harvard University, Boston, MA; 3Harvard School of Public Health, Boston, MA
USHUPO 2010
http://www.pressurebiosciences.com/downloads/posters/2010/USHUPO2010-Tue68.pdf

i. Quantitative Recovery

Chapter 5: Pressure-Assisted Lysis of Mammalian Cell Cultures Prior to Proteomic Analysis
Emily Freeman and Alexander R. Ivanov
Harvard School of Public Health Department of Genetics and Complex Diseases, Boston MA, The Harvard School of Public Health Proteomics Resource Sample Preparation in Biological Mass Spectrometry", Ivanov, A.R, and A.V. Lazarev, editors; Springer ©2011
Pre-Print Personal Copy (No Hyperlink)

Application of Pressure Cycling Technology to Tissue Sample Preparation for 2-DE
Ringham H, Bell RL, Smejkal GB, Behnke J, Witzmann FA.
Department of Cellular and Integrative Physiology, Indiana University School of Medicine, Indianapolis, IN 46202-2111, USA.
Electrophoresis. 2007 Mar; 28(6):1022-4.
http://www.ncbi.nlm.nih.gov/pubmed/17300130

3. Enhanced Protein Digestion (In-Solution and In-Gel)

a. Significant Reduction in Time

Improved proteomic profiling of the cell surface of culture-expanded human bone marrow multipotent stromal cells
Samuel T. Mindaye[a], Moonjin Ra[a], Jessica Lo Surdo[b], Steven R. Bauer[b], and Michail A. Alterman[a,]
[a] Tumor Vaccines and Biotechnology Branch, Division of Cellular and Gene Therapies, Center for Biologics Evaluation and Research, US Food and Drug Administration, Bethesda, MD, USA [b] Cellular and Tissue Therapies Branch, Division of Cellular and Gene Therapies, Center for Biologics Evaluation and Research, US Food and Drug Administration, Bethesda, MD, USA
http://www.sciencedirect.com/science/article/pii/S1874391912007427

Application of Pressurized Solvents for Ultrafast Trypsin Hydrolysis in Proteomics: Proteomics on the Fly
Daniel Lopez-Ferrer, † Konstantinos Petritis, † Kim K. Hixson, ‡ Tyler H. Heibeck, † Ronald J. Moore, † Mikhail E. Belov, † David G. Camp II, † and Richard D. Smith*, †
Biological Sciences Division and Environmental Molecular Sciences Laboratory, Pacific Northwest National Laboratory, P.O. Box 999, Richland, Washington 99352
J Proteome Res. 2008 Aug; 7(8):3276-81. Epub 2008 Jul 8.
http://www.scribd.com/doc/3882461/Application-of-Pressurized-Solvents-for-Ultrafast-Trypsin-Hydrolysis-in-Proteomics-Proteomics-on-the-Fly

High Pressure Trypsin Digestion of Proteins for Proteomic Analysis
Shane A. Wyatt and Timothy R. Croley
Commonwealth of Virginia; Division of Consolidated Laboratory Services, Richmond, VA Department of Chemistry; Virginia Commonwealth University, Richmond, VA
http://www.pressurebiosciences.com/downloads/3rdparty-2008-06-20/Virginia%20State%20Labs.Trypsin.pdf

Ultra-Rapid Pressure Digestion and Label-Free Quantitative Proteomics of Yersiniae Infected Mice Tissues
Kim K. Hixson1, Daniel López-Ferrer1, Matthew Bender2, Patricia L. Worsham3, Karl K. Weitz1, Nate Lawrence4, Amy Rasley5, Therese W. Clauss1, Ljiljana Pasa-Tolió1, Richard D. Smith1, Mary S. Lipton1 1Pacific Northwest National Laboratory, Richland WA; 2NBACC, Washington, DC; 3USAMRIID, Frederick, MD; 4Pressure BioSciences, Inc., South Easton, MA; 5Lawrence Livermore National Lab, Livermore, CA
ASMS 2009
http://www.pressurebiosciences.com/pdf-new-2009/publications/ASMS_Hixson_final_kh.pdf

b. Quantitative Recovery

Label-Free Mass Spectrometry-Based Relative Quantification of Proteins Separated by One Dimensional Gel Electrophoresis
Melkamu Getie-Kebtie[a], Alexander Lazarev[b], Maryna Eichelberger[c] and Michail Alterman[a,]
[a] Division of Cellular and Gene Therapies, Center for Biologics Evaluation and Research, Food and Drug Administration, Bethesda, MD 20892, USA[b] Pressure BioSciences, South Easton, MA 02375, USA [c] Division of Viral Products, Center for Biologics Evaluation and Research, Food and Drug Administration, Bethesda, MD 20892, USA
Analytical Biochemistry Volume 409, Issue 2, 15 February 2011, Pages 202-212
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6W9V-51962WR-6&_user=10&_coverDate=02%2F15%2F2011&_rdoc=1&_fmt=high&_orig=search&_origin=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=982a872ae2cb6e414e8b54644e5a48ce&searchtype=a

Chapter 9: Exploring the Capabilities of the Protein Identification by Unconventional Sample Preparation Approaches: LC/MALDI/On-Target Digestion Approach and High Pressure Assisted In-Gel Tryptic Digestion
Melkamu Getie-Kebtie and Michail Alterman[a]
Tumor Vaccines and Biotechnology Branch Division of Division of Cellular and Gene Therapies, Center for Biologics Evaluation and Research, Food and Drug Administration, Bethesda, MD 20892, USA
Sample Preparation in Biological Mass Spectrometry", Ivanov, A.R, and A.V. Lazarev, editors; Springer ©2011
Pre-Print Personal Copy (No Hyperlink)

High-Pressure Assisted In-Gel Tryptic Digestion in Label-Free Quantification of Influenza Virus Proteins
Melkamu Getie-Kebtie
Division of Cell and Gene Therapy, CBER/FDA
Harvard Symposium May 21, 2010
http://www.pressurebiosciences.com/downloads/publications/2010-06/High-Pressure-Assisted-In-Gel-Tryptic-Digestion.pdf

c. Greater Sequence Coverage

Comparison Between Ultra-High Pressure and Atmospheric Tryptic Digestion for Proteomic Analyses
E. Bonneil1, R. Biringer2, C. Bell1, P. Thibault1
1Institute for Research in Immunology and Cancer Université de Montréal;
2Thermo Fisher Scientific
Harvard Symposium May 21, 2010
http://www.pressurebiosciences.com/downloads/publications/2010-07/Comparison-ultra-high-pressure-%20athmospheric-tryptic.pdf

Tandem Mass Spectrometry Analysis of Ex Vivo Amyloid Fibril and Tissue Samples
Zhenning Hong, 1Giuseppe Infusini, 1Lawreen H. Connors, 2Martha Skinner,
2Catherine E. Costello1, 2
1Mass Spectrometry Resource and 2Amyloid Treatment and Research Program, Boston University School of Medicine, Boston, MA USA
USHUPO2008
http://www.pressurebiosciences.com/downloads/publications/2010-06/Zhenning-POSTER-ASMS-2010.pdf

d. Controlled Enzyme Specificity

The Effect of Pressure Cycling on Proteolytic Cleavage Efficiency, Reaction Time and Protein Sequence Coverage

Roger Biringer1, Eric Bonneil2, Julian Saba1, Andreas Huhmer1, Pierre Thibault2
1Thermo Fisher Scientific, San Jose, CA 2Institute for Research in Immunology and Cancer, Université de Montréal, Montréal, Canada
ASBMB 2010
http://www.pressurebiosciences.com/downloads/publications/2010-05/Biringer_ASBMB_2010_Poster.pdf

e. Improved Efficiency and Reproducibility

Rapid and Efficient Protein Digestion Using Trypsin-Coated Magnetic Nanoparticles Under Pressure Cycles

Byoungsoo Lee[1,†], Daniel Lopez-Ferrer[2,†], Byoung Chan Kim[3], Hyon Bin Na[4], Yong Il Park[4], Karl K. Weitz[2], Marvin G. Warner[2], Taeghwan Hyeon[4], Sang-Won Lee[5], Richard D. Smith[2], Jungbae Kim[1,*]PROTEOMICS Volume 11, Issue 2, pages 309–318, No. 2 January 2011
http://onlinelibrary.wiley.com/doi/10.1002/pmic.201000378/abstract

f. Trypsin, Other Proteases, and Deglycosylation

A Comparative Study of In-Gel Digestions Using Microwave and Pressure-Accelerated Technologies

Rudy Alvarado, Diana Tran, Bonnie Ching, and Brett S. Phinney[*]
UC Davis Proteomics Core Facility, University of California Davis Genome Center, Davis, CA 95616, USA
J Biomol Tech. 2010 September; 21(3): 148–155.
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2922831/

Rapid Sample Preparation Methods for the Analysis of N-Linked Glycans

Zoltan Szabo, András Guttman, Tomas Rejtar and Barry L. Karger
Barnett Institute, Boston, MA, USA
Harvard Symposium May 21, 2010
http://www.pressurebiosciences.com/downloads/publications/2010-06/PCTworkshopfinal.pdf

A Comparative Study of In-gel Digestions Using Microwave and Pressure Accelerated Technologies

Rudy Alvarado, Diana Tran, Bonnie Ching and Brett S. Phinney
UC Davis Proteomics Core Facility, University of California Davis Genome Center, Davis, CA 95616, USA
ABRF 2010
http://www.pressurebiosciences.com/downloads/publications/2010-04/ABRF-2010-Poster.pdf

A Comparison of Methods for Efficient Digestion of Protein Therapeutics

Lorna L. Maheu, Heather M. Connelly, Adam G. Harder, and Steven L. Cockrill
Analytical Sciences, Amgen Inc., Longmont, CO 80503
FACSS 2008
http://www.pressurebiosciences.com/downloads/publications/2010-08/Amgen-FACSS-2008-Poster.pdf

g. Cost Reduction

Optimization of High Pressure-Assisted Methods for Proteomic Sample Preparation

Alexander V. Lazarev1*; Vera S. Gross1; Greta Carlson1; Edmund Ting1; Emily Freeman2; Alexander R. Ivanov2; Melkamu Getie-Kebtie3; Michail Alterman3
1Pressure BioSciences, South Easton, MA, USA; 2Harvard School of Public Health, Boston, MA, USA; 3FDA, CBER, Rockville , MD, USA
HPBB2010
http://www.pressurebiosciences.com/downloads/publications/2010-09/HPBB_Final.pdf

h. Standardization

Novel Efficient Alternatives for Essential Sample Preparation Techniques in Functional Proteomics

Freeman and Alexander R. Ivanov
Harvard School of Public Health, Department of Genetics and Complex Diseases
ASMS 2010
http://www.pressurebiosciences.com/downloads/publications/2010-06/ASMS2010_Poster_IvanovAR_HSPH.pdf

4. Biopharmaceuticals, Vaccines, and Biosimilars

A Separation-Free Quantitative MS-Based Profiling Approach Using 2-AA Isotopically Labeled Substrates for High-Throughput Glycan Screening
Justin M. Prien1, Lorna Maheu1, Brad Prater1, and Steve Cockrill1
1Analytical Science, Amgen, Longmont, Colorado 80503
ASMS 2010
http://www.pressurebiosciences.com/downloads/publications/2010-06/2-AA_stable_isotope_poster_ASMS%202010_submitted.pdf

Application of Mass Spectrometry-Based Proteomics in Influenza Virus Research and Vaccine Manufacturing
Melkamu Getie-Kebtie1; Maryna Eichelberger2; Michail Alterman1
1FDA/CBER/OCTGT/TVBB, Bethesda, MD; 2FDA/CBER/OVRR/DVP, Bethesda, MD
USHUPO 2010
http://www.pressurebiosciences.com/pdf-new-2010/publications/Flu-USHUPO-2010.pdf

Rapid Release of N-Linked Glycans from Glycoproteins by Pressure-Cycling Technology
Zoltan Szabo, Andras Guttman and Barry L. Karger*
Barnett Institute, Northeastern University, Boston, Massachusetts 02115
Anal. Chem., 2010, 82 (6), pp 2588–2593
http://pubs.acs.org/doi/abs/10.1021/ac100098e

5. Potential Clinical Applications

a. Klotho

Improving the Efficiency and Throughput of an Enzymatic Digestion of Klotho using Pressure Cycling Technology (PCT)
Taha Reza et al.
Thermo Fisher Scientific
MSACL 2011
Pre-Print Personal Copy (No Hyperlink)

b. Cancer

IMAGING MALDI of Colorectal Carcinoma - Field Defects in Satellite Tissue

1Tiffany Remsen, 2M Momeni, 1P Kessler, 3F Francois, 1A Stern, 2S. Anand and 1P. Pevsner

1Dept of Pharmacology New York University School of Medicine, New York, NY, USA 2Brooklyn Hospital

Center, Brooklyn, NY, USA 3Dept of Medicine, New York University School of Medicine, New York, NY, USA
http://www.pressurebiosciences.com/downloads/3rdparty-2008-05-30/MALDI%20IMAGING%20AND%20COLORECTAL%20CARCINOMA.pdf

Mass Spectrometry of Buccal Mucosa-Biomarkers for Biodosimetry in Radiation Incidents
1P.H. Pevsner, 2S. Furmenty, 1T. Remsen, 1G. Krupp, 1 P. Kessler, 4G. Rothschild
3Jorge Gismo, 3J. Melamed, 2B. S. Rosenstein, 4R. Schneider, 5F. Naftolin
and 1A. Stern
New York University School of Medicine 1Department of Pharmacology, 2Department of Radiation Oncology, 3Department of Pathology, 4Department of Microbiology, 5Department of Obstetrics and Gynecology-Reproductive Biology
550 1st Avenue New York, NY 10016
AFRRI 2008
http://www.pressurebiosciences.com/downloads/3rdparty-2008-05-30/Mass%20Spectrometry%20of%20Buccal%20Mucosa.pdf

c. Drug Interactions

Screening for Drug-Drug Interactions Using a Targeted Proteomics Strategy
Daniel B. Kassel1; Kheng B. Lim1; Melinda Manuel1;Teruaki Okuda2; Naomi Kamiguchi2;Christie L Hunter3; Brian Williamson3; Lydia Nuwaysir3
1Takeda San Diego, Inc, San Diego, CA;2Takeda Pharmaceutical Company, Limited, Osaka, Japan; 3AB Sciex, Foster City, CA
ASMS 2010
http://www.pressurebiosciences.com/downloads/publications/2010-06/ASMS2010_Poster_CYPInduction_Final.pdf

d. Heart Disease

Discovery of Mitochondrial Protein Biomarkers of Atrial Fibrillation Using Unique Human Tissue Samples
Maryam Goudarzi1, Mark M. Ross1, Weidong Zhou1, Amy Van Meter1, and Emanuel Petricoin1,
Lance Liotta1, Lisa Martin2, Chidima Martin2 and Niv Ad2
1George Mason University, Manassas, VA; 2Inova Heart & Vascular Institute, Falls Church, VA
ASMS 2009
http://www.pressurebiosciences.com/downloads/publications/ASMS_2009_AF_poster_final.pdf

e. Diabetes

Method Development for Fecal Lipidomics Profiling
Katherine E Gregory , Susan Schiavo Bird , Vera S. Gross , Vasant R Marur , Alexander V. Lazarev , W. Allan Walker, and Bruce S. Kristal
Anal. Chem. 2012
pubs.acs.org/doi/abs/10.1021/ac303011k
http://pubs.acs.org/doi/abs/10.1021/ac303011k

Pressure Cycling Technology (PCT): a Novel Sample Preparation Approach to Biomarker Discovery and Drug Development in Lipid-Rich Samples
http://www.ngpharma.com/article/Pressure-Cycling-Technology-PCT-a-Novel-Sample---Preparation-Approach-to-Biomarker-Discovery-and-Drug-Development-in-Lipid-Rich-Samples/

Improved protocols for isolation of intact mitochondria from tissue samples
Vera Gross1; Irina Stavrovskaya2; Sergei Baranov2; Greta Carlson1; Emily Freeman3; Alexander Ivanov3; Bruce Kristal2; Alexander Lazarev1
1Pressure BioSciences, Inc, South Easton, MA; 2Brigham and Women's Hospital; Harvard University, Boston, MA; 3Harvard School of Public Health, Boston, MA
http://www.pressurebiosciences.com/downloads/posters/2010/USHUPO2010-Tue68.pdf

6. PCT Product Pipeline (2012-2014)

Pressure BioSciences, Inc. Unveils Four Key Instruments in Its 2011-2013 PCT Product Pipeline
Released: 02/07/11 10:32 AM EST
http://markets.financialcontent.com/ir.pbio/?Module=MediaViewer&GUID=17036272&Ticker=PBIO

Video: PBI Product Pipeline
MSACL 2011
http://www.pressurebiosciences.com/videos/msacl2/msacl2.html

PBI Newsletter: February 2011
http://www.pressurebiosciences.com/newsletters-pdf/PCT-News-February-v2-2011.pdf

a. Barocycler HUB440

Barocycler HUB440™ Pressure Generator
State-of-the-Art High Pressure Generator for Multiple Laboratory Applications
`http://www.pressurebiosciences.com/downloads/sell-sheets/HUB440-Sell-Sheet.pdf

Chemistry

Selective reduction of ketones using water as a hydrogen source under high hydrostatic pressure
Anna Tomin,a Alexander Lazarev,b Matthew P. Bere,a Hana Redjeba and Béla Török*a
Org. Biomol. Chem., 2012, 10, 7321
http://www.pressurebiosciences.com/downloads/publications/2012-08/c2ob25941a.pdf

Electron Paramagnetic Resonance

Measuring Protein Conformational Exchange Rates with Pressure-Jump Site Directed Spin Labeling EPR Spectroscopy

Michael T. Lerch[1], Zhongyu Yang[1], Christian Altenbach[1], Ed Ting[2], Jason Sidabras[3], James Anderson[3], James S. Hyde[3] and Wayne L. Hubbell[1]

[1] Jules Stein Eye Institute and Department of Chemistry and Biochemistry, UCLA, Los Angeles, CA, USA

[2] Pressure Biosciences, Inc., South Easton, MA, USA

[3] National Biomedical EPR Center, Department of Biophysics, Medical College of Wisconsin, Milwaukee, WI, USA

http://www.cell.com/biophysj/fulltext/S0006-3495%2811%2903562-4

High-pressure EPR Reveals Conformational Equilibria and Volumetric Properties of Spin-labeled Proteins

John McCoy and Wayne L. Hubbell1

Jules Stein Eye Institute and Department of Chemistry and Biochemistry, University of California, Los Angeles, CA 90095

PNAS January 4, 2011

http://www.pressurebiosciences.com/downloads/publications/2011-02/McCoy-pressure.pdf

b. Formalin Fixed Paraffin Embedded Tissue (FFPE)

Elevated Pressure Improves the Rate of Formalin Penetration while Preserving Tissue Morphology

Ingrid E. Chesnick[1], Jeffrey T. Mason[1], Timothy J. O'Leary[2], Carol B. Fowler[1, 2]

1Department of Biophysics, Armed Forces Institute of Pathology, Rockville, Maryland, USA, 2. Biomedical Laboratory Research and Development Service, Veterans Health Administration, Washington, DC, USA

J Cancer 2010; 1:178-183 ©Ivyspring International Publisher

http://www.jcancer.org/v01p0178.htm

Elevated Pressure Improves the Extraction and Identification of Proteins Recovered from Formalin-Fixed, Paraffin-Embedded Tissue Surrogates

Carol B. Fowler[1,2*], Ingrid E. Chesnick[1], Cedric D. Moore[1], Timothy J. O'Leary[2], and Jeffrey T. Mason[1]

1Department of Biophysics, Armed Forces Institute of Pathology, Rockville, Maryland, United States of America**,** Biomedical Laboratory Research and Development Service, Veterans Health Administration, Washington, D.C., United States of America

PLoS One. 2010 Dec 8; 5(12):e14253.

http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0014253

Exploring Post-translational Modification of the Mitochondrial Subproteome: and Expanding Role in Heart Disease

Jennifer E. Van Eyk, Ph.D.

Professor of Medicine, Biological Chemistry and Biomedical Engineering

Director, JHU Bayview Proteomics Center, Director, JHU NHLBI Proteomics Innovation Center on Heart Failure, Director, JHU ICTR/CTSA Biomarker Development Group

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Pressure BioSciences, Inc. Announces R&D Agreement with the Armed Forces Institute of Pathology (AFIP); Initial Data on Pressure-Enhanced Processing and Analysis of FFPE Tissue Presented at the Symposium on High Pressure at Harvard Medical School

Press Release: 05/27/10

http://markets.financialcontent.com/ir.pbio/?Module=MediaViewer&GUID=13231313&Ticker=PBIO

Significant Benefits of Pressure Cycling Technology (PCT) Cited in Recent Cancer and Heart Disease Studies

Press Release: 12/15/10

http://markets.financialcontent.com/ir.pbio/?Module=MediaViewer&GUID=16075945&Ticker=PBIO

c. Automated, In-Line, On-Demand Processing (HPLC Modules)

Pressure BioSciences, Inc. and Battelle Memorial Institute Sign Exclusive Patent License Agreement
Press Release: 12/22/08
http://markets.financialcontent.com/ir.pbio/?Module=MediaViewer&GUID=7501259&Ticker=PBIO

Pressurized Pepsin Digestion in Proteomics: An Automatable Alternative to Trypsin for Integrated Top-down Bottom-up Proteomics
Daniel López-Ferrer1*, Konstantinos Petritis1#, Errol W. Robinson2, Kim K. Hixson2, Zhixin Tian1, Jung Hwa Lee3, Sang-Won Lee3, Nikola Tolić2, Karl K. Weitz1, Mikhail E. Belov1, Richard D. Smith1 and Ljiljana Paša-Tolić2*
1Biological Science Division, 2Environmental Molecular Sciences Laboratory, Pacific Northwest National Laboratory, Richland, WA, USA and 3Department of Chemistry, Korea University, Seoul, Korea
MCP Papers Published on July 12, 2010 as Manuscript M110.001479
http://mcponline.org/content/early/2010/07/12/mcp.M110.001479.full.pdf+html?sid=899c1671-b128-43ac-86bf-7dc3b9b9e5fb

Development of New Technology Approaches for High-Throughput Proteome Analysis
Daniel López-Ferrer
Biological Separations & Mass Spectrometry Group
Pacific Northwest National Laboratory
Harvard Symposium May 21, 2010
http://www.pressurebiosciences.com/downloads/publications/2010-06/Lopez_Ferrer_final.pdf

Application of High Pressure and Highly Stable Trypsin Aggregate Coating on Superparamagnetic Magnetite/Silica Nanoparticles for High Performance Proteomics
Daniel López-Ferrer1, Byoungsoo Lee2, Jungbae Kim2 and Richard D. Smith1
1Pacific Northwest National Laboratory, Richland, WA 99352; 2Korea University, Seoul, Korea
ASMS 2010
http://www.pressurebiosciences.com/downloads/publications/2010-06/ASMS_2010_DLF_Final.pdf

Improved Protein Coverage and Throughput in Proteomics using On-Line Multiplexed Enzyme Digestions and Targeted MS/MS with a Modified LTQ-FTICR
Daniel López-Ferrer1, Konstantinos Petritis1, Andrey Liyu1,Jung Hwa Lee2, Sang-Won Lee2, Benito Cañas3, Kim K. Hixson1, Richard D. Smith1 and Mikhail E. Belov1
1Pacific Northwest National Laboratory, Richland, WA; Korea University, 2Seoul, Korea; 3Universidad Complutense de Madrid, Madrid, Spain
ASMS 2009
http://www.pressurebiosciences.com/pdf-new-2009/publications/Lopez-Ferrer_ASMS_2009_rev.pdf

New Strategies for High Pressure-Assisted Digestion in Proteomics
Kim K. Hixson1,2, Daniel López-Ferrer1, Karl K. Weitz1, Ronald J. Moore1, Scott R. Kronewitter1, Heather H. Smallwood3, Mikhail E. Belov1, and Richard D. Smith1
1Pacific Northwest National Laboratory, Richland, WA; 2Washington State University, Pullman, WA; St. Jude Children's Research Hospital, Memphis, TN
ASMS 2010
http://www.pressurebiosciences.com/downloads/publications/2010-06/Hixson_ASMS2010Final.pdf

Proteomics Under Pressure: Rapid Extraction and Digestion in a Single Tube
Alexander V. Lazarev1; Emily Freeman2; Vera S. Gross1; Greta Carlson1; Edmund Ting1; Alexander R. Ivanov2
1Pressure BioSciences, South Easton, MA; 2Harvard School of Public Health, Boston, MA
ASMS 2009
http://www.pressurebiosciences.com/pdf-new-2009/publications/ASMS09-posterTPE129.pdf

d. High-Throughput, Multi-Well Barocycler System

Barocycler HT Multiwell (48-384)
Video: PBI Product Pipeline
MSACL 2011
http://www.pressurebiosciences.com/videos/msacl2/msacl2.html

7. Related Fields of Use

a. Forensics

Pressure cycling technology (PCT) reduces effects of inhibitors of the PCR
Pam L. Marshall, Jonathan L. King, Nathan P. Lawrence, Alexander Lazarev,
and Vera S. Gross, and Bruce Budowle
http://www.pressurebiosciences.com/downloads/publications/2012-09/PCT-Manuscript.pdf

Pressure Cycling Technology (PCT) Augments Sensitivity of Detection of Forensic DNA Analyses
Bruce Budowle
Executive Director of the Institute of Investigative Genetics
Professor in Department of Forensics and Investigative Genetics
University of North Texas, Fort Worth Texas
http://www.pressurebiosciences.com/downloads/publications/2010-06/Pressure-and-DNA-RecoveryBudowle.pdf

Application of Pressure Cycling Technology (PCT) in Differential Extraction
Deepthi Nori*, MFS; Dr. Bruce R. McCord, PhD
International Forensic Research Institute, Department of Chemistry and Biochemistry
Florida International University, Miami, FL USA
http://www.pressurebiosciences.com/downloads/publications/2011-02/AAFS-Poster-2010.pdf

Seminar: Application of Pressure Cycling Technology (PCT) in Differential Extraction
Deepthi Nori*, MFS; Dr. Bruce R. McCord, PhD
International Forensic Research Institute, Department of Chemistry and Biochemistry Florida International University, Miami, FL USA
http://www.pressurebiosciences.com/downloads/publications/2011-02/AAFS-Seminar-2010.pdf

b. Agriculture

Improved Extraction of DNA of Ca. Liberibacter Species from Plants and Cultivated Cells Using Pressure Cycling Technology (PCT)
Aaron Sechler1, A. Marques2, N. Lawrence3, and Norman Schaad1
1FDWSRU, USDA-ARS, Fort Detrick, MD USA, 2EMBRAPA, Brasilia, Brasil,
3Pressure BioSciences Inc., South Easton, MA, USA
APS 2009
http://www.pressurebiosciences.com/downloads/publications/2010-08/2010_Poster_Final%20APS.pdf

Improved extraction of Rhizoctonia and Pythium DNA from wheat roots and soil samples using pressure cycling technology
Patricia A. Okubara, Chunqin Li, Kurtis L. Schroeder, Richard T. Schumacher,
and Nathan P. Lawrence
Can. J. Plant Pathol. 29: 304-310 (2007
http://www.pressurebiosciences.com/downloads/3rdparty-2007-12/PCT_CJPP-2007.pdf

c. Environmental Biology

Pressure BioSciences, Inc. to Collaborate With the Lawrence Berkeley National Laboratory on the Analysis of Microorganisms in Oil Spills: Results Could Lead to Improved Strategies for Environmentally-Safe Clean-up
Press Release: 08/23/10
http://markets.financialcontent.com/ir.pbio/?Module=MediaViewer&GUID=14400977&Ticker=PBIO

GEN Co-Sponsors Roundtable Discussion on Novel Bioremediation Techniques
Press Release: 11/01/10
http://markets.financialcontent.com/ir.pbio/?Module=MediaViewer&GUID=15375825&Ticker=PBIO

d. Food

Intact Protein Liquid Chromatography Mass Spectrometry for Bacteria Strain Differentiation and Bacterial Toxin Detection
John H. Callahan; Denis Andrzejewski; Rebecca Bell; Eric Brown; Steve Musser
FDA/CFSAN, College Park, MD
http://www.pressurebiosciences.com/downloads/3rdparty-2008-05-30/Callahan%20-%20Intact%20Protein%20LCMS%20for%20Bacteria%20Strain%20Differentiation%20and%20Bacterial%20Toxin%20Detection.pdf

Top-Down Identification of Bacterial Intact Protein Expression Profile Markers
Melinda A. McFarland; John H. Callahan; Denis Andrzejewski; Rebecca Bell;
and Steven M. Musser
FDA/CFSAN, College Park, MD
ASMS 2009
http://www.pressurebiosciences.com/downloads/3rdparty-2009-06/Top-Down-Identification-of-Bacterial-Intact-Protein.FDA.ASMS.2009.pdf

7. Extraction and Digestions in MicroTubes and MicroCaps

PCT MicroTube Adapter Kit
Processing time, sample throughput, accuracy, efficiency, and standardization are key elements of the sample preparation process in mass spectrometry. The PCT MicroTube Adapter Kit, in combination with the PCT SPS, can reliably and reproducibly control the enzymatic digestion of proteins while reducing the time of digestion from hours to minutes with the same or better quality as other, currently available techniques. The PCT MicroTube Adapter Kit comes complete with an ergonomically designed, space-saving Work Station containing PCT MicroTubes and PCT MicroCaps, as well as tools and hardware, to enable the user to process between one to forty eight samples simultaneously in the PCT SPS.
http://www.pressurebiosciences.com/products/pressure-enhanced-enzymatic-proteolysis.html

High Throughput Pressure-Enhanced Protein Extraction and Enzymatic Digestion with Pressure Cycling Technology (PCT) and PCT MicroTubes
C. Dussault, G. Carlson, V. Gross, N. Lawrence, A. Lazarev, M. Potter, R. T. Schumacher,
and E. Ting
Pressure BioSciences, Inc. 14 Norfolk Avenue, S. Easton, MA 02375
ASMS 2010
http://www.pressurebiosciences.com/downloads/publications/2010-05/Corporate-ASMS-2010-052110-Final.pdf

Proteomics Under Pressure: Rapid Extraction and Digestion in a Single Tube
Alexander V. Lazarev1; Emily Freeman2; Vera S. Gross1; Greta Carlson1; Edmund Ting1; Alexander R. Ivanov2
1Pressure BioSciences, South Easton, MA; 2Harvard School of Public Health, Boston, MA
57th ASMS
http://www.pressurebiosciences.com/downloads/publications/2010-11/ASMS09%20posterTPE129.pdf

8. PBI Shredder Systems for Mechanical Pre-Processing

The PCT Shredder or The SHREDDER SG3
PBI Shredder Systems are low shear mechanical disruption process for gentle, rapid, and safe disruption of tissues and organisms. Either The PCT Shredder or The SHREDDER SG3, when used with PBI Shredder PULSE Tubes and various buffers, can provide effective extraction of DNA, RNA, proteins, mitochondria, lipids and small molecules from tissues and organisms.

Both systems use a variety of PBI Shredder PULSE Tubes to directly and rapidly grind a biological sample providing easy handling and reducing sample contamination. And, although not required for all extractions, additional extraction efficiency can be achieved when this process is combined with pressure cycling technology (PCT).

http://www.pressurebiosciences.com/products/the-pct-shredder.html

http://www.pressurebiosciences.com/downloads/sell-sheets/The-Shredder-SG3.Final.030111.pdf

Intact and Functional Mitochondria from Solid Tissue: Effective Semi-Automated Extraction Using Gentle Mechanical Homogenization and Pressure Cycling Technology
Alexander Lazarev1, Vera S. Gross1, Greta Carlson1, Emily Freeman2, Alexander R. Ivanov2, Heather Greenberg3, Sergei Baranov3, Irina Stavrovskaya3, Bruce Kristal3.1Pressure BioSciences, Inc., South Easton, MA. 2HSPH Proteomics Resource, Harvard School of Public Health, Boston, MA.3Brigham and Women's Hospital; Harvard University, Boston, MA
MSACL 2011
http://www.pressurebiosciences.com/downloads/publications/2011-02/MSACL-2011-mitochondria-poster-v4.pdf

Simple Protocols for Isolation of Intact Mitochondria Using The SHREDDER SG3 and PBI Mitochondria Isolation Kits
Pressure BioSciences, Inc. 14 Norfolk Ave. South Easton, MA 02375
ASCB 2010
http://www.pressurebiosciences.com/downloads/publications/2010-12/ASCB-2010-booth-poster.pdf

PBI Shredder System Application Notes and Preparations (PrEPs)
http://www.pressurebiosciences.com/pub/application-notes-preparations.html

9. Related PCT Application Notes - PBI

Proteolysis (Trypsin)-PrEP: In-Solution PCT-Enhanced Trypsin Digestion for Proteomics
http://www.pressurebiosciences.com/PrEP-files/Proteolysis-Trypsin-PrEP.pdf

ProteoSolve-TD2 PrEp: Enzyme-Linked Immunosorbant Assays (ELISA) Conducted on Proteins Recovered from Ovarian Tumors Using ProteoSolve-TD2 and Pressure Cycling Technology (PCT)
http://www.pressurebiosciences.com/PrEP-files/Protocol_ELISA.Final.032410.pdf

ProteoSolve-TD2 PrEP: Total Protein Recovery from Solid Ovarian Tumors With ProteoSolve-TD2 and PCT
http://www.pressurebiosciences.com/PrEP-files/Protocol.Total-Protein-Recovery-from-Solid-Ovarian-Tumors.Final.032410.pdf

ProteoSolve-TD2 PrEP: Membrane Protein Recovery from Metastatic Ovarian Tumors Using ProteoSolve-TD2 and Pressure Cycling Technology (PCT)
http://www.pressurebiosciences.com/PrEP-files/Protocol.Membrane-Protein-Recovery-from-Metastic-Ovarian-Tumors.Final.032410.pdf

10. Product Sell Sheets – PBI

http://www.pressurebiosciences.com/products.html

11. Issued Patents – PBI

http://www.pressurebiosciences.com/issued-patents.html