

CURRICULUM VITAE

Keith R. Shockley, Ph.D.

Personal Data

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Education

- 1998 B.S., Chemical Engineering, New Mexico State University, Las Cruces, NM
Minors: Biochemistry and Chemistry
- 2000 M.S., Chemical Engineering, North Carolina State University, Raleigh, NC
Minor: Biotechnology
- 2004 Ph.D., Chemical Engineering, North Carolina State University, Raleigh, NC
Dissertation: *Functional Genomics Investigation of Microbial Physiology in the Hyperthermophilic Microorganisms Pyrococcus furiosus and Thermotoga maritima*
Thesis Advisor: Professor Robert M. Kelly

Professional Experience

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| 1996 | Summer Intern | The Dow Chemical Company (Texas Operations), Freeport, TX |
| 1997 | NSF REU Student Intern | Colorado State University, Fort Collins, CO |
| 1998-2000 | Teaching Assistant | North Carolina State University, Raleigh, NC |
| 1999-2004 | Research Assistant | North Carolina State University, Raleigh, NC |
| 2004-2008 | Postdoctoral Associate | The Jackson Laboratory, Bar Harbor, ME |
| 2008-present | Staff Scientist | National Institutes of Health (NIH), National Institute of Environmental Health Sciences (NIEHS), Biostatistics and Computational Biology Branch, Research Triangle Park, NC |
| 2008-present | Adjunct Member | National Institutes of Health (NIH), National Institute of Environmental Health Sciences (NIEHS), Biomolecular Screening Branch, Research Triangle Park, NC |
| 2008-2011 | Adjunct Member | National Institutes of Health (NIH), National Institute of Environmental Health Sciences (NIEHS), Host Susceptibility Branch, Research Triangle Park, NC |

Scholarships, Fellowships and Awards

Undergraduate –

- 1993-1997 President's Associates Scholarship (NMSU)
- 1994 Donald B. Summers Award (Department of Chemistry and Biochemistry, NMSU)
- 1995 Michael Snedar Award (College of Engineering, NMSU)
- 1996 AIChE 1995-96 Donald F. Othmer Award (American Institute of Chemical Engineers)
- 1997 Dow Outstanding Junior Award (The Dow Chemical Company)
- 1998 First Place in 1998 NMSU Senior Design Project Contest (Department of Chemical Engineering, NMSU)

Graduate –

- 1999 Dean's Fellowship Award
- 1998-2001 Graduate Assistance in Areas of National Need (GAANN) Fellowship
- 2000 GAANN mini-grant for PTC-100 thermal cyclers
- 2001 First runner-up in 2001 NCSU Schoenborn poster competition
- 2002 Second place for outstanding oral presentation in the 15th Annual Meeting of the Mid-Atlantic Biochemical Engineering Consortium
- 2003 Biochemical Engineering (XIII) conference travel grant
- 2003 Second place for outstanding presentation at 2003 NCSU Schoenborn oral presentation competition

Postdoctoral –

- 2005-2008 F32 Ruth L. Kirchstein fellowship award (NIH/NHGRI) for grant proposal entitled "ANOVA-Based Approaches to Time-Series Microarray Data"

NIEHS –

- 2012 NIEHS Director's One-NIEHS Award
- 2014 NIH Director's Group Award

Service within the NIEHS

- Consultant, Biostatistics and Bioinformatics Consulting Service
- Contributor, NIEHS Bioinformatics E-Bulletin
 - Article 1 (2009), *Quantitative High Throughput Screening at the NTP*
 - Article 2 (2011), *Tox21 collaboration*
- Invited panelist, NIEHS workshop *Advancing Research on Mixtures: New Perspectives and Approaches for Predicting Adverse Human Health Effects*, September 26-27, 2011
- Member, Advisory Board for Chemical Effects in Biological Systems (CEBS)
- Member and Lead Reviewer, Committee on Promotions II
- Member, High Throughput Screening (HTS) Faculty
- Member, NIEHS Cross-Divisional Implementation Planning: Predictive Toxicology and Disease Working Group

- Member, Staff Scientist Search Committee, Laboratory of Molecular Carcinogenesis (2013)
- Member, Technical Review Committee for Statistical Contracts
- Member, Internal Review Panel for NTP/DIR Bioinformatics Contracts
- Member, Tox21 Bioinformatics Working Group (Co-chair, 2008-2011)
- Member, Toxicogenomics (TGMX) Faculty

Teaching, Mentoring and Other Activities

2002	Invited lecture “ <i>Regulation of Proteolysis in Hyperthermophiles</i> ” for NCSU Biotechnology Program cDNA Microarray Workshop, NCSU
2004	Lecture “ <i>Affymetrix arrays: Diagnostics and Analysis Tools</i> ” for Short Course on Gene Microarray Development & Analysis: Approaches to Heart, Lung, Blood and Sleep Disorders, TJL
2006	Lecture “ <i>Introduction to R/maanova</i> ” for Short Course on Complex Trait Analysis, TJL
2006	Two workshop lectures on “ <i>Microarray Experiment Design and Analysis</i> ” for Short Course on Experimental Tools in Model Systems of Translational Vision Research, TJL
2006-2008	Faculty member and lecturer for advanced high school distance course “Independent Studies in Computational Biology”, The Center for Genome Dynamics, TJL
2006 & 2007	Mentor for two students in Summer Student Program, TJL
2007 & 2008	Lectures on “ <i>Interpreting Gene Lists: Using GO Terms</i> ”, for short courses on Complex Trait Analysis (2007) and Systems Genetics (2008), TJL
2009-present	Instructor, Introduction to Biostatistics and Bioinformatics Short Courses presented by members of the Integrative Bioinformatics Support Group and the Biostatistics and Computational Biology Branch, including sessions on “qHTS Analysis” and “DNA Microarray Analysis”
2010	Co-supervisor for student in NIEHS Summers of Discovery Program where the student won first place in the high school division of the poster competition
2011	Guest faculty member and lecturer on “ <i>Introduction to the Statistical Analysis of Microarray Data</i> ”, “ <i>Statistical Analysis of Microarray Data: Linear Modeling</i> ” and “ <i>Clustering DNA Microarray Data: Hierarchical Clustering</i> ” for short course on <i>Environmental Genomics</i> , Mount Desert Island Biological Laboratory, Salisbury Cove, ME
2012-2014	Co-mentor, high school student and Biostatistics Branch special volunteer that became a semifinalist for the Intel Science Talent Search competition based on work completed within the branch
2012	Guest speaker for BIT815D (Professional Development), NCSU
2014	Success coach and panelist for the Master Minds Nine program, NCSU
2014-2016	Co-mentor, M.S. statistician and special volunteer in the Biostatistics and Computational Biology Branch, NIEHS

Journal Referee/Reviewer:

Applied Biochemistry and Biotechnology; Biometrics; Chemico-Biological Interactions; Encyclopedia of Industrial Biology; Frontiers in Environmental Science; International Journal of Obesity; Journal of Applied Genetics; OMICS; PLoS ONE; Physiological Genomics; Statistical Applications in Genetics and Molecular Biology; Toxicological Sciences

Research Interests

- high throughput screening
- toxicogenomics
- multifactorial gene expression analysis
- complex trait analysis
- bioinformatics and computational biology
- applied linear and nonlinear modeling
- large-scale toxicity testing
- functional genomics

Professional Development

NCSU Biotechnology Program cDNA Microarray Workshop, NCSU, 2002

Short Course on Mathematical Approaches to the Analysis of Complex Phenotypes, TJL, 2004

Short Course on Complex Trait Analysis, TJL, 2005-2007

Short Course on Systems Genetics, TJL, 2008

BCBB Genetics/Bioinformatics Interest Group, NIEHS, 2008-present

2nd Inter-Agency Computational Toxicology Colloquium, NCTR, 2008

Computational Toxicology Workshop, NAS, 2009

ToxCast™ Data Analysis Summit, EPA, 2009

Advancing Research on Mixtures Workshop, NIEHS, 2011

BSB Journal Club, NIEHS, 2011-present

Environmental Genomics Short Course, MDIBL, 2011

NIEHS Genomics Day, NIEHS, 2011, 2012

Evidence-based Toxicology for the 21st Century: Opportunities and Challenges Workshop, EBCT, 2012

Workshop on Big Data and Toxicogenomics, NCBC, 2014

Second ToxCast Data Summit, EPA, 2014

Population-based Rodent Resources for Environmental Health Sciences Meeting, NIEHS, 2015

Publications

Peer-Reviewed Journal Articles –

1. Chhabra SR, **Shockley KR**, Ward DE, Kelly RM. (2002). Regulation of endo-acting glycosyl hydrolases in the hyperthermophilic bacterium *Thermotoga maritima* grown on glucan- and mannan-based polysaccharides. *Appl. Environ. Microb.* 68:545-554. PMID: PMC126696.
2. Ward DE, **Shockley KR**, Chang LS, Levy RD, Michel JK, Conners SB, Kelly RM. (2002). Proteolysis in hyperthermophilic microorganisms. *Archaea.* 1:63-74. PMID: PMC2685542.
3. Chhabra SR, **Shockley KR**, Connors SB, Scott KL, Wolfinger RD, Kelly RM. (2003). Carbohydrate-induced differential gene expression patterns in the hyperthermophilic bacterium *Thermotoga maritima*. *J. Biol. Chem.* 278:7740-7752.
4. **Shockley KR**, Ward DE, Chhabra SR, Conners SB, Montero CI, Kelly RM. (2003). Heat shock response by the hyperthermophilic archaeon *Pyrococcus furiosus*. *Appl. Environ. Microb.* 69:2365-2371. PMID: PMC154833.
5. Gao J, Bauer MW, **Shockley KR**, Pysz MA, Kelly RM. (2003). Hyperthermophilic archaeon *Pyrococcus furiosus* growth on chitin involves two family 18 chitinases. *Appl. Environ. Microb.* 69:3119-3128. PMID: PMC161489.
6. Montero CI, Conners SB, Johnson MR, Pysz MA, **Shockley KR**, Kelly RM. (2004). Microbial ecology of hydrothermal biotopes. *SPIE Proc. Ser.* 5163:171-178.
7. Pysz MA, Ward DE, **Shockley KR**, Conners SB, Kelly RM. (2004). Dynamic Heat Shock of the Hyperthermophilic Bacterium *Thermotoga maritima*. *Extremophiles.* 8:209-217.
8. Johnson MR, Montero CI, Conners SB, **Shockley KR**, Pysz MA, Kelly, RM. (2004). Functional genomics-based studies of the microbial ecology of hyperthermophilic microorganisms. *Biochem. Soc. T.* 32:188-192.
9. Pysz, MA, **Shockley KR**, Montero CI, Conners SB, Ward DE, Kelly RM. (2004). Transcriptional analysis of biofilm formation processes in the anaerobic, hyperthermophilic bacterium *Thermotoga maritima*. *Appl. Environ. Microb.* 70:6098-6012. PMID: PMC522082.
10. Johnson MR, Montero CI, Conners SB, **Shockley KR**, Bridger SL, Kelly RM. (2005). Population density-dependent regulation of exopolysaccharide formation in the hyperthermophilic bacterium *Thermotoga maritima*. *Mol. Microbiol.* 55:664-674.
11. **Shockley KR**, Scott KL, Pysz MA, Conners SB, Johnson MR, Montero CI, Wolfinger RD, Kelly RM. (2005). Genome-wide transcriptional variation within and between steady states for continuous growth of the hyperthermophile *Thermotoga maritima*. *Appl. Environ. Microb.* 71:5572-5576. PMID: PMC1214699.
12. Conners SB, Montero CI, Johnson MR, Comfort DA, **Shockley KR**, Chhabra SR, Kelly RM. (2005). An expression-driven approach to the prediction of carbohydrate transport and utilization regulons in the hyperthermophilic bacterium *Thermotoga maritima*. *J. Bacteriol.* 187:7267-7282. PMID: PMC1272978.
13. Johnson MR, Conners SB, Montero CI, Chou CJ, **Shockley KR**, Kelly RM. (2006). The *Thermotoga maritima* phenotype is impacted by syntrophic interaction with *Methanococcus jannaschii* in hyperthermophilic coculture. *Appl. Environ. Microb.* 72:811-818. PMID: PMC1352257.

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14. Lee HS, **Shockley KR**, Schut GJ, Conners SB, Montero CI, Johnson MR, Chou CJ, Bridger SL, Wigner N, Brehm SD, Jenney Jr. FE, Comfort DA, Kelly RM, Adams MWW. (2006). Transcriptional and biochemical analysis of starch metabolism in the hyperthermophilic archaeon *Pyrococcus furiosus*. J. Bacteriol. 188:2115-2125. PMID: PMC1428126.
 15. **Shockley KR**, Churchill GA. (2006). Gene expression analysis of mouse chromosome substitution strains. Mamm. Genome. 17:598-614.
 16. Li R, WernTsaih S, **Shockley K**, Stylianou IM, Wergedal J, Paigen B, Churchill GA. (2006). Structural model analysis of multiple quantitative traits. PLoS Genet. 2:e114. PMID: PMC1513264.
 17. Cui X, Affoutit J, **Shockley KR**, Woo Y, Churchill GA. (2006). Inheritance patterns of transcript levels in F1 hybrid mice. Genetics. 174:627-637. PMID: PMC1602077.
 18. Zimmerman JE., Rizzo W, **Shockley KR**, Raizen DM, Mackiewicz M, Churchill GA, Pack AI. (2006). Multiple mechanisms limit the duration of wakefulness in *Drosophila* brain. Physiol. Genomics. 27:337-350.
 19. Madding LS, Michel JK, **Shockley KR**, Conners SB, Epting KL, Johnson MR, Kelly RM. (2007). Role of the $\beta 1$ subunit in the function and stability of the 20S proteasome in the hyperthermophilic archaeon *Pyrococcus furiosus*. J. Bacteriol. 189:583-590. PMID: PMC1797377.
 20. Lecka-Czernik B, Ackert-Bicknell C, Adamo ML, Marmejelos V, Churchill GA, **Shockley KR**, Reid I, Gray A, Rosen CJ. (2007). Activation of peroxisome proliferator-activated receptor γ (PPAR γ) by rosiglitazone suppresses components of the insulin-like growth factor regulatory system *in vitro* and *in vivo*. Endocrinology. 148:903-911. PMID: PMC1851001.
 21. **Shockley KR**, Rosen CJ, Churchill GA, Lecka-Czernik B. (2007). PPAR $\gamma 2$ regulates a molecular signature of marrow mesenchymal stem cells. PPAR Research. 81219. PMID: PMC2234088.
 22. Mackiewicz M, **Shockley KR**, Romer R, Galante R, Zimmerman JE, Nadoo N, Baldwin D, Churchill GA, Pack AI. (2007). Macromolecule biosynthesis – a key function of sleep. Physiological Genomics. Physiol. Genomics. 31:441-457.
 23. Chou CJ, **Shockley KR**, Conners SB, Lewis DL, Comfort DA, Adams MWW, Kelly RM. (2007). Impact of glucan substrate linkage and elemental sulfur on bioenergetics and hydrogen production by the hyperthermophilic archaeon *Pyrococcus furiosus*. Appl. Environ. Microb. 73:6842-6853. PMID: PMC2074980.
 24. Stylianou IM, Affoutit JP, **Shockley KR**, Abdi FA, Sanjeev B, Rollins J, Churchill GA, Paigen BA. (2008). Applying Gene Expression, Proteomics and SNP Analysis for complex trait gene identification. Genetics. 178:1795-1805. PMID: PMC2278051.
 25. Ackert-Bicknell CL, **Shockley KR**, Horton LG, Lecka-Czernik B, Churchill GA, Rosen CL. (2009). Strain specific effects of Rosiglitazone on bone mass, body composition and serum IGF-1. Endocrinology. 150:1330-1340. PMID: PMC2654751.
 26. Mackiewicz M, Zimmerman J, **Shockley KR**, Churchill GA, Pack AI. (2009). What are microarrays teaching us about sleep? Trends in Molecular Medicine 15:79-87. PMID: PMC2942088.
 27. **Shockley KR**, Lazarenko OP, Czernik PJ, Rosen CJ, Churchill GA, Lecka-Czernik B. (2009). PPAR- $\gamma 2$ nuclear receptor controls multiple regulatory pathways of osteoblast

differentiation from marrow mesenchymal stem cells. *J. Cell. Biochem.* 106:232-246. PMID: PMC2745312.

28. **Shockley KR***, Witmer D, Burgess-Herbert SL, Paigen B, Churchill GA. (2009). Effects of atherogenic diet on hepatic gene expression across mouse strains. *Physiol. Genomics.* 39:172-182. PMID: PMC2789673. [commentary on article appears in same issue, *Physiol. Genomics* 39:169-171]
29. Hoenerhoff MJ, Pandiri AR, Lahousse SA, Hong HH, Ton TV, Auerbach SS, Gerrish K, Bushel PR, **Shockley KR**, Peddada SD, Sills RC. (2011). Global gene expression profiling of spontaneous hepatocellular carcinoma in B6C3F1 mice: similarities in the molecular landscape with human liver cancer. *Toxicol. Pathol.* 39:678-699. PMID: PMC4955670.
30. Dunnick JK, Brix A, Cunny H, Vallant M, **Shockley KR**. (2012). Characterization of polybrominated diphenyl ether toxicity in Wistar Han rats and use of liver microarray data for predicting disease susceptibilities. *Toxicol. Pathol.* 40:93-106. PMID: PMC4816085.
31. **Shockley KR***. (2012). A three-stage algorithm to make toxicologically relevant activity calls from quantitative high throughput screening data. *Environ. Health Persp.* 120:1107-1115. PMID: PMC3440085.
32. Pandiri AR, Sills RC, Ziglioli V, Ton TV, Hong HH, Lahousse SA, Gerrish KE, Auerbach SS, **Shockley KR**, Bushel PR, Peddada SD, Hoenerhoff MJ. (2012). Differential transcriptomic analysis of spontaneous lung tumors in B6C3F1 mice: comparison to human non-small cell lung cancer. *Toxicol. Pathol.* 40:1141-1159. PMID: PMC4799722.
33. Hoenerhoff MJ, Pandiri AR, Snyder SA, Hong HH, Ton TV, Peddada S, **Shockley K**, Chan P, Rider C, Kooistra L, Nyska A, Sills RC. (2013). Hepatocellular carcinomas in B6C3F1 mice treated with Ginkgo biloba extract for two years differ from spontaneous liver tumors in cancer gene mutations and genomic pathways. *Toxicol. Pathol.* 41:826-841. PMID: PMC4799723.
34. Teng C, Goodwin B, **Shockley K**, Xia M, Huang R, Norris J, Merrick A, Jetten AM, Austin CP, Tice RR. (2013). Bisphenol A affects androgen receptor function via multiple mechanisms. *Chem.-Biol. Interact.* 203:556-564. PMID: PMC3722857.
35. Anafi RC, Pellegrino R, **Shockley KR**, Romer M, Tufik S, Pack AI. (2013). Sleep is not just for the brain: transcriptional responses to sleep in peripheral tissues. *BMC Genomics.* 14:362. PMID: PMC3701596.
36. **Shockley KR***. (2014). Using weighted entropy to rank chemicals in quantitative high throughput screening experiments. *J. Biomol. Screen.* 19:344-353. PMID: PMC4029130.
37. Blackshear PE, Pandiri AR, Ton TV, Clayton NP, **Shockley KR**, Peddada SD, Gerrish KE, Sills RC, Hoenerhoff MJ. (2014). Spontaneous mesotheliomas in F344/N rats are characterized by dysregulation of cellular growth and immune function pathways. *Toxicol. Pathol.* 42:863-876. PMID: PMC4967937.
38. Ray M, **Shockley K**, Kissling G. (2014). Minimizing systematic errors in quantitative high throughput screening data using standardization, background subtraction, and non-parametric regression. *J. Experiment. Sec. Sci.* 3:ISSN#2162-8092. PubMed Central compliance in progress.
39. Huang R, Sakamuru S, Martin M, Reif D, Judson R, Houck K, **Shockley KR**, Fostel J, Witt K, Tong W, Zhao T, Dix D, Tice RR, Simeonov A, Austin CP, Xia M. (2014). Profiling of the Tox21 10K compound library for environmental agonists and antagonists of the estrogen receptor signaling pathway. *Sci. Rep.* 4:5664. PMID: PMC4092345.

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40. Arnardottir ES, Nikonova EV, **Shockley KR**, Podtelezchnikov AA, Tanis KQ, Stone DJ, Gislason T, Winrow CH, Pack AI. (2014). Blood gene expression reveals reduced circadian rhythmicity in individuals resistant to sleep deprivation. *Sleep*. 37:1589-1600. PMID: PMC4173916. [editorial on article appears in same issue, *Sleep* 37:1581-1589]
 41. George-Raizen JB, **Shockley KR**, Trojanowski NF, Lamb AL, Raizen DM. (2014). Dynamically-expressed prion-like proteins form a cuticle in the pharynx of *Caenorhabditis elegans*. *Biol. Open*. 3:1139-1149. PMID: PMC4232772.
 42. Blackshear PE, Pandiri AR, Nagai H, Bhusari S, Hong L, Ton TV, Clayton NP, Wyde M, **Shockley KR**, Peddada SD, Gerrish KE, Sills RC, Hoenerhoff MJ. (2015). Gene expression of mesothelioma in vinylidene chloride-exposed F344/N rats reveal immune dysfunction, tissue damage, and inflammation pathways. *Toxicol. Pathol.* 43:171-185. PMID: PMC4275413.
 43. French JE, Morgan DL, Shepherd K, Price HC, King D, Kissling GE, Witt KL, **Shockley KR**, Pedersen LC, Gatti DM, Svenson KL, Munger SC, Churchill GA. (2015). Population based genetic determinants of individual susceptibility to benzene toxicity. *Environ. Health Perspect.* 123:237-245. PMID: PMC4348743.
 44. **Shockley KR***. (2015). Quantitative high-throughput screening data analysis: challenges and recent advances. *Drug Discov. Today* 20:296-300. PMID: PMC4375054.
 45. Chen S, Hsieh JH, Huang R, Sakamuru S, Sin LY, Xia M, **Shockley KR**, Auerbach S, Kanaya N, Lu H, Svoboda D, Witt KL, Merrick BA, Teng CT, Tice RR. (2015). Cell-based high-throughput screening for aromatase inhibitors in the Tox21 10K library. *Toxicol. Sci.* 147:446-457. PMID: PMC4592355.
 46. Bhusari S, Pandiri A, Hiroaki N, Yu W, Foley J, T TV, DeVito M, **Shockley KR**, Peddada S, Gerrish K, Malarkey D, Hooth M, Sills R, Hoenerhoff M. (2015). Genomic profiling reveals unique molecular alterations in hepatoblastomas and adjacent hepatocellular carcinomas in B6C3F1 mice. *Toxicol. Pathol.* 43:1114-1125. PMID: PMC4670276.
 47. Hayes SA, Pandiri AR, Ton TT, Hong HH, Clayton NP, **Shockley KR**, Peddada SD, Gerrish K, Wyde M, Sills RC, Hoenerhoff MJ. (2016). Renal cell carcinomas in vinylidene chloride exposed male B6C3F1 mice are characterized by oxidative stress and TP53 pathway dysregulation. *Toxicol. Pathol.* 44:71-87. PMID: PMC4752433.
 48. Pei Y, Peng J, Behl M, Sipes NS, **Shockley KR**, Rao MS, Tice RR, Zeng X. (2016). Comparative neurotoxicity screening in human iPSC-derived neural stem cells, neurons and astrocytes. *Brain Res.* 1638:57-73. PubMed Central compliance in progress.
 49. Boyd WA, Smith MV, Co CA, Pirone JR, Rice JR, **Shockley KR**, Freedman JH. (2016). Developmental effects of the ToxCast™ Phase I and II chemicals in *Caenorhabditis elegans* and corresponding responses in zebrafish, rats, and rabbits. *Environ. Health Persp.* 124:586-593. PMID: PMC4858399.
 50. **Shockley KR***. (2016). Estimating potency in high-throughput screens by maximizing the rate of change in weighted Shannon entropy. *Sci. Rep.* 6:27897. PMID: PMC4908415.
 51. Dunnick JK, Merrick BA, Brix A, Morgan DL, Gerrish K, Wang Y, Flake G, Foley J, **Shockley KR**. (2016). Molecular changes in the nasal cavity after N,N-Dimethyl-p-toluidine exposure. *Toxicol. Path.* 44:835-847. PubMed Central compliance in progress.
 52. Dunnick JK, **Shockley KR**, Morgan DL, Brix A, Gerrish K, Sanders M, Ton TV, Pandiri A. Hepatic transcriptomic alterations and benchmark dose analysis for N,N-Dimethyl-p-toluidine

(DMPT) and p-Toluidine after 5-day exposure in rats. (Arch. Toxicol., in press). PubMed Central compliance in progress.

Book Chapters –

- B1) Pysz MA, Rinker KD, **Shockley KR**, Kelly RM. (2001). Continuous cultivation methods for hyperthermophilic biomass and enzyme production. *Methods in Enzymology*. 330:31-40.
- B2) Kelly RM, **Shockley KR**. (2004). Applications of genomic Data – Enzyme discovery and microbial genomics. *In* C. Fraser, K. Nelson, and T. Read (eds.), *Microbial Genomes*. Humana Press, Totowa, New Jersey, pp. 461-484.
- B3) Adams MWW, Jenney FE, Chou CJ, Hamilton-Brehm S, Poole FL, **Shockley KR**, Tachdjian S, Kelly RM. (2006). Transcriptomics, proteomics and structural genomics of *Pyrococcus furiosus*. *Archaea – physiology, molecular biology and evolution*. In Garrett, R. and Klenk, R.- P. (eds.), *Archaea*. Blackwell Publishing Inc., Malden, Massachusetts.
- B4) Tachdjian S, **Shockley KR**, Conners SB, Kelly RM. (2008). Functional genomics of stress response in extremophilic archaea. *In* P. Blum (ed.), *Archaea: new models for prokaryotic biology*. Caister Academic Press, Wymondham, UK.

Published Abstracts –

- A1) **Shockley KR**, Ward DE, Pysz MA, Chhabra SR, Conners SB, Kelly RM. (2002). Regulation of proteolysis in hyperthermophilic microorganisms. *Abstr. Pap. Am. Chem. S.* 224:U203-U204.
- A2) Chhabra SR, **Shockley KR**, Conners SB, Scott K, Wolfinger RD, Kelly RM. (2003). Glycoside hydrolases from *Thermotoga maritima*: physiological and biotechnological aspects. *Abstr. Pap. Am. Chem. S.* 225:U200.
- A3) Kelly RM, Conners SB, **Shockley KR**, Johnson MR, Montero CI. (2005). Comparative functional genomics of the hyperthermophilic bacterium *Thermotoga maritima* and the archaeon *Pyrococcus furiosus*. *Abstr. Pap. Am. Chem. S.* 229:U1174.
- A4) Johnson MR, Conners SB, Montero CI, **Shockley KR**, Kelly RM. (2005). Growth phase dependent cell aggregation, maturation and detachment in the hyperthermophilic bacterium *Thermotoga maritima*. *Abstr. Pap. Am. Chem. S.* 229:U236.
- A5) Conners SB, Montero CI, Comfort DA, **Shockley KR**, Johnson MR, Chhabra SR, Kelly RM. (2005). Prediction of carbohydrate transport and utilization regulons in the hyperthermophilic bacterium *Thermotoga maritima* through the use of carbohydrate-specific transcriptional response. *Abstr. Pap. Am. Chem. S.* 229:U240.
- A6) Zimmerman JE, Mackiewicz M, Rizzo W, **Shockley K**, Churchill GA, Pack AI. Change in gene expression with sleep and wakefulness in Drosophila brain. (2005). *Sleep* 28:A341.
- A7) **Shockley K**, Lazarenko O, Churchill G, Ackert-Bicknell C, Rosen C, Lecka-Czernik B. (2005). PPAR-gamma 2 nuclear receptor controls multiple regulatory pathways of osteoblast and adipocyte differentiation including IGF-1 and TGF-beta/BMP signaling. *J. Bone Miner. Res.* 20:S245.
- A8) Pack A, Zimmerman J, **Shockley K**, Mackiewicz M. Elucidating mechanisms regulating sleep and wake by expression profiling studies. (2006). *J. Sleep Res.* 15:28.
- A9) Lecka-Czernik B, Lazarenko O, Czernik P, Rosen C, **Shockley K**, Churchill G. (2006). Osteoblastic activity of Wnt signaling pathway is controlled by PPAR-gamma 2 nuclear receptor. *J. Bone Min. Res.* 21:S382.

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- A10) Michel JK, Madding LS, **Shockley KR**, Conners SB, Epting KL, Johnson MR, Tachdjian S, Kelly RM. (2006). Functional role of beta proteins in the thermophilic archaeal 20S proteasomes using functional genomic and proteomic approaches. (2006). Abstr. Pap. Am. Chem. S. 232:147-BIOT.
- A11) Mackiewicz M, **Shockley K**, Romer M, Galante R, Zimmerman J, Naidoo N, Churchill G, Pack A. (2007). Macromolecule biosynthesis – A key function of sleep. *Sleep* 30:A365-A366.
- A12) Su ZG, **Shockley KR**, Stylianou I, Paigen B. (2008). QTL genes that regulate HDL on distal mouse chromosome 5 are *Srb1* and *Acads*. *Arterioscl. Throm. Vas.* 28:E36.
- A13) Ackert-Bicknell C, Churchill GA, **Shockley KR**, Horowitz M, Canalis E, Rosen CJ. (2008). A recombinant congenic strain (B.H-6) establishes that trabecular bone mass and bone marrow adiposity are distinct and heritable phenotypes. *J. Bone Min. Res.* 23:S107.
- A14) Tice RR, Witt KL, **Shockley KR**, Caspary WJ, Xia M, Huang R, Austin CP. (2009). The use of quantitative high throughput screens (qHTS) in genetic toxicology. *Environ. Mol. Mutagen.* 50:542.
- A15) Witt K, Huang R, **Shockley K**, Austin CP, Zheng M, Sun Y, Tice RR, Xia M. (2010). Assessing the DNA damaging potential of chemicals via activation of the p53 pathway using quantitative high-throughput screening (qHTS). *The Toxicologist* 114:152.
- A16) **Shockley K**, Kissling G, Huang R, Xia M, Austin C, Tice R. (2010). A statistical framework for analyzing quantitative high-throughput screening data (qHTS). *The Toxicologist* 114:42.
- A17) Lamb A, **Shockley KR**, Raizen DM. (2010). Homeostasis of a *C. elegans* sleep-like state. *Sleep* 33:A59.
- A18) Auerbach SS, **Shockley KR**, Vallant M, Cunny H, Dunnick J. (2011). Characterization of the hepatic response to a mixture of low molecular weight polybrominated diphenyl ethers: disease, signature, network, and pathway analysis. *The Toxicologist* 120:342.
- A19) **Shockley KR**, Kissling GE, Huang R, Xia M, Austin CP, Tice RR. (2011). Using a multiple stage decision tree to make activity calls in quantitative high throughput screening (qHTS) data. *The Toxicologist* 120:103.
- A20) Pellegrino R, Anafi R, **Shockley KR**, Romer M, Hakonarson HH, Pack A. (2012). Transcriptional effects of sleep and sleep deprivation on peripheral tissues. *Sleep* 35:A13-A14.
- A21) Anafi R, Nikonova EV, Arnardottir ES, **Shockley KR**, McDonald TP, Podtelezchnikov AA, Winrow CJ, Hogenesch JB, Renger JJ, Pack A. (2012). Assessing circadian phase in human subjects using limited peripheral blood measurements. *Sleep* 35:A133-A134.
- A22) Hobbs CA, Morgan DL, Shepard K, Price HC, Kissling GE, **Shockley KR**, Recio L, Witt KL, French JE. (2012). Population variation in micronucleus response to inhaled benzene in diversity outbred (J:DO) mice. *Environ. Mol. Mutagen.* 53:S26.
- A23) **Shockley KR**, Brix AE, Vallant MK, Cunny HC, Dunnick JK. (2012). Characterization of polybrominated diphenyl ether toxicity in Wistar Hans rats and use of liver microarray data for predicting disease susceptibilities. *The Toxicologist* 126:266.
- A24) Arnardottir ES, Nikonova EV, **Shockley KR**, Anafi RC, Podtelezchnikov AA, Tanis K, Stone DJ, Maislin G, Gislason T, Renger J, Winrow C, Pack AI. (2012). Response to sleep deprivation and recovery sleep: human blood biomarkers. *J. Sleep Res.* 21:38.

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- A25) Bhusari S, Pandiri A, Wang Y, Foley J, Hong H, Ton T, **Shockley KR**, Peddada S, Gerrish K, Malarkey D, Sills R, Hoenerhoff M. (2013). Transcriptomic profiling of hepatoblastomas and associated hepatocellular carcinomas in B6C3F1 mice. *The Toxicologist* 132:234.
- A26) Witt KL, Kissling GE, Morgan DL, **Shockley KR**, Gatti DM, Churchill GA, French JE. (2013). Benchmark dose models for benzene genotoxicity using the diversity outbred mouse. *The Toxicologist* 132:414.
- A27) Huang R, Sakamura, S, Martin MT, Reif D, Judson R, Houck K, Casey W, Hsieh J, **Shockley K**, Ceger P, Fostel J, Witt KL, Tong W, Rotroff D, Simeonov A, Dix DJ, Austin CP, Kavlock R, Tice RR, Xia M. (2014). Profiling of the Tox21 10K compound library for agonists and antagonists of the estrogen receptor alpha signaling pathway. *The Toxicologist* 138:41.
- A28) Rinckel I, Casey W, Huang R, Hsieh J, **Shockley K**, Xia M, Tice RR, Ceger P. (2014). Performance of the BG1 Luc and ER β -lactamase estrogen receptor transactivation assays in Tox21. *The Toxicologist* 138:43.
- A29) **Shockley K**. (2014). Using weighted entropy to rank chemicals in Tox21 Phase II BG1 ER-Luc estrogen receptor assays. *The Toxicologist* 138:609.
- A30) Merrick B, **Shockley KR**, Morgan DL, Gerrish K, Elmore S, Stanko JP, Pandiri AR, Ton T, Dunnick JK. (2015). Liver microarray analysis by estrous cycle staging after 90-day Tetrabromobisphenol A (TBBPA) exposure. *The Toxicologist* 144:20.
- A31) **Shockley KR**, Morgan DL, Brix A, Flake G, Foley J, Wang Y, Pandiri AR, Mahler B, Lyght O, Gerrish K, Dunnick JK. (2015). NTP studies of N,N-dimethyl-p-toluidine (DMPT), a component in medical devices and dental material. *The Toxicologist* 144:434.
- A32) Yamashita H, Pandiri A, **Shockley K**, Peddada S, Gerrish K, Rider C, Hoenerhoff M, Sills R. (2015). MicroRNA profiling of hepatocellular carcinomas in B6C3F1 mice treated with ginkgo biloba extract gavage for 2 years. *Int. J. Toxicol.* 34:88.
- A33) Rider CV, Auerbach SS, Ferguson SS, Tokar EJ, Hsieh JH, **Shockley KR**, Germolec DR, Jutlu E, Masten SA, Waidyanatha S. (2015). From Deepwater horizon to high-throughput screening: polycyclic aromatic compound testing at the National Toxicology Program. *Environ. Mol. Mutagen.* 56:S37.
- A34) Witt KL, Hsieh JH, Xia M, Huang R, Auerbach SS, Paules RS, **Shockley KR**, Merrick BA, Sedykh A, Tice RR, Smith-Roe SL. (2015). High-throughput screening for rapid identification of potential genotoxicants in large compound libraries: comparison of the Tox21 approach to classic genotoxicity assays. *Environ. Mol. Mutagen.* 56:S53.
- A35) Rider C, Auerbach S, Ferguson SS, Tokar E, Hsieh JH, **Shockley K**, Germolec D, Mutlu E, Masten S, Waidyantha S. (2016). *In vitro* screening to *in vivo* testing of polycyclic aromatic compounds at the National Toxicology Program. *The Toxicologist* 150:106.
- A36) Yamashita H, Hoenerhoff MJ, **Shockley KR**, Peddada SD, Gerrish KE, Sutton D, Cummings CA, Wang Y, Foley JF, Behl M, Sills RC, Pandiri AR. (2016). Reduced disc shedding contribute to Kava Kava extract-induced retinal degradation in F344/N rats. *The Toxicologist* 150: 143.
- A37) **Shockley KR**. (2016). Estimating compound potency in Tox21 phase II estrogen receptor agonist assays using weighted information gain. *The Toxicologist* 150:387.
- A38) DeVito M, Borghoff S, Zorilla L, **Shockley KR**, Kissling G, Travlos G. (2016). The effects of a high fat (HF) diet on male diversity outbred (DO) mice. *The Toxicologist* 150:490.

Other Selected Presentations and Posters –

Shockley, KR. (1997). Mechanism of ethylene stimulation of Taxol production in plant cell cultures. Second Annual Symposium of the NSF REU Program in Bioprocessing, Department of Chemical and Biological Engineering, Colorado State University, Fort Collins, CO (presentation)

Shockley KR, Kelly RM. (2000). Targeted microarray analysis of proteolysis in hyperthermophilic microorganisms. Seventh Annual NSF Hyperthermophiles Symposium, Raleigh, NC (presentation)

Shockley KR, Kelly RM. (2000). Targeted microarray analysis of proteolysis in hyperthermophilic microorganisms. NSF Hyperthermophiles Conference, North Carolina State University, Raleigh, NC (poster)

Shockley KR, Kelly RM. (2000). Targeted microarray analysis of proteolysis in hyperthermophilic microorganisms. Schoenborn Graduate Research Symposium Poster Session, North Carolina State University, Raleigh, NC (poster)

Shockley KR, Kelly RM. (2001). Targeted microarray analysis of proteolysis in hyperthermophilic microorganisms. Schoenborn Graduate Research Symposium Poster Session, North Carolina State University, Raleigh, NC (poster)

Shockley KR, Kelly RM. (2002). Targeted microarray analysis of proteolysis in hyperthermophilic microorganisms. Mid-Atlantic Biochemical Engineering Consortium (MABEC), Philadelphia, PA (presentation)

Shockley KR, Ward DE, Chhabra SR, Conners SB, Montero CI, Kelly RM. (2002). Heat shock by the hyperthermophilic archaeon *Pyrococcus furiosus*. Schoenborn Graduate Research Symposium Poster Session, North Carolina State University, Raleigh, NC (poster)

Shockley KR, Kelly RM. (2002). Regulation of proteolysis in hyperthermophilic microorganisms. Graduate Seminar Series, Graduate Seminar Series, Department of Chemical Engineering, North Carolina State University, Raleigh, NC (presentation)

Shockley KR, Conners SB, Johnson MR, Pysz MA, Montero CI, Scott K, Chhabra SR, Kelly RM. (2003). cDNA microarray-based transcriptional analysis of the model hyperthermophiles *Thermotoga maritima* and *Pyrococcus furiosus* during transient and steady growth conditions. Engineering Conferences International Biochemical Engineering XIII: Biochemical Engineering in the Era of Genomics, Systems Biology, Genetic Medicine & Nanotechnologies, Boulder, CO (poster)

Shockley KR, Conners SB, Montero CI, Johnson MR, Chhabra SR, Pysz MA, Kelly RM. (2003). Microarray-based transcriptional analysis of thermal stress response and sugar utilization in the hyperthermophiles *Pyrococcus furiosus* and *Thermotoga maritima*. Life in the Extreme: Opportunities in Idaho, Idaho State University, Pocatello, ID (presentation)

Shockley KR. (2003). From extreme environments to hot spots: functional genomics of hyperthermophiles. Schoenborn Graduate Research Symposium, North Carolina State University, Raleigh, NC (presentation)

Shockley KR. (2003). Transcriptional analysis of the heterotrophic hyperthermophilic microorganisms *Thermotoga maritima* and *Pyrococcus furiosus*. The Jackson Laboratory, Bar Harbor, ME (presentation)

Shockley KR, Zimmerman JE, Mackiewicz M, Pack AI, Churchill GA. (2005). Analysis of variance-based assessments of time series microarray data applied to flies and mice. Systems Biology: Global Regulation of Gene Expression, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY (poster)

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- Shockley KR.** (2005). Statistical assessments of time series GeneChip® data using multi-factorial ANOVA provide novel insights into sleep deprivation and the function of PPAR- γ 2 in mice. Discovery Strategies 2005: Improving the predictive value of mouse models in drug discovery and development, The Jackson Laboratory, Bar Harbor, ME (presentation)
- Shockley KR.** (2006). Candidate genes from gene expression data. Novartis Institute for Biomedical Research, Inc., Boston, MA (presentation)
- Shockley KR,** Churchill GA. (2006). 5th Annual Meeting of the Complex Trait Consortium. University of North Carolina, Chapel Hill, NC. (poster and short presentation)
- Shockley KR,** Lecka-Czernik B, Rosen CJ, Churchill GA. (2007). PPAR-g2 regulates adipocyte differentiation of bone marrow mesenchymal stem cells. Meeting of the National Centers of Integrative and Systems Biology, Boston, MA (poster)
- Shockley KR.** (2007). Using the gene expression response to rosiglitazone to study osteoporosis and obesity. Department of Chemical and Biological Engineering, The University of Alabama, Tuscaloosa, AL (presentation)
- Shockley KR.** (2008). Using the gene expression response to rosiglitazone to study osteoporosis and obesity. Department of Chemical Engineering, Texas Tech University, Lubbock, TX (presentation)
- Shockley KR.** (2008). Using the gene expression response to rosiglitazone to study osteoporosis and obesity. Department of Chemical Engineering, University of Tulsa, Tulsa, OK (presentation)
- Shockley KR.** (2008). AIChE Meeting: The University of Tulsa. Department of Chemical Engineering, University of Tulsa, Tulsa, OK (presentation)
- Shockley KR.** (2008). Using gene expression microarrays to study gene response in mouse stem cells. Department of Biological Systems Engineering, Virginia Tech, Blacksburg, VA (presentation)
- Shockley KR.** (2008). Using gene expression microarrays to study gene response in mouse stem cells. The National Institute of Environmental Health Sciences, Research Triangle Park, NC (presentation)
- Shockley KR.** (2008). PPAR γ 2 controls osteoblast differentiation in marrow mesenchymal stem cells. National Institute of Environmental Health Sciences, Research Triangle Park, NC (presentation)
- Shockley KR.** (2008). Mice respond to atherogenic high-fat diet with strain-specific differences in gene expression. 7th Annual Meeting of the Complex Trait Consortium, Montreal, Canada (presentation)
- Shockley KR,** Lecka-Czernik B, Rosen CJ, Churchill GA. (2008). Using gene expression microarrays to study drug response in mouse stem cells. The Division of Internal Research Board of Scientific Counselors review of the Biostatistics Branch, NIEHS, Research Triangle Park, NC (poster)
- Shockley KR.** (2009). Using mouse gene expression and phenotypes to explore the effects of atherogenic diet. The National Institute of Environmental Sciences Biostatistics Branch Seminar Series, RTP, NC (presentation)
- Shockley KR,** Kissling GE, Xia M, Huang R, Austin CP, Tice RR. (2009). Analysis of quantitative high throughput screening data for applications in toxicology. The First ToxCast Data Analysis Summit, Environmental Protection Agency, Research Triangle Park, NC (poster)

Shockley KR. (2009). qHTS: description of a p53 assay data set. Biostatistics Branch/Genetics interest group, NIEHS, Research Triangle Park, NC (presentation)

Shockley KR. (2009). qHTS analysis update. Tox21 General Meeting, US Environmental Protection Agency, Research Triangle Park, NC (presentation)

Shockley KR. (2010). Tox21 Informatics Working Group. The NTP Board of Scientific Counselors Meeting, National Institute of Environmental Health Sciences, Research Triangle Park, NC (presentation)

Shockley KR, Kissling GE, Huang R, Xia M, Austin CP, Tice RR. (2010). A decision tree algorithm for analyzing quantitative high-throughput screening data (qHTS). Review of the Biomolecular Screening Branch by the NTP Board of Scientific Counselors, NIEHS, Research Triangle Park, NC (poster)

Shockley KR. (2011). Preliminary comparison of different activity calls approaches. Tox21 General Meeting, NIH Chemical Genomics Center, Bethesda, MD (presentation)

Shockley KR, Brix AE, Vallant MK, Cunny HC, Dunnick JK. (2011). Characterization of polybrominated diphenyl ether toxicity in Wistar Han rats and use of liver microarray data for predicting disease susceptibilities. NIEHS Genomics Day, NIEHS, Research Triangle Park, NC (poster)

Shockley KR. (2012). A three-stage algorithm to make toxicologically relevant activity calls in quantitative high-throughput screening (qHTS) data. The Division of Internal Research Board of Scientific Counselors Review of the Biostatistics Branch, NIEHS, Research Triangle Park, NC (poster)

Shockley KR. (2014). Using weighted entropy to rank chemicals in Tox21 Phase II BG1 ER-Luc estrogen receptor assays. Interagency Coordinating Committee on the Validation of Alternative Methods, NIEHS, Research Triangle Park, NC (poster)

Shockley KR. (2014). Reflections on communicating science and social media. Biostatistics Branch/Genetics interest group, NIEHS, Research Triangle Park, NC (presentation)