Characterizing Antibiotic Resistant Foodborne Pathogens in Domestic Kitchens and Retail Foods

Funded by:
USDA/CSREES/Capacity Building

Unit:
School of Agriculture and Consumer Sciences

Award:
$299,213.00

Duration:
September 15, 2006 — September 15, 2011

Project Contact:
Dr. Agnes Kilonzo-Nthenge
akilonzontheng@tnstate.edu
(615) 963-5437

INVESTIGATORS

Agnes Kilonzo-Nthenge, Ph.D.
Dr. Agnes Kilonzo-Nthenge currently serves as Research Assistant Professor in the School of Agriculture and Consumer Sciences (Family and Consumer Sciences Department) at Tennessee State University.

Sandria L. Godwin, Ph.D., R.D., L.D/N.
Dr. Sandria L. Godwin is currently a Professor in the School of Agriculture and Consumer Sciences (Family and Consumer Sciences Department) at Tennessee State University.

Fur-Chi Chen, Ph.D.
Dr. Fur-Chi Chen is currently a Research Associate Professor in the School of Agriculture and Consumer Sciences (Department of Family and Consumer Sciences) at Tennessee State University.

SUMMARY

The emergence of antibiotic resistant bacteria in the food chain has become a major area of concern. Two studies have been conducted in this research. In the first study both pathogenic and commensal microorganisms were recovered from domestic kitchens and retail meats. In the second study, profiles and patterns of antibiotic resistant bacteria isolated from domestic kitchens and retail meats were determined. Enterobacter sakazakii, Shigella spp, Salmonella spp, E. coli, Klebsiella pneumoniae, Klebsiella terrigena, Klebsiella oxytoca, Flavimonas oryzihabitans, Aeromonas hydrophila group 1, Enterobacter cloaceae, Enterobacter aerogenes Hafnia alvei 1, Kluyvera spp Pantoea spp 3 were some of the antibiotic resistant bacteria isolated from retail meats and domestic kitchens. Enterobacteriaceae recovered from poultry, beef, swine, fresh produce, and domestic kitchens showed single, double, and triple antibiotic resistance.

A database of characterized antibiotic resistant microorganisms isolated from retail meats and domestic kitchens has been created. Data on patterns and profiles of antibiotic resistance obtained from this study will be essential in implementing measures needed to control the spread of antibiotic-resistant pathogens in domestic kitchens and retail stores. This data can also be used for risk assessment exercises to explain the role of bacteria in retail meats and domestic kitchens in the dissemination of antibiotic resistance to human populations.

The results from this project point out retail meats and domestic kitchens to be potential sources for both pathogenic and commensal antibiotic-resistant bacteria. The findings of this study indicate the need to develop consumer educational material on safe handling of raw foods and the importance of judicious use of antibiotics on farms. Using the laboratory results, educational materials are being designed to educate consumers on safe hygienic food handling practices and judicious use of antibiotics in agriculture. Consumers will be made aware of possible antibiotic resistant microorganism clusters in the eco-system.

Funding from this grant has supported graduate students and those students have been trained to isolate, identify, and characterize antibiotic-resistant bacteria from food and environmental samples. Two graduate theses have been directed on this grant.

Publication

Presentations


Agnes Kilonzo-Nthenge, Ph.D.
Research Assistant Professor, Family and Consumer Sciences

Dr. Agnes Kilonzo-Nthenge currently serves as Research Assistant Professor in the School of Agriculture and Consumer Sciences (Department of Family and Consumer Sciences) at Tennessee State University (TSU). She is a 2003 graduate of Auburn University with a Doctorate degree in Food Science and Nutrition (emphasis in Food microbiology). Some of her responsibilities include teaching a Food Microbiology course, both graduate and undergraduate, and directing graduate student research in the School of Agriculture and Consumer Sciences, and Chemistry Department at TSU. Dr. Kilonzo-Nthenge is a recipient of Distinguished Research Support Scientist Award (2007) in the Institute for Agricultural and Environmental Research (IAgER), Auburn University Presidential Graduate Fellowship (1999-2003), Certificate of Excellence in Research Auburn University (2000), and Institute of Food Technology Paper Competition Award (2000). She is a member of International Association of Food Protection and National Registry of Food Safety Professionals, Inc. Dr. Kilonzo is also a certified Food Safety Manager and Hazard Analysis and Critical Control Point (HACCP). She serves as reviewer of Journal of Food Protection and Journal of Food Microbiology. Dr. Kilonzo researches antimicrobial drug resistance of foodborne pathogens, bacterial contamination of fresh produce and retail meats, and characterization of microorganisms from consumer homes and farms. She has published 6 refereed papers in reputable scientific journals, 11 refereed abstracts, and 16 presentations. She has attracted about $600,000 in external research funding as principal investigator (PI) and co-principal investigator (Co-PI).

Sandria L. Godwin, Ph.D., R.D., L.D/N.
Professor, Family and Consumer Sciences

Dr. Sandria Godwin is currently a Professor in the School of Agriculture and Consumer Sciences (Department of Family and Consumer Sciences) at Tennessee State University (TSU). She serves as Director of the Didactic Program in Dietetics, and Program Leader for the Food Safety and Nutrition group. A graduate of Kansas State University, Dr. Godwin has received over $6 million in research funding since joining the faculty at TSU in 1982. Her work has been featured on National Public Radio, www.JohnTesh.com, the Jay Leno Show, and in numerous magazines and newspapers, such as Self, Harvard Medical Newsletter, Arizona Republic, and Fitness. Dr. Godwin’s awards include: the Leader Award from the American Association of Family and Consumer Sciences, the TSU Blue and White Award for Research and Creative Arts, TSU Researcher of the Year, the Distinguished Research Award from the College of Human Ecology at Kansas State University, the Partner Award from the Metropolitan Action Commission, the Leader Award from the Tennessee Association of Family and Consumer Sciences, and the Community Health Hero Award from the Metropolitan Davidson County Health Department. She currently serves on the Health Advisory Council of the Metropolitan Action Commission and is Vice-President of Good Food for Good People. Dr. Godwin has published widely in referred journals and her research interests include consumer food safety knowledge and practices, home refrigeration practices, food security, hunger and the environment, and emergency preparedness.

Fur-Chi Chen, Ph.D.
Research Associate Professor, Family and Consumer Sciences

Dr. Fur-Chi Chen is currently a Research Associate Professor in the School of Agriculture and Consumer Sciences (Department of Family and Consumer Sciences) at Tennessee State University (TSU). He received his Ph.D. in Food Science from Auburn University in 1998. He completed the four-year postdoctoral training at Auburn and joined Tennessee State University in 2002. His research program focuses on safety and regulations of transmissible spongiform encephalopathies (TSEs) in food and animal feed products, biosensors for detection of foodborne pathogens, and microbial contamination during cold storage. He has authored or co-authored 24 refereed journal articles and more than 80 abstracts, and has taught classes in Nutrition, Food Science and Food Chemistry. He has been active in Institute of Food Technologists and International Association for Food Protection and has served as the scientific reviewer for the Journal of Food Science, the Journal of Food Processing and Preservation, and the Journal of Association of Official Analytical Chemists (AOAC). He received a Distinguished Research Scientist Award from the Institute of Agricultural and Environmental Research and a Faculty Research Award from Tennessee State University in 2007. He has served on the review panel for the USDA/NRI Competitive Grant Program in 2006 and 2008, and was elected as the President for Chinese American Food Society in 2009. He is a member of USDA-National Advisory Committee on Meat and Poultry Inspection for 2010-2012.