2000-2001
MASS SPECTROMETRY LABORATORY
SUMMARY OF ACTIVITIES

I. PUBLISHED ABSTRACTS

Ann Abraham, F. Aladar Bencsath, Archil Shartava, David Kakhniashvili, and Steven R.Goodman. Preparation of Irreversibly Sickled β-actin From Normal Red Blood Cell β-actin Verified by Liquid Chromatography and Off-line Mass Spectrometry. Proc., 48th ASMS Conf., Mass Spectrometry and Allied Topics, Abst. #181 (2000).

F. Aladar Bencsath, Terriann Reilly, Michael DiLiberti, Lawrence C. Hufnagle, and James Barnett. Hydrocarbon Analysis in Petroleum Tainted Salmon by the Use of Electronic Nose and Dynamic Headspace GCMS. Proc., 48th ASMS Conf., Mass Spectrometry and Allied Topics, Abst. # 477 (2000).

F. Aladar Bencsath, Terriann Reilly, Michael DiLiberti, Lawrence C. Hufnagle, and James Barnett. Analysis of Petroleum Tainted Seafood by the Use of Electronic Nose and Gas Chromatography/Mass Spectrometry. Book of abstracts, Voyage of Discovery Pittcon, Abst. #973 (2001).

II. PRESENTATIONS

Ann Abraham. Electron Capture GC/MS Determination of Gamma-aminobutyric Acid in Plasma. 49th ASMS Conf., Mass Spectrometry and Allied Topics, Chicago, IL (2001).

F. Aladar Bencsath, Terriann Reilly, Michael DiLiberti, Lawrence C. Hufnagle, and James Barnett. Analysis of Petroleum Tainted Seafood by the Use of Electronic Nose and Gas Chromatography/Mass Spectrometry. Pittcon, New Orleans, LA (2001).

F. Aladar Bencsath. Human Sensory Assessment and Instrumental Analysis of Petrochemical Taint in Seafood Exposed to Crude Oil and Diesel Oil Contaminated Water. 49th ASMS Conf., Mass Spectrometry and Allied Topics, Chicago, IL (2001).

III. BRIEF SUMMARY OF ACTIVITIES

1. Personnel

In March, 2001, Dr. Aladar Bencsath, Director of Mass spectrometry laboratory, resigned as Director but remained active as the advisor/consultant of MS laboratory.

2. Service

In the past year, 193 samples were submitted for analyses by 19 investigators from 13 laboratories: 16 investigators from 10 laboratories in the College of Medicine, 1 in non-medical departments at the University of South Alabama, and 2 outside the university. The analyses required 810 instrument hours, of which about 350 hours were spent for instrumental & method development. Instrument maintenance also required about 100 hours. A total fee of $2247 was invoiced for the sample analyses.

48% of the samples required electron or chemical ionization, and another 48% required fast atom bombardment ionization. A few samples required MS/MS analyses (6.3%).

Samples from two research projects required gas chromatography-mass spectrometry (GC/MS) analyses with electron ionization and GC/MS with electron capture negative chemical ionization. For these samples, specific clean up and GC processes were developed. To determine the volatile trace components in seafood samples (2%), dynamic headspace enrichment techniques were utilized in combination with GC/MS analyses.

3. Collaboration and method development:

We continued the collaborative research with Dr. Steven Goodman, Director of the Comprehensive Sickle Cell Center, on the oxidative transformation of β-Actin in order to produce the Actin specimen equivalent to the irreversibly sickled cell β-Actin, which plays a pivotal role in irreversible sickling. This modified protein is needed for bio-chemical studies that aim to inhibit and hope to reverse the sickling process. During this period, we developed a microassay for measuring the polymerization of actin using fluorescence detection. The collaboration has been concluded with a research paper submitted to the "Biochemistry" journal.

In collaboration with Dr. Dirk Dhossche, Dept. of Psychiatry, we developed an electron capture chemical ionization GC/MS method for GABA determination in blood plasma from autistic and normal children. The novel electronegative GABA derivative demonstrates excellent MS and GC characteristics needed for the analyses at the nanogram level. A manuscript that reports this study has been submitted to the "European Journal of Pediatrics."

An earlier collaboration on the FDA project "Petrochemical hazards in seafood" was continued using dynamic headspace GC/MS analyses, sensory assessment and electronic nose instrumentation. Selective absorption of the mono- and bi-cyclic aromatic hydrocarbon compounds by fish and oyster from petroleum contaminated water were demonstrated. The dominant components may be useful markers of petrochemical taint in seafood after oil spill.

Presently, we collaborate with Rita Peachey, Sea lab, Dept. of Marine Sciences, to determine the polycyclic aromatic hydrocarbons (PAHs) in oysters from different regions of Mobile Bay. We have developed a GC/MS method to identify and quantify the PAHs in nanogram levels for this project.

4. Future direction.

The laboratory will be able to give services for investigators to analyze small molecules with our current instrumentation and will continue to help develop methods for their projects. The laboratory is expected to complement a new proteomics laboratory operation that will utilize more advanced mass spectrometric techniques to analyze larger peptides and proteins in biological samples.