

**Karen Terry Welch, Ph.D.**

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**EDUCATION**

Ph.D. Organic Chemistry. University of Tennessee, Knoxville. December 2002.  
Dissertation: Conformational Studies of Carbohydrates and Carbohydrate-containing Molecules  
Advisor: Dr. David C. Baker

B.S. Chemistry and Microbiology. University of Memphis, Memphis, Tennessee. August 1995.

**RESEARCH EXPERIENCE**

**Mentor—Undergraduate Research.** Department of Chemistry, Georgia Southern University. Aug. 2004–present.

- Supervised research students in the area of carbohydrate/cyclitol synthesis and NMR (collaboration with Dr. Todd Deal, Georgia Southern) and molecular modeling.

**Post-doctoral research.** Department of Biochemistry, Cellular, and Molecular Biology, University of Tennessee, Knoxville. Nov. 2002–June 2004. Mentor: Dr. Engin H. Serpersu.

Research project: Design of non-carbohydrate inhibitors of aminoglycoside-modifying enzymes (AGMEs)

- Identified potential lead compounds from chemical databases by virtual screening, which led to the discovery of the first non-carbohydrate inhibitor of aminoglycoside phosphotransferase (3')-IIIa that is competitive with the aminoglycoside substrate
- Coordinated research efforts with laboratories in the Chemistry department at UT Knoxville and the Pharmaceutical Sciences department at UT Memphis
- Worked with undergraduates and new graduate students to incorporate their efforts into the research process
- Used docking calculations to propose modifications to lead compounds, and to understand the basis of recognition of adenosine triphosphate-like molecules by AGMEs
- Overexpressed and purified AGMEs for use in *in vitro* assays
- Performed whole cell assays of aminoglycoside mimetics using *Escherichia coli* transformed with aminoglycoside resistance plasmids
- Characterized synthesis products and potential lead compounds by 1D and 2D nuclear magnetic resonance (NMR) techniques
- Set up Diffusion Ordered Spectroscopy (DOSY) experiments for UT researchers
- Installed and maintained UNIX-based software related to the project (CAVEAT, Chiron, Mardigras)

**Doctoral Research.** Department of Chemistry, University of Tennessee, Knoxville. Aug. 1996–Nov. 2002.

Advisor: Dr. David C. Baker

- Performed conformational studies of *O*- and *C*- and *S*-disaccharides of hyaluronic acid (HA) using molecular modeling complemented by 2D NMR techniques
- Used molecular modeling and NMR studies to develop a structure–stability relationship for anthocyanins and ascertain the origin of their color stabilities in solution
- Determined the structures of natural products and research compounds using NMR, including novel anthocyanins, polysaccharides, synthetic carbohydrate intermediates, and carbosilane dendrimers
- Analyzed carbohydrates by high performance anion exchange chromatography
- Synthesized carbohydrate intermediates used in the preparation of *C*-glycosides of HA
- Maintained three Silicon Graphics workstations used for molecular modeling and trained users

## TEACHING EXPERIENCE

**Assistant Professor of Bioorganic Chemistry.** Department of Chemistry, Georgia Southern University, Statesboro, GA. August 2005–present.

- Taught undergraduate organic chemistry lecture and laboratory
- Developed course materials to be used in lab and lecture

**Visiting Assistant Professor.** Department of Chemistry, Georgia Southern University, Statesboro, GA. August 2004–May 2005.

- Taught undergraduate organic chemistry lecture and laboratory
- Developed course materials to be used in lab and lecture
- Managed organic chemistry stockroom with two student workers

**Adjunct Faculty.** Department of Natural and Behavioral Sciences, Pellissippi State Technical Community College, Knoxville, TN. July 2004.

- Taught second semester general chemistry course in a five-week format

**Teaching assistant.** Department of Chemistry, University of Tennessee, Knoxville. Aug. 1996–Nov. 2002.

- Served as teaching assistant for freshman chemistry for majors and nonmajors
- Presented a lecture on the basics of molecular modeling and assisted undergraduate students in the design and execution of a molecular modeling project as part of an advanced undergraduate organic chemistry course at UT
- Offered a short course for graduate students on performing selected 2D NMR experiments—COSY, HSQC, TOCSY, and NOESY (Departmental Service Award 2002)

## RESEARCH INTERESTS

- Rational design of carbohydrate mimetics
- Optimizing the *in silico* screening of compounds in charged and/or promiscuous active sites

- Solution conformation and dynamics of carbohydrates by molecular modeling and NMR

## PUBLICATIONS

1. Karen T. Welch, Slivia Arévalo, John F. C. Turner, and Rafael Gómez, “An NMR and Molecular Modeling Study of Carbosilane-Based Dendrimers Functionalized with Phenolic Groups or Titanium Complexes at the Periphery.” *Chem. Eur. J.* **2005**, *11*, 1217–1227.
2. Michael S. Allen, Benjamin S. Prebyl, Karen T. Welch, Arthur J. Meyers, David C. Baker, and Gary S. Saylor, “Analysis and Glycosyl Composition of the Exopolysaccharide Isolated from the Floc-Forming Wastewater Bacterium *Thauera* sp. MZ1T.” *Environ. Microbiol.* **2004**, *6*, 780–790.
3. Neil A. Whittemore, Karen T. Welch, James R. Cox, Donald K. Dougall, and David C. Baker, “A Quenched Molecular Dynamics-Rotating Frame Overhauser Spectroscopy Study of a Series of Semibiosynthetically Monoacylated Anthocyanins.” *J. Org. Chem.* **2004**, *69*, 1663–1669.
4. Karen T. Welch, Kristopher G. Virga, Neil A. Whittemore, Edward Wright, Can Özen, Cynthia L. Brown, Richard E. Lee, and Engin H. Serpersu, “Discovery of non-carbohydrate inhibitors of aminoglycoside-modifying enzymes.” (In press, *Bioorganic and Medicinal Chemistry Letters*)
5. Karen T. Welch, Neil A. Whittemore, Donald K. Dougall, and David C. Baker, “Solution conformations of monoacylated anthocyanins from *Daucus carota*: a structure–stability relationship for anthocyanins.” (Manuscript in preparation.)

## ORAL PRESENTATIONS

1. Karen T. Welch, Neil A. Whittemore, James R. Cox, Donald K. Dougall, and David C. Baker. “Investigation of the relationship between chemical structure and color stability of monoacylated anthocyanins from *Daucus carota*,” *Abstr. Pap. 227th ACS National Meeting*, Anaheim, CA 2004. **(Invited presentation)**
2. Karen T. Welch, Donald K. Dougall, and David C. Baker “Solution Conformations of Monoacylated Anthocyanins from *D. carota*,” *Abstr. Pap. 225<sup>th</sup> ACS National Meeting*, New Orleans, LA 2003.
3. Karen T. Welch, Sean Hamilton, Bin Jiang, and David C. Baker, “Solution Conformations of Three Disaccharides of Hyaluronic Acid,” *Abstr. Pap. 225<sup>th</sup> ACS National Meeting*, New Orleans, LA 2003.
4. Zhong-Xue Ren, Qiang Yang, Karen T. Welch, and David C. Baker. “Synthesis of C-/O-linked hyaluronic acid (HA) tetrasaccharide mimetics as antimetastatic agents,” *Abstr. Pap. 223<sup>rd</sup> ACS National Meeting*, Orlando, FL, 2002.
5. Qiang Yang, Zhong-Xue Ren, Karen T. Welch, David C. Baker. “Synthesis of an S-/O-linked tetrasaccharide related to hyaluronic acid (HA),” *Abstr. Pap. 223<sup>rd</sup> ACS National Meeting*, Orlando, FL, 2002.
6. Karen T. Welch, Neil A. Whittemore, David C. Baker, and Donald K. Dougall. “Conformational studies of monoacylated anthocyanins: Factors that affect their color stability,” *Abstr. Pap. 219<sup>th</sup> ACS National Meeting*, San Francisco, CA, 2000.

**RESEARCH GRANTS:**

Co-authored proposal for National Institutes of Health (NIH). Submitted 6-1-04. (Principal Investigators: Dr. Engin H. Serpersu and Dr. David C. Baker)

**PROFESSIONAL AFFILIATIONS:**

American Chemical Society, Carbohydrate Division

**HONORS AND AWARDS:**

Outstanding Second Year Organic Student, UT Knoxville 1998  
Departmental Service Award, UT Knoxville 1999, 2002

**ACADEMIC SERVICE:**

President of Association of Chemistry Graduate Students, UT Knoxville 1998–2000  
Representative to Graduate Student Association, 2000  
Graduate student representative to University of Tennessee Research Council, 2000

**REFERENCES:**

Dr. David C. Baker 667 Buehler Hall Knoxville, TN 39776	dcbaker@utk.edu 865-974-1066
Dr. J. Ricky Cox 413B Blackburn Science Building Murray, KY 42071-3346	ricky.cox@murraystate.edu 270-762-6543
Dr. Engin H. Serpersu M407 Walters Life Sciences Knoxville, TN 37996	serpersu@utk.edu 865-974-2668
Dr. John F. C. Turner 409 Buehler Hall Knoxville, TN 37996	jturner@ion.chem.utk.edu 865-974-8591