BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.

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NAME: Robert Chandos Monsen

eRA COMMONS USER NAME (credential, e.g., agency login): RCMONS01

POSITION TITLE: Postdoctoral Researcher

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Start Date MM/YYYY	Completion Date MM/YYYY	FIELD OF STUDY
Henderson Community College		8/2009		Undeclared
University of Southern Indiana	B.S.	8/2010	12/2014	Biochemistry
University of Louisville	M.S.	8/2016	08/2018	Biochemistry & Genetics
University of Louisville	Ph.D.	8/2018	11/2020	Biochemistry & Genetics

A. Personal Statement

I have the prior expertise and motivation to successfully carry out the proposed research project. I have a broad background in integrative structural biology techniques and biophysical methods. In particular, I have extensive experience in small-angle X-ray scattering data reduction and analysis, as well as extensive experience with molecular dynamics and hydrodynamics methods for use in structural refinement. My research broadly focuses on the characterization and drug targeting of non-B DNA structures known as G-quadruplexes. As the PI on several GUPs from Argonne national laboratory, I have laid the groundwork for integrative structural studies of highly complex DNA quadruplex systems, such as the higher-order human telomere and hTERT core promoter, resulting in new molecular receptors for use in *in silico* drug discovery efforts. Importantly, these receptors have led to the discovery of novel small molecules which are currently in development as anti-cancer therapeutics. As a result of these experiences, I am aware of the current limitations of these combined methods and seek to find orthogonal methods that complement the integrative structural biology approach. The current application would build logically on my prior work.

B. Positions and Honors

2013-2014 Undergraduate Independent Researcher Department of Chemistry, University of Southern Indiana. PI: Dr. Jeannie Collins
2015-2016 Research Technician, SABIC, Mt. Vernon, IN.
2016-2020 Graduate Research Assistant, Department of Biochemistry and Molecular Genetics, Graduate School, University of Louisville. PI: Dr. John Trent
2021-Present Postdoctoral Fellow in the lab of Dr. John Trent, University of Louisville Medical School

AWARDS/SCHOLARSHIPS

2016 **Fellowship, School of Interdisciplinary and Graduate Studies (SIGS), University of Louisville School of Medicine**
Ph.D. fellowship in the Biochemistry and Molecular Genetics program ($28,000/year stipend).

2017 **Beckman Coulter AUC Abstract Scholarship Winner**
Abstract contest winner for innovative research using analytical ultracentrifugation which included an all-expense paid trip to Glasgow, Scotland to present research at the 2017 AUC conference (Estimated worth $4-5,000)

2017 **Graduate Student Council (GSC) Research Grant**
University of Louisville research grant award for equipment/reagents used during dissertation research ($500).

2018 **Graduate Student Council (GSC) Research Travel Grant**

University of Louisville grant award for research conference travel and poster/oral presentations ($350).

2019 **Fellowship, Arno Spatola Endowment Graduate Research Fellowship, Institute for Molecular Diversity & Drug Design, University of Louisville**
Research Fellowship supporting drug discovery, development, and collaborations ($15,000).

2020 **Argonne National Laboratory APS Beam Time Allocation**
X-ray beam time allotted for proposal to analyze various DNA G-quadruplex promoter and telomere systems for the Fall of 2020 (Estimated worth $20,000).

2020 **Graduate Dean's Citation**
University of Louisville award to graduate students in recognition of superior accomplishment through publications, teaching, excellence, and professional service during their graduate studies beyond the achievement of a high grade point average.

2020 **John M. Houchens Prize**
University of Louisville award to the doctoral student whose dissertation has potential for significant impact on a field.

HONORS

1. **Science Fair Judge** – Hoosier Science and Engineering Fair, Evansville IN (2015)
2. **Mentor** – Undergraduate summer rotation student – Poster "Small Molecule Inhibitors of hTERT" presented at R!L (Research! Louisville), Louisville KY (2018)
3. **Science Fair Judge** – Meyzeek Middle School Science Fair, Louisville KY (2019)
4. **Science Fair Judge** – Louisville Regional Science and Engineering Fair (LRSEF), Louisville KY (2019)
5. **Science Fair Judge** – DuPont Manual Regional Science Fair, Louisville KY (2019)
6. **Mentor** – High school summer rotation student – Poster "Automation of DNA-ligand MD Simulations with Free Energy Calculations for Enrichment of High Affinity Ligands in Virtual Screening" presented at R!L, Louisville KY – Won 2nd place among HS students (2019)
7. **Mentor** – Graduate student mentor (2020-present)
8. **Mentor** – High school students participating the 2021 LRSEF science fair (2020-2021)

C. Contributions to Science

My dissertation work began with both *in silico* and *in vitro* drug discovery campaigns against various G-quadruplex forming nucleic acids. During this time, I discovered a suite of novel small molecules with moderate binding affinity to higher-order DNA sequences. This research eventually led to a G-quadruplex virtual drug discovery review, as well as a methods paper for small molecule screening using analytical ultracentrifugation. I have since branched out into integrative structural biology approaches used to characterize higher-order DNA G-quadruplex systems. Two of such investigations have recently been published in Nucleic Acids Research. To date, I have personally deposited >95% of all G-quadruplex SAXS data in the SASBDB. I am continuously pushing the boundaries of higher-order G-quadruplex structural characterization. Currently, I am a postdoctoral researcher in the same lab, continuing the patent and development process of the aforementioned small molecules while also pursuing new avenues in G-quadruplex structural biology studies.

RESEARCH PUBLICATIONS

1. **Monsen, R.C.** and Trent, J.O. (2018) G-quadruplex virtual drug screening: A review. Biochimie, 152, 134-148.
2. Dean, W.L., Gray, R.D., DeLeeuw, L., **Monsen, R.C.** and Chaires, J.B. (2019) Putting a New Spin of G-Quadruplex Structure and Binding by Analytical Ultracentrifugation. Methods Mol Biol, 2035, 87-103.
3. Chaires, J.B., Gray, R.D., Dean, W.L., **Monsen, R.**, DeLeeuw, L.W., Stribinskis, V. and Trent, J.O. (2020) Human POT1 unfolds G-quadruplexes by conformational selection. Nucleic Acids Res, 48, 4976-4991.
4. **Monsen, R.C.**, DeLeeuw, L., Dean, W.L., Gray, R.D., Sabo, T.M., Chakravarthy, S., Chaires, J.B. and Trent, J.O. (2020) The hTERT core promoter forms three parallel G-quadruplexes. Nucleic Acids Res, 48, 5720-5734.
5. **Monsen, R.C.**, Chakravarthy, S., Dean, W.L., Chaires, J.B. and Trent, J.O. (2021) The solution structures of higher-order human telomere G-quadruplex multimers. Nucleic Acids Res, 49, 1749-1768.

6. DeLeeuw, L.W., **Monsen, R.C**., Petrauskas, V., Gray, R.D., Baranauskiene, L., Matulis, D., Trent, J.O. and Chaires, J.B. (2021) POT1 stability and binding measured by fluorescence thermal shift assays. PLoS One, 16, e0245675.

PROFESSIONAL SERVICE

1. Reviewer for Nucleic Acids Research (NAR)
2. Reviewer for Biochimie

MEMBERSHIPS

1. **G4 Society** – Global community of nucleic acids researchers with the common goal of providing a framework in which the nucleic acids disciplines can collaborate and integrate ideas with a primary focus on G-quadruplex DNA (Since 2020)

ABSTRACTS AND PRESENTATIONS

2. Undergraduate Research Conference – Evansville, In (Fall, 2013)
   Poster Presentation: **Monsen, R. C.,** Collins, J. Capillary Electrophoretic Analysis of Actin Filaments of the Slime Mold *Stemonitis Flavogenita.*
3. AUC 2017 Conference – Glasgow, Scotland (Aug, 2017)
   Poster Presentation: **Robert C. Monsen**, Lynn Deleeuw, William L. Dean, Jonathan B. Chaires, John O. Trent. Elucidation of the hTERT Core Promoter G-Quadruplex as a Target for Telomerase Inhibition.
   Oral Presentation: **Robert C. Monsen**, Lynn Deleeuw, William L. Dean, Jonathan B. Chaires, John O. Trent. Elucidation of the hTERT Core Promoter G-Quadruplex as a Target for Telomerase Inhibition.
4. 1st Annual Commonwealth Computational Summit – Lexington, KY (Oct, 2017)
   Poster Presentation: **Robert C. Monsen**, Lynn Deleeuw, Jon Maguire, William L. Dean, Jonathan B. Chaires, John O. Trent. Structure-based Drug Discovery: Computational Virtual Screening.
5. Graduate Student Regional Research Conference – Louisville, KY (March, 2018)
   Poster Presentation: **Robert C. Monsen**, Lynn Deleeuw, Jon Maguire, William L. Dean, Jonathan B. Chaires, John O. Trent. The hTERT Core Promoter Sequence Forms Three Parallel G-quadruplexes.
6. 32nd Gibbs Biothermodynamics Conference – Carbondale, IL (Oct, 2018)
   Poster Presentation: **Robert C. Monsen**, Lynn Deleeuw, Jon Maguire, William L. Dean, Jonathan B. Chaires, John O. Trent. Structure-Based Design of Selective hTERT Promoter G-Quadruplex Ligands.
7. Research! Louisville – Louisville, KY (Oct, 2018)
   Poster Presentation: **Robert C. Monsen**, Lynn Deleeuw, Jon Maguire, William L. Dean, Jonathan B. Chaires, John O. Trent. Structure-Based Design of Selective hTERT Promoter G-Quadruplex Ligands.
8. 33rd Gibbs Biothermodynamics Conference – Carbondale, IL (Oct, 2019)
   Poster Presentation: **Robert C. Monsen**, Lynn Deleeuw, William L. Dean, Jonathan B. Chaires, John O. Trent. Biophysical Characterization of a Self-Organizing G-quadruplex in the hTERT Core Promoter.
9. UofL Biochemistry & Molecular Genetics Student Seminar series – Virtual (July, 2020)
   Oral Presentation: **Robert C. Monsen**. Small-angle X-ray Scattering and Flexible Molecular Modeling: A Brief Overview.

D. Research Support

Completed Funding

SIGS Research Fellowship from the University of Louisville 8/1/2016-8/1/2018 to support the first two years of research training for Robert Monsen B.S., M.S.

5R01GM077422-09 J. Trent (P.I.) 02/01/2007-04/30/2021
NIH/NIGMS
Title: Targeting Nucleic Acids with an Integrated Virtual and Actual Screen

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
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NAME: Jonathan B. Chaires

POSITION TITLE: Professor of Medicine and James Graham Brown Endowed Chair of Cancer Biophysics

eRA COMMONS USER NAME (credential, e.g., agency login): jbchai01

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of California at Santa Cruz	B.A.	06/1972	Biology
University of Connecticut, Storrs, CT	Ph. D.	06/1978	Biophysics
Yale University, New Haven, CT	Postdoctoral	12/1981	Biophysical Chemistry

A. Personal Statement

I have a 45 year career in biophysical studies of nucleic acids and their interactions. My undergraduate research at the University of California at Santa Cruz under the mentorship of Harry Noller first whetted my interest in nucleic acids. My undergraduate research thesis resulted in a seminal study that demonstrated a functional role for ribosomal RNA in 1972, well before the “RNA world” was as fashionable as it is now. Graduate training at the University of Connecticut with Gerson Kegeles provided me with an opportunity to learn and apply the methods of relaxation kinetics to solve problems in protein synthesis, in particular to explore the reaction mechanism that governs the association of bacterial ribosome subunits and the mechanism by which initiation factor 3 dissociates ribosomes. In addition, UConn was at that time the epicenter of analytical ultracentrifugation, so I received rigorous training in the theory and practical application of that method from David Yphantis and others. I trained at Yale University with Donald Crothers as an NIH Postdoctoral Fellow, who introduced me to the field of drug-DNA interactions, an area in which I have remained active throughout my career. My own laboratory has used biophysical and molecular biological approaches to thoroughly characterize the binding of the clinically important anthracycline antibiotics (daunorubicin, doxorubicin) to specific DNA sites. The fundamental information obtained in those studies allowed us to formulate design principles that led to the synthesis of a new class of bisintercalating anthracycline compounds with picomolar DNA binding affinity and enhanced sequence selectivity. We also designed and synthesized enantiomeric daunorubicin, a compound with novel structural recognition of left-handed DNA. My laboratory pioneered studies of the structural recognition of nucleic acids by small molecules, and has invented a competition dialysis for the discovery of small molecules that bind selectively to particular DNA conformations. Most recently, our interests turned to studies of four-stranded quadruplex DNA as a drug target. We have implemented a novel integrated screening platform that uses *in silico* methods to screen libraries of millions of small molecules for their selective recognition of particular nucleic acid structures, followed by rigorous *in vitro* validation of hits by high-throughput experimental tests. Our laboratory is among the world's best in the application and integration of thermodynamics into drug design and discovery.

Four relevant peer-reviewed publication highlights:

1. Chaires, J. B. (2008). "Calorimetry and thermodynamics in drug design." *Annual Reviews in Biophysics* **37**: 135-151. (over 200 citations)
2. Gray, R. D., Buscaglia, R. & Chaires, J. B. (2012). "Populated intermediates in the thermal unfolding of the human telomeric quadruplex." *Journal of the American Chemical Society* **134**(40): 16834-16844.
3. Gray, R. D., Trent, J. O. & Chaires, J. B.. (2014). "Folding and unfolding pathways of the human telomeric G-quadruplex." *Journal of Molecular Biology* **426**(8): 1629-1650.
4. Li, J., Correia, J. J., Wang, L., Trent, J. O. & Chaires, J. B.. (2005). "Not so crystal clear: the structure of the human telomere G-quadruplex in solution differs from that present in a crystal." *Nucleic Acids Research* **33**(14): 4649-4659.

B. Positions and Honors

Positions:

1979-1981 NIH Postdoctoral Fellow, Department of Chemistry, Yale University,
1982-1986 *Assistant Professor*, Department of Biochemistry, University of Mississippi Medical Center
1986-1990 *Tenured Associate Professor*, Department of Biochemistry, University of Mississippi Medical Center
1989-1990 *Visiting Scientist*, Department of Molecular Biology, Max Planck Institute for Biophysical Chemistry
1990-2004 *Professor*, Department of Biochemistry, University of Mississippi Medical Center, Jackson
2000-2004 *Professor*, Joint Appointment, Department of Chemistry, University of Mississippi, Oxford
2004- James Graham Brown Endowed Chair of Cancer Biophysics, University of Louisville, Louisville, KY
2004- *Professor* with tenure, Department of Medicine, University of Louisville, Louisville, KY
2005- *Director*, Biophysics Core Facility, James Graham Brown Cancer Center, Louisville, KY
2004- *Senior Scientist*, James Graham Brown Cancer Center, Louisville, KY
2004- *Professor* of Biochemistry & Molecular Biology (adjunct), University of Louisville. Louisville, KY

Service:

1991-92 Member, National Science Foundation Advisory Panel for the Biophysics Program
1997-2001, Chartered Reviewer, NIH, BBCA Molecular and Cellular Biophysics Study Section
2000 & 2003 Member, National Cancer Institute Program Project Grant Site Visit Team
2000 Member, Committee of Visitors to evaluate the Biomolecular Structure & Function and Biomolecular Processes Clusters, Division of Molecular and Cellular Biosciences, National Science Foundation
2004 Chairperson, NIH Bioengineering Research Partnership Review Panel ZRG1 BST-A(50)
2004, 2008, Member, Site Visit Team to Review Laboratory of Physical Biology, NICDH.
2005 *Ad hoc member*, NIH GGG-J(10) Genes, Genetics, Genomes Study Section,
2008, 2015 *Ad hoc member,* NIH S10 Shared Instrumentation Review Panel, ZRG1 BCMB-R 311,
2003-2009 Editorial Board, *Biophysical Journal*
2006-2012, Editorial Advisory Board, *Biophysical Chemistry*
200 -present, Editorial Advisory Board, *Current Medicinal Chemistry - Anticancer Agents*
2009-present, Associate Editor, *Biochimie*
2013-present, Editorial Board, *Expert Opinion on Drug Discovery;* Editorial Board*, METHODS*

Honors: 1968, *President's Scholar*, University of California; 1989-90 *Alexander von Humboldt Fellow*; 1996 *Basic Science Teacher Award*, University of Mississippi School of Dentistry; 2000, *Outstanding Chemist*, Mississippi Section of the American Chemical Society; 2006, *President*, Gibbs Society for Biothermodynamics; 2013, *James Graham Brown Cancer Center Scientist of the Year;* 2017, *Hugh M. Huffman Memorial Award for long-term contributions to thermodynamics involving calorimetry*

C. Contribution to Science

I have over 195 peer-reviewed publications and book chapters and have edited 4 books. My h-index is 67 and my work has been cited over 18,000 times (6,500 citations since 2013). I have dutifully served on numerous NIH and NSF review panels and study sections and on the editorial boards of several journals important in my field. I organized the first two international meetings (2007, 2009) on quadruplex DNA, a topic that has now blossomed into a vibrant multidisciplinary research area after having languished as a biophysical oddity for several decades.

1. I have made major contributions to the understanding of the thermodynamics of small molecule binding to DNA. I was an early adopter of calorimetry to study drug-DNA interactions, and was among the first to attempt to parse the binding free energy of drug binding into its component contributions. My laboratory was among the first to obtain accurate heat capacity changes for, and to measure hydration changes of, drug-DNA binding reactions. We attempted the first explicit correlation of structural and thermodynamics properties of drug-DNA complexes.

a. Chaires, J. B. (2006). "A thermodynamic signature for drug-DNA binding mode." *Archives of Biochemistry and Biophysics* 453(1): 26-31. (over 200 citations)
b. Haq, I., Ladbury, J. E., Chowdhry, B. Z., Jenkins, T. C. & Chaires, J. B.. (1997). "Specific binding of hoechst 33258 to the d(CGCAAATTTGCG)$_2$ duplex: calorimetric and spectroscopic studies." *Journal of Molecular Biology* 271(2): 244-257

c Qu, X. and J. B. Chaires (2001). "Hydration changes for DNA intercalation reactions." *Journal of the American Chemical Society* 123(1): 1-7.
d. Ren, J., Jenkins, T.C. &Chaires, J. B. (2000). "Energetics of DNA intercalation reactions." *Biochemistry* 39(29): 8439-8447.

2. My laboratory has provided the deepest characterization of the DNA binding of the clinically important anthracycline antibiotics. We defined the thermodynamic and kinetic landscapes for their binding, the structural and sequence specificity of their binding and have used this information to design new compounds with interesting properties. The two most important designs are for a series of *bisintercalating anthracyclines* with enhanced sequence selectivity and picomolar affinity for DNA and *enantiomeric daunorubicin* which shows structural selectivity for left-handed, Z DNA.

a. Chaires, J. B., Fox, K. R., Herrera, J. E.,Britt, M. & Waring, M. J.. (1987). "Site and sequence specificity of the daunomycin-DNA interaction." *Biochemistry* 26(25): 8227-8236.
b. Chaires, J. B., Leng, F., Przewloka, T., Fokt, I., Ling, Y. H., Perez-Soler, R. & Priebe, W.. (1997). "Structure-based design of a new bisintercalating anthracycline antibiotic." *Journal of Medicinal Chemistry* 40(3): 261-266.
c. Qu, X., Trent, J. O., Fokt, I., Priebe, W. & Chaires, J. B. (2000). "Allosteric, chiral-selective drug binding to DNA." *Proceedings of the National Academy of Sciences U S A* 97(22): 12032-12037.
d. Chaires, J. B. (1990). "Biophysical chemistry of the daunomycin-DNA interaction." *Biophysical Chemistry* 35(2-3): 191-202. (Review)

3. My laboratory pioneered quantitative studies of structural-selective binding of small molecules to DNA. We characterized DNA as an allosteric system in which ligand binding is coupled to conformational transitions in the nucleic acid. DNA is not an inert lattice for binding, but rather is a dynamic system with an ensemble of conformational forms. Most dramatic of these is left-handed Z DNA, but other more subtle helical forms also exist and strongly influence binding. Perhaps our major contribution in this area is the invention of a novel competition dialysis method for the quantitative measure of structural-selective binding. This tool has been adopted world-wide as a convenient, high-throughput means of definitively establishing structural-selective ligand binding to nucleic acids.

a. Ren, J. and J. B. Chaires (1999). "Sequence and structural selectivity of nucleic acid binding ligands." *Biochemistry* 38(49): 16067-16075. (500 citations)
b. Chaires, J. B. (1986). "Allosteric conversion of Z DNA to an intercalated right-handed conformation by daunomycin." *Journal of Biological Chemistry* **261**(19): 8899-8907.
c. Chaires, J. B. (2008). "Allostery: DNA does it, too." *ACS Chemical Biology* **3**(4): 207-209
d. Gray, R. D., Li, J. & Chaires, J. B.(2009). "Energetics and kinetics of a conformational switch in G-quadruplex DNA." *Journal of Physical Chemistry* B 113(9): 2676-2683.

4. My laboratory has been a major contributor to the development of G-quadruplex DNA as an interesting and functionally important genomic element. For decades quadruplex DNA was a biophysical oddity, but is now recognized to play important biological roles in the control of gene expression, the regulation of translation, telomere function and genetic recombination. I organized the first two international meetings on quadruplex DNA that brought a diverse community of scientists together for the first time, the first of which was featured as a cover story in *Chemical & Engineering News*. The meeting has continued and has grown to be the most important forum in the field, on par with Gordon Conferences. We have made significant fundamental contributions to the physical chemistry of G-quadruplex DNA.

a. Stu Borman COVER STORY: Ascent Of Quadruplexes - Nucleic acid structures become promising drug targets. *Chemical & Engineering News,* Volume 85 (Issue 22), Issue Date: May 28, 2007, pp. 12-17
b. Chaires, J. B. (2010). "Human telomeric G-quadruplex: thermodynamic and kinetic studies of telomeric quadruplex stability." *FEBS Journal* **277**(5): 1098-1106. (Review)
c. Chaires, J. B., Trent, J. O., Gray, R. D., Dean, W. L., Buscaglia, R., Thomas, S. D. & Miller, D. M. (2014). "An improved model for the hTERT promoter quadruplex." *PLoS One* **9**(12): e115580.
d. Lane, A. N, Chaires, J. B., Gray, R. D. & Trent, J. O. (2008). "Stability and kinetics of G-quadruplex structures." *Nucleic Acids Research* **36**(17): 5482-5515. (Review with over 300 citations)

5. Perhaps my most valuable contribution is my willingness to act as an irritant and challenge in print what I perceive to be misguided thinking or interpretations in published work. For example, the first generation chiral metal complexes from the Barton laboratory were touted as structural-selective intercalators. We challenged that view and showed that those *tris*-phenanthroline ruthenium compounds were neither intercalators nor did they have any significant structural selectivity. Our two papers on that topic have been cited over 1000 times each, and we hope served to establish more rigorous standards for the evaluation of subsequent generations of chiral metal complexes, many of which did indeed prove to have interesting molecular recognition features. The most cited paper in G-quadruplex research is one that reports a propeller-shaped parallel structure for human telomere DNA sequences determined by x-ray crystallography, and argues that that structure is the best target model for drug design efforts. Our research showed that the parallel structure is not the predominant conformation form in solution, and that the parallel structure forms only under the harsh conditions needed to form crystals or under extreme dehydrating conditions in solution. Our biophysical studies were quickly confirmed by NMR spectroscopists who discovered a novel hybrid form that appears to be a more physiologically relevant conformation. More recently, the quadruplex field was rife with claims that polyethylene glycols could affect unimolecular quadruplex conformation by "macromolecular crowding", and argued for the physiological relevance of particular quadruplex conformations over others based on those interpretations. We had pioneered studies of crowding and osmotic stress agents on nucleic acid stability, and knew the situation was not that easily explained. We showed that instead polyethylene glycols alter quadruplexes by a conformational selection process that features their physical binding to particular quadruplex forms. Polyethylene glycols are, thus, not good mimics for the crowded conditions in the cell, and the claims of "physiologically relevant" conformations based on their use are dubious.

a. Satyanarayana, S., Dabrowiak, J. C. & Chaires, J. B. (1992). "Neither delta- nor lambda-tris(phenanthroline)ruthenium(II) binds to DNA by classical intercalation." *Biochemistry* **31**(39): 9319-9324. (>1000 citations)
b. Satyanarayana, S., Dabrowiak, J. C. & Chaires, J. B. (1993). "Tris(phenanthroline)ruthenium(II) enantiomer interactions with DNA: mode and specificity of binding." *Biochemistry* **32**(10): 2573-2584 (>1000 citations)
c. Li, J., Correia, J. J., Wang, L., Trent, J. O. & Chaires, J. B.. (2005). "Not so crystal clear: the structure of the human telomere G-quadruplex in solution differs from that present in a crystal." *Nucleic Acids Research* **33**(14): 4649-4659. (300 citations)
d. Buscaglia, R., Miller, M. C., Dean, W. L., Gray, R. D., Lane, A. N., Trent, J. O. & Chaires, J. B. (2013). "Polyethylene glycol binding alters human telomere G-quadruplex structure by conformational selection." *Nucleic Acids Research* **41**(16): 7934-7946.
e. Spink, C. H. & J. B. Chaires (1999). "Effects of hydration, ion release, and excluded volume on the melting of triplex and duplex DNA." *Biochemistry* **38**(1): 496-508.

Published works in MyBibliograhpy:
http://www.ncbi.nlm.nih.gov/sites/myncbi/jonathan.chaires.1/bibliography/40458006/public/?sort=date&direction=ascending

D. Research Support

Ongoing Research Support:
RO1 GM077422 Chaires & Trent (coPI) 2/01/07 to 3/31/21
Targeting Nucleic Acids with an Integrated Virtual and Actual Screen
Development of an integrated high-throughput screening procedure for the discovery of compounds directed toward novel DNA targets. This application is a competitive renewal of this grant.
Role: co PI

U01 HL127518, Bates, Krentsel, Miller (Multi-PI) 4/1/15-3/31/18
NIH (REACH Award)
The ExCITE Program: Expediting Commercialization, Innovation, Translation, & Entrepreneurship
Role: Co-investigator

Completed Recent Research Support:

RO1 CA 35635 Chaires (PI) 03/01/84 to 12/31/15

Specificity of Intercalation Reactions

This project studied the thermodynamics of drug-DNA binding interactions and the energetic basis of structural- and sequence-selective binding to nucleic acids. It provided continuous support for my research for most of my career. I have not sought renewal so I can focus my full efforts on this current project (RO1 GM077422).

5P20RR018733 Miller, DM (PI) 07/08-06/13

Molecular Targets COBRE

Role: Co-investigator and Biophysics Core Director