

Melike Caglayan, Ph.D.

NIEHS/NIH, 111 T.W. Alexander Dr. RTP, NC 27709, US
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EDUCATION

Ph.D. in Molecular Biology – Bogazici University, Istanbul, Turkey	2010
M.Sc. in Molecular Biology – Bogazici University, Istanbul, Turkey	2005
B.Sc. in Biology – Istanbul University, Istanbul, Turkey	2001

RESEARCH EXPERIENCE

Research Fellow	Oct., 2016-present
Postdoctoral Fellow	2013-2016

National Institutes of Health (NIH)

National Institute of Environmental Health Sciences (NIEHS)

Genome Integrity and Structural Biology Laboratory (GISBL)

DNA Repair and Nucleic Acid Enzymology Laboratory, *Mentor: Samuel H. Wilson*

- Discovered DNA polymerase β 's new activity in lyase removal of 5'-adenylated-dRP group
- Demonstrated complementary role of DNA polymerase β in aprataxin deficiency
- Discovered DNA polymerase β oxidized nucleotide insertion-mediated ligation failure
- Demonstrated complementary roles of base excision repair enzymes in mitochondrial aprataxin deficiency

Visiting Fellow	Jan.-Nov., 2009
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Yale University

Department of Molecular Biophysics and Biochemistry

DNA Replication and Repair Laboratory, *Advisor: Catherine M. Joyce*

- Characterized temperature based accuracy of thermostable DNA polymerase enzyme

Research Assistant and Graduate Student	2002-2009
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Bogazici University

Department of Molecular Biology and Genetics

Biochemistry Laboratory, *Mentor: Nese Bilgin*

- Identified novel thermophilic *Geobacillus*-genus-specific bacterial species isolated from the geothermal regions of Anatolian hot springs in Turkey and registered the genes to NCBI GenBank Database
- Contributed to the understanding of genetic diversity and phylogenetic position of the bacterial strains isolated from geothermal regions of Turkey
- Characterized optimum reaction conditions for the novel thermostable DNA polymerase enzymes identified

GRANTSMANSHIP

NIH Pathway to Independence Award (K99/R00) 1K99-ES026191-01	Nov., 2015
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- Oxidant and environmental toxicant-induced effects compromise ligation in DNA repair

AWARDS AND HONORS

- Intramural Paper of the Month, NIEHS (Caglayan M. *et al.*, *Nuc. Acids Res.*) Sep., 2017
- NIH Intramural Research Program Paper, NIH Catalyst (Caglayan M. *et al.*, *Nature Commun.*) Mar., 2017
- Intramural Paper of the Month, NIEHS (Caglayan M. *et al.*, *Nature Commun.*) Jan., 2017
- 47th Environmental Mutagenesis and Genomics Society Meeting (Best Presentation Award) 2016
- Intramural Paper of the Month, NIEHS (Caglayan M. *et al.*, *Nuc. Acids Res.*) Feb., 2015
- Intramural Paper of the Month, NIEHS (Caglayan M. *et al.*, *Nat. Struct. Mol. Biol.*) May, 2014
- 5th US-EU Conference on Repair of Endogenous DNA Damage (Travel Award) 2014
- Postdoctoral Fellowship, The Scientific and Technological Research Council of Turkey 2013
- Visiting Fellow Award, The Scientific and Technological Research Council of Turkey 2010
- Visiting Fellow Award, Bogazici University Foundation 2009

INVITED TALKS

- 1st University of Florida Health Cancer Center Research Showcase Nov., 2017
- 48th Environmental Mutagenesis and Genomics Society Meeting, NC Sept., 2017
- 47th Environmental Mutagenesis and Genomics Society Meeting, MO Sept., 2016
- Gordon Research Seminar: Mammalian DNA Repair, CA Feb., 2015
- 5th US-EU Conference on Repair of Endogenous DNA Damage, NM Oct., 2014
- International Enzyme Engineering Symposium, Turkey Sept., 2008
- Federation of European Biochemical Societies Conference, Turkey Sept., 2007

INVITED PLATFORM PRESENTATIONS

- Gordon Research Conference: Frontiers of Mammalian Genomic Stability in Human Health Feb., 2017
- 14th Annual NIEHS Science Days, NC Nov., 2016
- NIH Research Festival, MD Sept., 2016
- Gordon Research Conference: DNA Damage, Mutation and Cancer, CA Mar., 2016
- NIEHS Genome Integrity and Structural Biology Laboratory Annual Retreat, NC Oct., 2015
- 46th Environmental Mutagenesis and Genomics Society Meeting, MO Sept., 2015
- ZING Conference: DNA Polymerases, Cambridge UK Sept., 2014
- Gordon Research Conference: DNA Damage, Mutation and Cancer, CA Mar., 2014
- NIEHS Laboratory of Structural Biology Annual Retreat, NC Sept., 2013
- XXIII. National Biochemistry Congress, Istanbul Turkey Apr., 2011

PEER REVIEWER SERVICE

- Journals: DNA Repair, Bio-Protocol, Turkish Journal of Biochemistry
- NIEHS Internal Reviewer
- Study Section Reviewer: University of North Carolina Research Opportunities Initiative

SERVICE OUTREACH

- NIEHS Summer of Discovery Judge 2016
- Gordon Research Conference: DNA Damage, Mutation and Cancer, Discussion Leader 2016
- NIEHS GISBL Annual Retreat, Trainees Action Committee, Co-chair 2015
- NIEHS Summer of Discovery Judge 2015
- EMBO Young Scientists Forum Turkey, Organizing Committee Member 2010

CONTINUING EDUCATION

- Scientist Teaching Science Pedagogy Course, NIH July, 2017
- Grant Writing, Duke University Continuing Studies Jan., 2016
- Writing from the Scientific Reader's Perspective, Duke University Continuing Studies Feb., 2016
- Write Winning NIH Grant Proposal, NIEHS Mar., 2016
- Scientific Project Management Training Course, NIH Apr., 2016
- Research Mentor Training Course, NIEHS July, 2016

TEACHING EXPERIENCE

Instructor 2011-2012

Koc University, Istanbul, Turkey

Department of Molecular Biology and Genetics

- Created course syllabus, developed course content for the undergraduate Biochemistry, Cell and Molecular Biology classes
- Used model construction to aid concept building and small discussion groups to foster inquiry and problem solving-based learning
- Instructed undergraduate students to actively participate in scientific discussions, outside assignments and research projects
- Trained Teaching Assistants, and collaborated with Professors for any teaching issues and other academic issues

Teaching Assistant 2005-2010

Bogazici University, Istanbul, Turkey

Department of Molecular Biology and Genetics

- Developed and lead lecture and laboratory classes: 'Practical Applications in Molecular Biology' and 'Practical Applications in Biochemical Techniques' for undergraduate students. Course Schedule/Class Size: 3 hours a week for 30 students
- Prepared and graded quizzes, examinations, and laboratory activity datasheets
- Worked directly with students to answer questions and provide scientific guidance
- Supervised laboratory organization, equipment, and safe laboratory techniques
- Assisted in preparation of syllabus, course content and instruction materials

MENTORING EXPERIENCE

Student Research Mentor 2006-2008

M.Sc. students in Bogazici University, Department of Molecular Biology and Genetics

- Taught gene cloning, expression and protein purification techniques
- Discussed and evaluated the data, and reviewed current literature
- Helped in preparation of posters and served as co-author at their presentations in XXIII. National Biochemistry Congress

PROFESSIONAL AND VOLUNTEER SOCIETY MEMBERSHIPS

- Turkish American Scientists and Scholars Association
- Environmental Mutagenesis and Genomics Society
- The Aziz & Gwen Sancar Foundation Carolina Turkish House
- American-Turkish Association ATA-NC Turkish School
- SAFE Haven Cat Shelter, NC

PUBLICATIONS

- 1) **Caglayan M.** and Wilson S.H. Pol μ dGTP mismatch insertion opposite T coupled with ligation reveals a promutagenic DNA intermediate during double strand break repair. *Nature Communications* (2018) – in press
- 2) Horton J.K., Stefanick D.F., **Caglayan M.**, Zhao M.L., Gassman N.R., Wilson S.H. XRCC1 phosphorylation affects aprataxin recruitment and DNA deadenylation activity. *DNA Repair* (2018) – 64: 26 – 33.
- 3) Prasad R., **Caglayan M.**, Da-Peng D., Nadalutti C.A., Gassman N.R., Zhao M., Stefanick D.F., Horton J.K., Krasich R., Longley M.J., Copeland W.C., Griffith J.D., Wilson S.H. DNA polymerase β : The missing link of the base excision repair machinery in mammalian mitochondria. *DNA Repair* (2017) 60: 77 – 88.
- 4) **Caglayan M.**, Prasad R., Krasich R., Longley M.J., Kadoda K., Tsuda M., Sasanuma H., Takeda S., Tano K., Copeland W.C., Wilson S.H. Complementation of aprataxin deficiency by base excision repair enzymes in mitochondrial extracts. *Nucleic Acids Research* (2017) 17: 10079 – 10088. *NIEHS Paper of the Month
- 5) **Caglayan M.**, Wilson S.H. Role of DNA polymerase β oxidized nucleotide insertion in DNA ligation failure. *Journal of Radiation Research - Review article* (2017) 1093: 1 – 5.
- 6) **Caglayan M.**, Horton J.K., Da-Peng D., Stefanick D.F., Wilson S.H. Oxidized nucleotide insertion by pol β confounds ligation during base excision repair. *Nature Communications* (2017) 8: 14045. *NIEHS Paper of the Month; *NIH Intramural Research Paper
- 7) Sassa A., **Caglayan M.**, Rodriguez Y., Beard W.A., Wilson S.H., Nohmi T., Honma M., Yasui M. Impact of ribonucleotide backbone on translesion synthesis and repair of 7,8-Dihydro-8-oxoguanine. *Journal of Biological Chemistry* (2016) 291: 24314 – 24323.
- 8) **Caglayan M.**, Wilson S.H. Oxidant and environmental toxicant-induced effects compromise DNA ligation during base excision DNA repair. *DNA Repair - Review article* (2015) 35: 85 – 89.
- 9) **Caglayan M.**, Horton J.K., Prasad R., Wilson S.H. Complementation of aprataxin deficiency by base excision repair enzymes. *Nucleic Acids Research* (2015) 43: 2271 – 2281. *NIEHS Paper of the Month
- 10) **Caglayan M.**, Batra V.K., Sassa A., Prasad R., Wilson S.H. Role of polymerase β in complementing aprataxin deficiency during abasic-site base excision repair. *Nature Structural and Molecular Biology* (2014) 21: 497 – 499. *NIEHS Paper of the Month
- 11) Sassa A., **Caglayan M.**, Dyrkheeva N.S., Beard W.A., Wilson S.H. Base excision repair of tandem modifications in a methylated CpG dinucleotide. *Journal of Biological Chemistry* (2014) 289: 13996 – 4008.
- 12) **Caglayan M.**, Bilgin N. Temperature dependence of accuracy of DNA polymerase I from *Geobacillus anatolicus*. *Biochimie* (2012) 94: 1968 – 1973.
- 13) **Caglayan M.**, Bilgin N. Cloning and sequence analysis of novel DNA polymerases from thermophilic *Geobacillus* species isolated from Hot Springs in Turkey: Characterization of DNA polymerase I from *Geobacillus kaue* strain NB. *Applied Biochemistry and Biotechnology* (2011) 165: 1188 – 1200.

REFERENCES

Samuel H. Wilson, M.D., Ph.D.

Current postdoctoral mentor

NIEHS

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William C. Copeland, Ph.D.

Chief of the Genome Integrity and Structural Biology Laboratory & Collaborator

NIEHS

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Nese Bilgin, Ph.D.

Ph.D. and M.Sc. mentor

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Kuyas Bugra, Ph.D.

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