Mustafa Ozgul, M.D.

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Professional Summary

Translational scientist and physician with 13+ years of research experience, including 5+ years of biomarker discovery and 2+ years of hands-on AI/ML development across ophthalmology research. Developed blood-based disease prediction platforms integrating cutting-edge mass spectrometry biomarker discovery with machine learning classification (XGBoost, Random Forest, neural networks), achieving >95% accuracy in clinical studies. Discovered novel native peptide-based inflammation and immune-related biomarkers with significant differential expression ($p<0.005$, fold change >10) in wet AMD patient populations. Experienced in small biotech environments, regulatory pathway analysis (FDA, CLIA), and translating research into clinical applications. Eager to apply AI-driven biomarker expertise to advance next-generation therapeutics development.

Professional Experience & Employment

Founder & Lead Scientist **January 2025 – Present**

A1 Diagnosis (Pre-seed), Irvine, California

- Developed first blood-based AI platform for AMD risk assessment, analyzing 5,000+ plasma molecules with attomole sensitivity for 20M+ at-risk patients.
- Discovered native peptide fragments from 18 inflammation and immune-related proteins (including Thymosin Beta-4, PDLIM1, LAT, FERMT3) with significant differential expression ($p<0.005$, fold change >10) between healthy subjects and wet AMD patients, revealing novel I&I biomarkers for disease prediction.
- Performed systematic evaluation of ML models; achieved 100% Leave-One-Out CV accuracy and 98.2% bootstrap test accuracy (95% CI: 0.80–1.00) with no overfitting across 1000 bootstrap iterations.
- Deployed production-ready Streamlit platform integrating XGBoost model with 8-level risk stratification, interactive visualizations.
- Led regulatory pathway analysis (FDA, CLIA) to establish clinical validation strategies and market entry pathways.
- Presented at AI in Healthcare Conference at Stanford University.

Data Scientist **July 2024 – Jan 2025**

Goldberg Med GmbH – (Remote), Wurselen, Germany

Led a cross-functional data science team to perform systematic evaluation of all possible machine learning models to identify optimal algorithms for colorectal cancer prediction using advanced Gaita (stool) and Serum sample analysis with clinical confirmation. Through comprehensive model comparison, we selected dual XGBoost models as the best-performing approach. I implemented feature engineering with 10-11 biomarkers including SDC2, SEPTIN9, TFPI2, and SFRP2 to achieve 87-88% sensitivity and 84% specificity.

Developed a risk assessment platform with comprehensive interface, interactive visualizations, and clinical-grade risk stratification. This platform receives clinical data in Excel format, analyzes it using machine learning models, and provides risk assessment results. I applied SHAP interpretability analysis and advanced statistical modeling for clinical decision support and model validation.

Assistant Project Scientist III **2018 Sep – 2024 June**

Gavin Herbert Eye Institute, School of Medicine, University of California Irvine

Discovery Eye Foundation

My research project focused on identifying therapeutic agents and potential biomarkers for age-related macular degeneration (AMD). Our innovative approach involves comprehensive scans of native peptides and their oxidation, deamidation, phosphorylation and degradation products. We utilize data independent acquisition (DIA) for full scans using EvoSep Ultra-HPLC – timsTOF Pro 2 mass spectrometry and Peaks ® Studio Pro software. This helps uncover new insights into AMD pathogenesis, potentially identify novel therapeutics peptides and biomarkers. Using EvoSep Ultra-HPLC – timsTOF Pro 2, we have discovered native peptides along with their oxidation, amidation, phosphorylation and degradation products in a single plasma sample.

This research has three primary objectives. First, we aim to identify and correlate native peptides and their products in blood plasma samples with the clinical severity of AMD. Second, identifying biomarkers for the various stages of AMD using machine learning algorithm. Third, we will evaluate the therapeutic properties of the native peptides of interest on human retinal cell cultures. If successful, this study could lead to the development of a bio-inspired treatment model for the dry form of AMD, which currently lacks effective treatments. Moreover, identifying biomarkers for the various stages of AMD could have implications for early detection, screening and monitoring of the disease, as well as potential applications in other age-related disorders such as Alzheimer's disease.

I am honored to have received the 2023 Discovery Center for Eye Research Bridge-funding Support (DCER). This funding enables us to pursue these promising avenues of investigation and work towards improving the lives of those affected by AMD and related conditions.

In addition to identifying potential biomarkers, I am focused on identification of potential therapeutics using nanoparticle technology for the treatment of various eye diseases, specifically age-related macular degeneration. This work includes developing unique and innovative delivery systems of medication to test Humanin-G peptides loaded nanoparticles/microspheres to rescue retinal cells and to maintain visual acuity in AMD patients. Additional research has produced advanced knowledge on how to maintain the integrity of a Humanin-G peptide for several weeks. Our results show that six weeks after administration, stabilized Humanin-G loaded microspheres slow the retinal degeneration on RCS rats This research was supported by National Eye Institute (5R01EY027363-03).

Our research investigated the stability and degradation patterns of Humanin-G (HNG), a more potent analog of the mitochondrial-derived peptide Humanin. Using HPLC and high-resolution mass spectrometry, we monitored HNG solutions at different temperatures (4°C and 37°C) in aqueous solutions and stabilizing formulations in both short-term and long-term. We quantified the decrease in full-length HNG and the emergence of oxidized species, dimers, and other degradation products when incubated at both temperatures. Our results emphasized the importance of appropriate formulation and storage conditions for maintaining HNG stability and provided insights into its oxidation and degradation pathways. These findings, which we successfully published, will guide future therapeutic development of this promising cytoprotective peptide.

Mentor **2021 May – 2024 June**

I advised and instructed medical school students Sylvana Marquina and Kenneth Robertson-Brown to write review paper entitled ‘’ A Review on PLGA particles as a Sustained Drug-delivery System and its Effect on the Retina.’’ Our review paper was received invitation and published by esteemed Experimental Eye Research.

Consultant **2017 Nov – 2018 Sep**

Integrated Medical Sensor Inc, Orange County, California

I was responsible for preparing protocols and experimental designs on different types of nanocoatings and hydrogels of the world`s smallest implantable continuous glucose sensor. Specifically, we seek to minimize foreign body response and improve long-term performance of real-time glucose monitoring in experimental animal studies. Each step of the protocols is analyzed, and designs modified based on results from in vitro and in vivo experiments.

Visiting Scholar / Researcher **2017 Oct – 2018 Aug**

Department of Physics, California State Polytechnic University Pomona, California

My research focused on development of a system of label-free optical fiber immunosensors to detect levels of specific proteins in different concentrations and antigen-antibody binding kinetics in liquid using an optical spectrum analyzer. I routinely immobilized target specific antibodies on the surface of tapered optical fibers using bioconjugation techniques to functionalize the optical fibers and detect molecular interaction kinetics. Our findings were accepted for presentation at the AAAS conference in June 12-15, 2018 in Pomona, California.

Postdoctoral Fellow **2016 Oct – 2017 Oct**

Department of Cancer Biology, City of Hope National Medical Center, Los Angeles, California

I worked to understand prostate cancer mechanisms in mice models, utilizing hematoxyline and eosine staining, immunohistochemistry staining, immunofluorescence staining as well as handling genetically engineered mice, survival mice surgery and genotype analysis using PCR, among others.

Mentor **2016 June – 2016 Aug**

The Materials Connection Research Experience for Undergraduate Studies, *University of California -Riverside*

I advised and instructed graduate, on weekly basis, regarding production and characterization of anticancer drug-loaded nanoparticles. This was part of research that received NSF award number **#1359136**

Visiting Scholar / Researcher **2015 June – 2016 Oct**

Department of Bioengineering, University of California, Riverside, California

My research focused on the design of unique nanostructures for highly efficient targeted drug delivery applications in the biomaterials and nanomedicine lab. I routinely produced different types of drug-loaded nanoparticles by self-assembly techniques and characterized them through transmission electron microscopy. The primary goal of my research at UCR was to develop novel drug systems with lower cytotoxicity that could be combined with imaging and ablation technologies to improve tumor regression while preserving healthy tissues during treatment. I co-wrote NIH R21 grant proposal with my professor.

Research Assistant **2013 Aug – 2016 Aug**

Department of Anatomy, School of Medicine, Namik Kemal University, Tekirdag, Turkiye

I produced different types of anticancer drug-loaded nanomicelles and nanospheres that were non-functionalized with biocompatible and biodegradable properties. I filed a patent about multi-functionalized anticancer drug-loaded nanomicelles (WIPO Publication No: WO 016/167730 A1).

Teaching Assistant **2013 Sept – 2015 May**

Department of Anatomy, School of Medicine, Namik Kemal University, Tekirdag, Turkiye

My responsibilities included regular review of the anatomy knowledge of graduate health science students prior to their instructing first- and second-year medical students. I also taught anatomy to these groups.

Research Assistant **2012 May – 2013 July**

Department of Histology and Embryology, School of Medicine, Istanbul Medeniyet University, Turkiye

I co-authored, with my supervising professor, research reports for publication. I wrote grant proposals for research, reviewed and followed-up applications after submission.

Machine Learning & Computational Biology

- Predicted 3D molecular structures of therapeutic peptides (Humanin-G, SHLP1-6) using AlphaFold-2 and UCSF Chimera to guide AMD drug formulation design.
- Analyzed peptide stability, hydropathicity (GRAVY), isoelectric point, and enzymatic cleavage sites using ExPASy ProtParam and PeptideCutter to optimize therapeutic peptide development.
- Implemented and optimized 14 ML algorithms — tree-based (Random Forest, XGBoost, Gradient Boosting, Extra Trees), regularized linear (Logistic Regression, Ridge, LASSO, Elastic Net), probabilistic (SVM, KNN, Naive Bayes), neural networks (DNN), and ensemble methods (Voting, Stacking) — to classify AMD patients from healthy subjects using plasma biomarker profiles.
- Applied hyperparameter optimization (Grid Search, Random Search, Bayesian Optimization, Optuna) with rigorous cross-validation (K-fold, Stratified K-fold, Leave-One-Out) and Bootstrap validation (1000 iterations) to maximize model performance and quantify prediction uncertainty.
- Applied SHAP interpretability analysis to identify key plasma biomarkers driving AMD risk prediction.

Statistical Analysis and Data Visualization

- Developed automated statistical analysis pipelines that select appropriate tests (Student's t-test, Welch's t-test, Mann-Whitney U, Kruskal-Wallis H, ANOVA) based on normality (Shapiro-Wilk) and variance homogeneity (Levene's test) for rigorous clinical data analysis.
- Applied Generalized Additive Models (GAM) to adjust for confounding variables and isolate treatment effects from baseline patient characteristics in clinical outcomes research (Nature Scientific Reports 2025). Performed comprehensive power analysis calculating

effect sizes (Cohen's d), required sample sizes for 80/90/95% power, and post-hoc tests (Tukey's HSD) for multi-group clinical studies.

- Created publication-quality figures (300-600 DPI) with automated significance annotations, trend curves, and error bars using matplotlib, seaborn, and pandas for peer-reviewed journals.
- Built end-to-end analysis pipelines generating descriptive statistics, pairwise comparisons, and publication-ready Methods/Results text for clinical manuscripts.

Mass Spectrometry Based Laboratory Skills

- Using EvoSep Ultra-HPLC – timsTOF Pro 2 and Peaks ® Studio Pro software to identify amino acid sequences of native peptides and their posttranslational modifications (oxidation, amidation, phosphorylation etc.) and degradation products in human blood plasma samples. Our experience along with this method allow us to determine potential biomarkers and therapeutic peptides in plasma samples.
- Using High Resolution Mass Spectrometry (Waters® Xevo® G2-XS Qtof) coupled to Ultra Performance Liquid Chromatography, MassLynx (UPLC-HRMS) and BiopharmaLynx softwares to determine molecular weights, charges, b/y ions, intensity and identify amino acid sequences of intact peptides and their oxidation, dimerization and degradation products in LC-MS grade water and in phosphate buffer saline and stabilization formula solutions.
- UPLC-HRMS, mzMINE 3 software and MS-DIAL database to determine molecular weights, charges, b/y ions, intensity and identify small molecules in human blood plasma samples.
- Using Waters® Micromass® Quattro micro™ API (Triple-quadrupole mass spectrometry) coupled to UPLC system to analyze encapsulation efficiency of Humanin-G peptides in PLGA particles
- Using Matrix Assisted Laser Desorption Ionization-Time of Flight Mass Spectrometry (MALDI-TOF/TOF, AB SCIEX TOF/TOF™ 5800) to observe and intact peptides and their fragments
- Using High Performance Liquid Chromatography (HPLC, Agilent® 1200) to analyze purity and stability of peptides

Molecular Biology Based Laboratory Skills

- Analyzing PCR for genotyping of genetically engineered mice
- Preparing tissues for histopathological analysis;

  Fixation, Dehydration, Clearing, Embedding, Microtome Sectioning, Staining (please see the details below)
- Performing immunohistochemistry (IHC) staining

  Androgen receptor, beta-catenin, cytokeratin-5, cytokeratin-8, p63, ecadherin, synaptophysin phosphorylated mouse c-met, etc.
- Performing immunofluorescence (IF) staining

  Androgen receptor, beta-catenin, cytokeratin-5, cytokeratin-8, p63, ecadherin, etc.
- Troubleshooting/optimizing new primary antibodies for IHC and IF stainings
- Performing hematoxylin eosin staining
- Preparing tissues for cryostat sectioning
- Cryostat sectioning such as urogenital sinus in embryonic mice and prostate in adult mice
- 0.03% H_2O_2 preparation for Immunohistochemistry (IHC) staining
- Citrate Buffer pH 6.0 preparation for IHC staining and IF staining
- Preparing Phosphate Buffer Solution, tamoxifen solution, %30 Sucrose solution etc.
- MTT assay for cell culture study

Laboratory Animal-Based Skills

- Administrate subconjunctival injections
- Dissect the eye cups in Royal College Surgeon (RCS) rat model
- Extract retinal cells and neuroretina from the eye cup
- Prepare and embed posterior eye cup in optimal cutting temperature (O.C.T) compound for histology analysis.
- Handling experimental animals such as genetically engineered mice (p53 deleted mice, mutant beta-catenin mice, etc) and Wistar Albino, Sprague Dawley rats, etc.
- Generate prostate cancer models in genetically engineered mice
- Maintain and generate genetically engineered mice colonies
- Tattoo toes of pups of genetically engineered mice
- Collect tail samples from pups and prepare them for polymerase chain reaction (PCR) analysis
- Wean litters, select goal mice and ideal mating pairs based on PCR results
- Preparing projections and next generation mating strategies to reach ideal numbers of goal mice in optimum time.
- ***Surgery of genetically engineered mice:*** pellet insertion (testosterone pellet)
- ***Surgery of genetically engineered mice:*** castration
- Maintain post-operative and follow-up observations of mice
- Using an autoclave to sterilize surgical tools for animal surgery
- Euthanize/Sacrifice mice and collect organs for histopathology experiments
- Injecting drugs intraperitoneally or delivering orally to rats.
- Generate experimental model for studying skin burns in rats

Material Science Based Laboratory Skills

- Routinely prepared and characterized:

  PLGA microspheres and nanospheres

  Humanin-G loaded PLGA microspheres/nanospheres

  Cisplatin loaded PLGA microspheres/nanospheres

  Paclitaxel loaded PLGA nanospheres

  Paclitaxel loaded PLGA coated iron oxide nanospheres

  Thymoquinone loaded nano-sized micelles

  Curcumin loaded nano-sized micelles

  - ✓ For the last two see patent (WIPO Publication No: WO 016/167730 A1) for details
  - ✓ *The above nanoparticles have biodegradable and biocompatible properties*
- Using vacuum rotary evaporator
- Characterizing standard biochemical methods using UV/Vis spectroscopy
- Developing and/or modifying the experimental research protocols
- Routinely read, comprehend, and interpret technical texts, drawings and charts

Electron Microscopy Skills

- I have extensive experience using a transmission electron microscope (FEI Tecnai12) and scanning electron microscopy (Quanta 3D Dual Beam/Focus Ion Beam)

- Preparing samples with uranyl acetate staining for transmission electron microscopy

  Analyzing nanoparticle sizes in electron microscopy images using Image J and SPSS
- Preparing samples and coating them with Pt/Pd for observation using a scanning electron microscope
- Analyzing morphology of nanoparticles using transmission and scanning electron microscopes
- Cutting PLGA microspheres using Focus Ion Beam technology to observe internal structure of the microspheres

Nanoparticles Size Assessment

- Using Dynamic Light Scattering techniques and Nanoparticle Tracking Analyzer (Nanosight 3000) to determine presence and size of nanoparticles

Computer Based Program Skills

AlfaFold3 and Google Research Colaboratory

- Routinely generate highly accurate predicted three-dimensional peptide and protein structures.

Rstudio *Software*

- Experience with R programming language for statistical data analysis and generate various graphs including volcano plots, bar graphs for grant applications, review articles and original-research articles

BioRender *Online Tool*

- Generate various figures for our grant applications, review articles and original-research articles.

MassLynx *Software*

- Analyze raw data from Ultra-Performance Liquid Chromatography coupled to High Resolution Mass Spectrometry to generate graphs.

BiopharmaLynx *Bioinformatic Software*

- Determine mass to charge ratios, retention times, b/y ions, intensities and amino acid sequences of intact and degraded peptides using raw data from Ultra-Performance Liquid Chromatography coupled to High Resolution Mass Spectrometry.

GraphPad Prism software & ***SPSS*** software

- Standard Deviation
- Nested t test
- Analysis of variance (ANOVA)
- Unpaired and Paired T-test
- *p* Values (level of significance)
- *Mann-Whitney U test*
- *Normality distribution analysis using Shapiro-wilk test, Anderson-darling test and Kolmogrov-Smirnov test*

NCBI Basic Local Alignment Search Tool

- Identify sequence similarity of peptides and proteins among various species. This powerful tool allows us to find conserved sequences of the peptides and proteins. The conserved sequences have potential similar functions in various species.

Image J *Software*

The ExPASy ProtParam Bioinformatics Tool

- Structural prediction including instability index value, grand average of hydropathy value (GRAVY), theoretical isoelectric point (pI) in the certain peptides

The ExPASy PeptideCutter Bioinformatics Tool

- Prediction of potential cleave sites, cleaving enzymes, and chemicals in the certain peptides

Microsoft Office Programs (Word, Excel, PowerPoint, Outlook)

Microsoft Office Online Programs (Word, Excel, PowerPoint, Outlook)

Google Office Programs (Docs, Sheets, Slides etc.)

Training Courses and Certifications

- *CO_2 Critical Point Dryer,* February 2023, University of California, Irvine, CA, USA
- *The Agilent 1200 Series Gradient system, August 2022,* Kiser Lab, University of California, Irvine, CA, USA
- *JEOL JEM-2800 Transmission Electron Microscopy*, May 2022, University of California, Irvine, CA, USA
- *Collaborative Institutional Training Initiative (Citi Program),* June 2021, University of California, Irvine, CA, USA

  Introduction to Post-Procedure Care of Mice and Rats in Research: Minimizing Pain and Distress (ID: 1868) Investigator Responsibility (ID: 1869)

  Minimizing Sources of Nonexperimental Variation (ID: 1870)

  Systematically Monitoring for Pain and Distress (ID: 1871)

  Detecting Clinical Signs of Pain and Distress (ID: 1872) Appearance and Behavior (ID: 1873)

  Physical Exam for Clinical Condition (ID: 1874)

  Body Weight (ID: 1875)

  Fluid and Electrolyte Balance (ID: 1876)

  Body Temperature (ID: 1877)

  Tumors (ID: 1878)

  Alleviation of Pain and Distress (ID: 1879) Documentation of Post-Procedure Care (ID: 1880) Summary (ID: 1881)

  References (ID: 1882)
- *Leica Sputter Coating ACE 600, March 2020,* University of California, Irvine, CA, USA

  5 nm size iridium coating on nanoparticles and microspheres
- *FEI Magellan 400 XHR Extreme High Resolution Scanning Electron Microscopy, Feb 2020,* University of California, Irvine, CA, USA
- *Waters® MassLynx and BiopharmaLynx softwares*, Mass Spectrometry Facility, University of California, Irvine, CA, USA
- *Waters® Micromass® Quattro micro™ API (Triple-quadrupole mass spectrometry) coupled to Liquid Chromatography system*,
- *Ultra-performance liquid chromatography coupled with high-resolution mass spectrometry (Waters® Xevo G2-XS QTof),* Mass Spectrometry Facility, University of California, Irvine, CA, USA
- *Matrix Assisted Laser Desorption Ionization-Time of Flight Mass Spectrometry (MALDI-TOF/TOF, AB SCIEX TOF/TOF™ 5800), Mass Spectrometry Facility, University of California, Irvine, CA, USA*
- *Leica Sputter Coating ACE 200, October 2019,* University of California, Irvine, CA, USA

  5 nm size platinum and palladium coating on nanoparticles and microspheres
- *JEOL JEM-2100 Transmission Electron Microscopy*, July 2019, University of California, Irvine, CA, USA

- *FEI Quanta 3D FEG Dual Beam Scanning Electron Microscopy with Focus Ion Beam technology,* July 2019, University of California, Irvine, CA, USA
- *Animal Care and Use Program*, October 2016, City of Hope at Duarte, CA, USA

  Rodent Survival Surgery

  Anesthesia & Aseptic Techniques

  Handling, Restraint & Biomethodology
- *Sample Preparation and Uranyl Acetate Staining for Transmission Electron Microscopy*, August 2016, University of California Riverside, CA, USA
- *Tecnia 12 FEI Transmission Electron Microscopy*, May 2016, University of California, Riverside, California, USA
- *Laboratory Safety Orientation (Fundamentals), Fume Hood Safety, Hazard Communication, Bloodborne Pathogens, Biosafety, Laser Safety, Fire Extinguishers, Hazardous Waste Management*, July 2015, University of California at Riverside, CA, USA
- *Applications of RNAi and miRNA Analysis Methods*, June 2014, Biotechnology Institute, Ankara University, Ankara, Turkiye
- *Basic Proteomics Strategie*s, June 2014, Biotechnology Institute, Ankara University, Ankara, Turkiye
- *Process MR images of brain in Stereology and Segmentation Methods*, May 2014, 12th National Neuroscience Congress, Istanbul, Turkiye
- *Project Preparation via Logical Framework Approach*, May 2014, Tekirdag, Turkiye
- *Confocal Microscopy Techniques, Application and Developing Technologies*, September 2013, Ankara, Turkiye
- *Microscopy, Imaging and Stereology Course*, January 2012, Ankara, Turkiye
- *Experimental Animal User's Certificate*, 2011, Trakya University, Edirne, Turkiye
- *Trakya University Faculty of Medicine Experimental Animals Basic Applications Course*, May 2011, Edirne, Turkiye
- *DNA Damage, DNA Repair and Proteomics,* October 2014 Dokuz Eylul University, Izmir, Turkiye

Patent Application

- Identifications Potential Biomarkers and Therapeutics Peptides for Age-Related Macular Degeneration. **Ozgul M.** Submitted to UCI Beall Applied Innovation, UC Case number 2024-9AI, UCI Licensing Officer: Patricia Chan, Ph.D.)
- Stable Liquid Formulation of Humanin-G. **Ozgul M.,** Kenney M. K., Nesburn A. B. (Submitted to UCI Beall Applied Innovation, Research Translation Group, Patent Submission UC Case number 2021-759, UCI Licensing Officer: Casie Kelly, Ph.D.)
- Multi-functionalized Anticancer Drug-Loaded Sterically Stabilized Nanomicelles. Filed April 2015, WIPO publication number: WO2016167730 A1 (Ozen O.A., **Ozgul M.,** Aydin M.)

Awards

- Identification of Potential Biomarkers for Age-Related Macular Degeneration. (*Discovery Center for Eye Research Bridge-Funding Support, DCER, 2023)*
- Development of Stable Liquid Formulation of Humanin-G Peptide. (*Discovery Eye Foundation 2020)*

Grants

Identification of Potential Biomarker and Therapeutic Peptides for Age-related Macular Degeneration *(Discovery Center for Eye Research Bridge-Funding Support*

Age-related macular degeneration (AMD) is a leading cause of irreversible vision impairment in the center of visual field among older adults in developed countries. There are currently no FDA-approved biomarkers to predict, screen or diagnose AMD using plasma samples. Early detection and treatment of AMD help slow or prevent progression of vision loss and improve visual outcome. Therefore, there is a critical need for reliable plasma biomarkers for screening and early detection of AMD.

Successful completion of this proposal will demonstrate the translational nature of our study, which contributes to identifying novel native peptides profiles for AMD to be used as early diagnostic and screening tools. Earlier diagnosis and treatment may lead to better prognoses for patients and lower healthcare expenses. This will ensure that our work is impactful and makes a significant difference in the field of AMD.

Development of Long Acting-Release Formulation of Humanin-G *(Discovery Eye Foundation)*

Age-related Macular Degeneration (AMD) is a leading cause of elderly vision loss. The population of those afflicted continues to increase. Dry AMD affects approximately 85-90% of patients with AMD. Our proposal, in this project, is to produce polymeric nanospheres/microspheres as the encapsulating technology, allowing for long-acting release of the Humanin-G for a more effective treatment of AMD cybrid cultures. The ultimate outcome of this project would be the effective treatment of dry AMD through this innovative technique, allowing treatment of a condition that, until now, has had no effective resolution.

Investigation of the Anticancer Effects of Active Targeted Multi-drug-loaded Cell-based Nanoparticles on Triple Negative Breast Cancer Cell Lines (Turkiye-US collaboration project)

Our research aimed to overcome the inadequacies of targeting triple negative breast cancer cells and reduce the exposure to off-target organs by conventional chemotherapies.

Investigation of the Cytotoxic Effect of Thymoquinone on Healthy Epithelial Cell Lines**, Project Number: NKUBAP.00.20.AR.14.20 (Completed, 04 February 2015)**

Our major project goal was to investigate the cytotoxic effects of thymoquinone against MCF-10A (human mammary epithelial cell line and has non-cancerous breast cell characteristics) and L929 cell line (fibroblast, mus musculus) in time-dependent manner and dosage-dependent manner.

Presentations Given

Neuroprotective Effect of Intraperitoneal Humanin-G in Retinal Degeneration of Royal College of Surgeons Rats. Salt Lake City, Utah, May 4-8, 2025.

Identification of Native Peptide-Based Potential Biomarkers in Plasma for Age-related Macular Degeneration. The Vision Research Mixer. *Irvine, California, May 15, 2024.*

Analysis of HNF14 peptide using Basic Local Alignment Search Tool and UPLC-HRMS. The Association for Research in Vision and Ophthalmology (*ARVO) 2024. Seattle, Washington. May 5-9, 2024.*

Bioinformatic Analysis of Small Humanin Like Peptides using AlfaFold-2 and Expasy ProtParam. The Association for Research in Vision and Ophthalmology (*ARVO) 2024. Seattle, Washington. May 5-9, 2024.*

Humanin-G`s Protective Effect on Retinal Degeneration in RCS rats. The Association for Research in Vision and Ophthalmology (*ARVO) 2024. Seattle, Washington. May 5-9, 2024.*

Stability Determination of HNF14 in H2O and PBS Using High Resolution Mass Spectrometry. The Association for Research in Vision and Ophthalmology (*ARVO) 2023 New Orleans, Louisiana April 23-27, 2023.*

Determination of Humanin Fragments in Human Blood Plasma Samples. The Association for Research in Vision and Ophthalmology (*ARVO) 2023 New Orleans, Louisiana April 23-27, 2023.*

Determination of Fragments of SHLP2 in AMD Patients. The Association for Research in Vision and Ophthalmology (*ARVO) 2023 New Orleans, Louisiana April 23-27, 2023.*

Analysis of 1-month-old Humanin-G in H2O and PBS Using High Resolution Mass Spectrometry. The Association for Research in Vision and Ophthalmology (*ARVO) 2022 Virtual Meeting, May 11-12, 2022.*

The impact of subconjunctival injections of Humanin-G loaded microspheres on RCS rat model of retinal degeneration. The Association for Research in Vision and Ophthalmology (*ARVO) 2022 Virtual Meeting, May 11-12, 2022.*

Analysis of 1-month-old MOTS-c in H2O; Using High Resolution Mass Spectrometry. The Association for Research in Vision and Ophthalmology (*ARVO) 2022 Virtual Meeting, May 11-12, 2022.*

11-month-old Humanin-G in H_2O using High Resolution Mass Spectrometry Analysis. The Association for Research in Vision and Ophthalmology (*ARVO) 2021 Virtual Meeting, May 1-7, 2021.*

Rapid Label-Free Immunoassays Using U-Shaped Tapered Optical Fibers. 99th Annual Meeting Pacific Division of AAAS, June 12-15, 2018, Pomona, CA, USA

Active and Passive Targeting Mechanism and Nanomedicine for Cancer Therapy. 12 June 2015, University of California, Riverside, USA

Mechanism of FDA Approved Nanomedicine for Cancer Therapy. June 2015, University of California, Riverside, USA

Recent Advances in Nanotechnology and Nanomedicine. April 2014, NKUBAT, Tekirdag, Turkiye

Publications

Laparoscopic Sleeve Gastrectomy with Cruroplasty and Single-Suture Omentopexy: A Retrospective Pilot Study on Gastroesophageal Reflux Disease Outcomes. Kankaya B., Buyukasik S., Altundal Y.E., **Ozgul M.**, Alis H. Bariatric Surgical Practice and Patient Care. 2025;20(3). doi: 10.1089/bari.2024.0060.

Beyond The Age Limit: A Comparative Study (< 70 Vs≥ 70 Years) in Breast Cancer Characteristics and Surgical Management in Women. Buyukasik S., Kankaya B., Altundal Y.E., **Ozgul M.,** Kapan S. Breast Cancer: Targets and Therapy. 2025;1231-1246.

Age and Education Influencing Willingness in Men to Recommend Breast Cancer Screening: A Comparative Study of University Personnel and Clinical Attendees. Buyukasik S., Kankaya B., Altundal Y.E., **Ozgul M.**, Atashbari F., Osman A.A.H. Breast Cancer: Targets and Therapy. 2025;17:741.

Neuroprotective Effect of Intraperitoneal Humanin-G in Retinal Degeneration of Royal College of Surgeons Rats. Lin B., Schneider K., **Ozgul M.**, Ianopol N.N., Kenney C.M., Seiler M.J. Invest. Ophthalmol. Vis. Sci. 2025;66(8):3830-3830.

Weight Loss Dynamics After Laparoscopic Sleeve Gastrectomy: A Retrospective Single Center Analysis with Age and Preoperative Weight Stratification. Kankaya B., Buyukasik S., Altundal Y.E., **Ozgul M.**, Etemad A. Sci Rep. 2025;15(1):8771.

Exploring the Gender-Specific Impact of Intraperitoneal Bupivacaine on Early Postoperative Pain in Sleeve Gastrectomy. Buyukasik S., Kankaya B., Altundal Y. E., **Ozgul M.**, Alis H. J Laparoendosc Adv Surg Tech A. 2023 Nov;33(11):1040-1046. doi: 10.1089/lap.2023.0217

A Review on PLGA particles as a Sustained Drug-delivery System and its Effect on the Retina.* Marquina S., **Ozgul M., Kenney M. C., Kenneth R. B. Exp Eye Res. 2023 Oct:235:109626. doi: 10.1016/j.exer.2023.109626.

* This review paper was invited by Reviews and Special Issues Editor Prof. Sanjoy K. Bhattacharya from Experimental Eye Research.

Using Human 'Personalized' Cybrids to Identify Drugs/Agents That Can Regulate Chronic Lymphoblastic Leukemia Mitochondrial Dysfunction. Singh L., Atilano S., Chwa M., Singh M.K., **Ozgul M.**, Nesburn A., Kenney MC. Int J Mol Sci. 2023 Jul 3;24(13):11025. doi: 10.3390/ijms241311025.

Determination of Fragments of SHLP2 in AMD Patients. Ghazaryan A., **Ozgul M.,** Melendez M.A., Neto F.J.T., Kenney M.C. Invest. Ophthalmol. Vis. Sci. 2023;64(8):2105-2105.

Determination of Humanin Fragments in Human Blood Plasma Samples. Neto F.J.T., **Ozgul M.**, Ghazaryan A., Melendez M.A., Kuppermann B.D. Invest. Ophthalmol. Vis. Sci. 2023;64(8):2324-2324.

Stability Determination of HNF14 in H2O and PBS Using High Resolution Mass Spectrometry. **Ozgul M.**, Katz B., Nashine S., Kenney M.C. Invest. Ophthalmol. Vis. Sci. 2023;64(8):3014-3014.

Stability Determination of Intact Humanin-G with Characterizations of Oxidation and Dimerization Patterns. **Ozgul M.**, Nesburn A. B., Nasralla N., Katz B., Enes T., Kuppermann B., Kenney M. K. Biomolecules. 2023 Mar 11;13(3):515. doi: 10.3390/biom13030515.

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Analysis of 1-month-old Humanin-G in H2O and PBS Using High Resolution Mass Spectrometry. **Ozgul M.**, Katz B., Taylan E., Kenney M.C., Invest. Ophthalmol. Vis. Sci. June 2022, Vol.63, 309 – F0112.

11-month-old Humanin-G in H_2O using High Resolution Mass Spectrometry Analysis. **Ozgul M.**, Katz B., Kenney M.C., Invest. Ophthalmol. Vis. Sci. June 2021; 62(8):250.

Protective Effect of Nigella Sativa on Renal Reperfusion Injury in Rats. Caskurlu T., Kanter M., Erboga M., Erboga Z. F., **Ozgul M.**, Atis G. IJKD. 2016 May;10(3):135-43.

Expression of Matrix Metalloproteinase-1 in Round Ligament and Uterosacral Ligament Tissue from Women with Pelvic Organ Prolapse. Usta A., Guzin K., **Kanter M.**, Ozgul M., Usta C. S. J Mol Histol. 2014 Jun;45(3):275-81. doi: 10.1007/s10735-013-9550-3.

Immunohistochemical Analysis of Connective Tissue in Patients with Pelvic Organ Prolapse. Yucel N., Usta A., Guzin K., Kanter M., Bilgic E., Ozel N. O., **Ozgul M.** J Mol Histol. 2013 Feb;44(1):97-102. doi: 10.1007/s10735-012-9456-5.

Conferences, Symposiums, Seminars Attended

The Vision Research Mixer, May 2024*,* Irvine, CA, US

10th Annual Bench to Bedside Symposium, June 2024, Irvine, CA, US

The Association for Research in Vision and Ophthalmology, April 2024, Seattle, WA, US

9th Annual Bench to Bedside Symposium, May 2023, Irvine, CA, US

The Association for Research in Vision and Ophthalmology, April 2023, New Orleans, LA, US

8th Annual Bench to Bedside Symposium, June 2022, Irvine, CA, US

The Association for Research in Vision and Ophthalmology, May 2022, Virtual Meeting

7th Annual Bench to Bedside Symposium, September 2021, Virtual Meeting

The Association for Research in Vision and Ophthalmology, May 2021, Virtual Meeting

3D-Printed Labware for High-Throughput Enzyme Immobilization, Feb 28, 2020, Irvine, CA, US

Nanotechnology and Materials-based Immunotherapeutic Approaches to Diabetes and Cancer, January 2020, Irvine, CA, US

Imaging-driven discovery of a CTLA-4-dependent feedback loop that controls T regulatory cell abundance in tumors, October 2019, Irvine, CA, US.

13th Annual Colloquium, Gavin Herbert Eye Institute, November 2019, Irvine, CA, US

6th Annual Bench to Bedside Symposium, March 2019, Irvine, CA, US

Development of cell-based high-throughput screening assays to identify small-molecule modulators targeting vision deficiency, November 2018, Irvine, CA, US

ASCO (American Society of Clinical Oncology) Annual Meeting, June 2016, Chicago, IL, US

National Anatomy Congress, September 2014, Malatya, Turkiye

III National Nanotechnology Congress, February 2014, Istanbul, Turkiye

Advances in Cancer Management January 2013, Istanbul Medeniyet University, Istanbul, Turkiye

Stem Cell and Gene Therapy, February 2012, Bursa, Turkiye

Guest Editor Role

As a Guest Editor, I am organizing a Methods Collection on Innovative Strategies in Drug Delivery: Navigating Future Therapeutics.

Journal of Visualized Experiments (JoVE) is the leading peer-reviewed scientific methods video journal.

Education

Medical Doctor **July 2012**

School of Medicine, Trakya University, Turkiye

Professional Memberships

The Association for Research in Vision and Ophthalmology (ARVO)

American Society of Clinical Oncology (ASCO)

American Association for Cancer Research (AACR)

Activities

The Student Representative of Trakya University Medical School, 2007-2008.