

CURRICULUM VITAE

Edward Chaum, M.D., Ph.D.

Margy Ann and J. Donald M. Gass Professor of Ophthalmology, Vanderbilt Eye Institute

Edward.Chaum@vanderbilt.edu

EDUCATION

Undergraduate:

Johns Hopkins University, (Baltimore, MD), **B.A.**, May 1979, *Natural Sciences*

Graduate:

Cornell Graduate School of Medical Sciences (New York, NY), **Ph.D.**, May 1986
Cell Biology and Genetics

Cornell University Medical College (New York, NY), **M.D.**, May 1987

Postgraduate Training:

Residencies:

Pediatrics, Massachusetts General Hospital (Boston, MA), July 1987 - June 1990

Ophthalmology, Boston University Hospital (Boston, MA), July 1990 - June 1993

Fellowship:

Retina, Massachusetts Eye & Ear Infirmary (Boston, MA), July 1993 - June 1994

ACADEMIC APPOINTMENTS

Vanderbilt University Medical Center, Vanderbilt Eye Institute

Margy Ann and J. Donald M. Gass Chair, Professor of Ophthalmology, April 2018 - present

University of Tennessee Health Science Center, College of Medicine, Memphis, TN

Plough Foundation Professor of Retinal Diseases, 2000 – 2018

- Assistant Professor of Ophthalmology and Pediatrics, July 2000 – June 2001
- Associate Professor of Ophthalmology (with tenure), Associate Professor of Pediatrics, and Anatomy and Neurobiology, July 2001 – June 2006
- Professor of Ophthalmology, 2006; Professor of Pediatrics, Anatomy and Neurobiology, and Biomedical Engineering, July 2007.

University of Tennessee Health Science Center, College of Graduate Health Sciences

Graduate School Faculty, December 2004 - 2018

University of Memphis, Memphis, TN

Adjunct Graduate Faculty, Department of Biomedical Engineering, July 2005 – 2018

University of Massachusetts Medical Center, Worcester, MA

- Assistant Professor of Ophthalmology, Pediatrics and Cell Biology July 1994 – June 2000
- Interim Chief, Division of Ophthalmology, October 1998 - June 2000

PROFESSIONAL ORGANIZATIONS

American Academy of Ophthalmology

Alpha Omega Alpha Honor Medical Society

Association for Research in Vision and Ophthalmology

American Telemedicine Association / IEEE

Macula Society / Retina Society

Research to Prevent Blindness / Fight for Sight

PROFESSIONAL ACTIVITIES

Extramural

- National Eye Institute, NIH. Peer Review Study Sections, VisC, BDPE, DPVS, others; 2006 – 2018
- Academic Editor: PLoS ONE, 2011-16
- Editorial Reviewer: 2000-present Archives of Ophthalmology, British Journal of Ophthalmology, British Journal of Pharmacology, Experimental Eye Research, Investigative Ophthalmology and Visual Science, Journal of Cellular Biochemistry, Journal of Cellular Physiology, Journal of Gene Medicine, Journal of Pharmacy and Pharmacology, Molecular Vision, Ophthalmology, Pan American Journal of Public Health, PLoS ONE, Retina, Survey of Ophthalmology, IEEE Transactions in Medical Imaging, IEEE Computers in Biology and Medicine, SPIE, others.
- Invited Grant and Fellowship Reviewer for International Funding Agencies
Wellcome Trust, Great Britain, 2002; Health Research Board, Ireland, 2003; Erwin Schrodinger Research Fellowship, Austrian Science Fund 2004; Fight for Sight, New York, NY, 2004 – present; Prevent Blindness America 2009 – 2015; Technology Foundation STW (Netherlands), 2009; Catalan Agency for Health Technology Assessment and Research, Spain, 2010; Medical Research Council, Great Britain, 2011; Canada Innovation Research, 2014

Other Professional Activities

Board of Directors, Juvenile Diabetes Research Foundation, West TN Chapter, 2007 - 2011
Oak Ridge National Laboratory, External Advisory Board, Biomedical Science & Engineering, 2012
SENSORIUM: University of Memphis – Founding Principal Researcher, 2013 - present
Board of Directors, Research Inc., Memphis VA Medical Center, 2014 - 2018

Entrepreneurial

1. **Hubble Telemedical - Founder and CMO** - Venture-backed telemedicine startup.
Winner, R&D100 Award, 2010 – TRIAD Telemedical Network
Winner Federal Laboratory Consortium Award for Technology Transfer, 2010
Winner, American Telemedicine Association Innovation Award, 2011
USDA Phase I SBIR 2012, Phase II SBIR 2013
Acquired by Welch Allyn, 2015
2. **Infusense – Founder and CMO** - Angel-backed startup, biomedical sensors
SEBIO Finalist 2011, DOD Phase I SBIR, 2012
3. **Nanophthalmics - Founder and CMO** - Venture-backed startup, surgical devices
4. **Focal Point Pharmaceuticals, Co-Founder and CSO** - Venture-backed startup
5. **Ipax Pharmaceuticals, Co-Founder and CMO** - Grant-backed startup.
6. **Bennefit Nutrition, Co-Founder and CMO** - Grant-backed startup

Issued Patents

1. *Method and system for the diagnosis of disease using retinal image content and an archive of diagnosed human patient data* US 8,243,999 B2, Sept. 20, 2012
2. *Method and system for assigning a confidence metric for automated determination of optic disc location* US 8,218,838 B2, July 10, 2012
3. *Retinal instrument* US 8,425,596 B2, April 23, 2013
4. *Microfabricated instruments and methods to treat recurrent corneal erosion* US 8,591,481 B2, Nov. 23, 2013

5. *Method and device for detection of bioavailable drug concentration in a fluid sample.*
US 9,700,246 B2, July 11, 2017.
6. *Method and device for detection of bioavailable drug concentration in a fluid sample.*
EU patent allowed, pending.
7. *Method and device for detection of bioavailable drug concentration in a fluid sample.*
Canadian patent allowed, pending.

Special Awards and Recognition

- 1992 Alpha Omega Alpha, Honor Medical Society
- 1998 Research Career Award (K08), National Eye Institute, NIH
- 2000 Plough Foundation Professor of Retinal Diseases, University of Tennessee, endowed Chair
- 2006-13 Best Doctors in America®
- 2009 Keynote Speaker: 1st Annual Biomedical Science & Engineering Conf., Oak Ridge Natl. Lab.
- 2009 Senior Scientist Award, Research to Prevent Blindness, New York, NY
- 2010 R&D100 Award – Life Sciences: “TRIAD Network”
- 2010 Federal Laboratory Consortium Award for Technology Transfer, with ORNL
- 2011 American Telemedicine Association Innovation Award: *Hubble Telemedical, Inc.*
- 2013 Memphis Business Quarterly, Inaugural 2013 Innovation Award
- 2013 B. Otto Wheeley Award for Excellence in Technology Transfer, University of Tennessee
- 2018 Elected to Macula Society
- 2018 Elected to Retina Society

Invited Lectures

- New England Ophthalmological Society, April 1999
- Keynote Speaker: Tennessee Academy of Sciences, Collegiate Division, May, 2005
- Keynote Speaker: 1st Biomedical Science & Engineering Conference, ORNL, March, 2009
- Keynote Speaker: National Council of University Research Administrators, April 2013
- Keynote Speaker: St Jude Children’s Research Hospital, March 2013
- University of Memphis, Fogelman College of Business, 2015, 2017

RESEARCH SUPPORT

University of Massachusetts Medical Center

1. *“Gene Transfer into Human Retina”*

Massachusetts Lions Eye Research Fund Inc., Principal Investigator, 1997–2000

2. *“Directed Gene Transfer into Retinal Pigment Epithelial Cells”*

Research Career Award, National Eye Institute, NIH, Principal Investigator,
K08 EY00381, 2/1998 – 6/2000

University of Tennessee Health Science Center

1. *Plough Foundation Professorship in Retinal Diseases*

Endowed Chair, Department of Ophthalmology, UTHSC, 2000-2018

Active Grants –Vanderbilt University

1. *Phenotype Modeling in Prom1 Mutations*

Shulsky Foundation, New York, NY, Principal Investigator, 11/13 to 6/18

2. *Nutlin Analogues for the Prevention and Treatment of PVR in Ocular Trauma*

CRM RP VRP– MR130114, PI, 2/2015 to 12/2018

3. *Nanoplatfom and Modeling of the Subretinal & RPE Microenvironment in AMD (EY024063)*

NIH/NEI R-01; PI, 12/2014 to 11/2019

Completed Grants

1. *“Directed Gene Transfer into Retinal Pigment Epithelial Cells”*
Research Career Award, National Eye Institute, NIH, Principal Investigator,
K08 EY00381, 7/2000 – 2/2005
2. *“Proprietary study of retinal cell culture”*
Alcon Research Labs Inc., Principal Investigator, 2001 – 2012
3. *“Biomedical Information Technology Network”*
USAMRMC, US Army, CDMRP, Co-Principal Investigator, 5/2005 – 6/2007
4. *“Retinal Imaging Algorithms Using Content-based Image Retrieval”*
Oak Ridge National Laboratory, Co-investigator, 5/2004 – 4/2005
5. *“Electrochemical Quantification of Serum Propofol for Target-Controlled Infusion Anesthesia”*
USAMRMC, US Army, TATRC, Principal Investigator, 9/2005 – 6/2012,
6. *“MEMS and NEMS Tools for Retinal Surgery”*
Oak Ridge National Laboratory, Co-investigator, 9/2004 – 8/2005
7. *“A Study of the Resolution of Intraocular Bleeding in Infants and Toddlers with Shaken Impact Syndrome”* Fight For Sight, PI, 10/2004-12/2006
8. *“Automated Screening for Diabetic Retinopathy by Content”*
National Eye Institute, NIH, R-01 EY017065, UT/ORNL collaboration, Principal Investigator, 9/2005-8/2008; 2/2009-1/2012
9. *“Automated Screening of Diabetic Retinopathy in Underserved Patients in Shelby County”*
The Plough Foundation, Principal Investigator, 9/2007-8/2012
10. *“Team Sugar Free”*
HRSA, Co-investigator with Delta Health Alliance, 9/2007-8/2012
11. *“Maturation Grant, UTRF”*
UT Research Foundation, 2/2008
12. *Nanoscale Architectures for Rapid Transcriptome Profiling of Tissue*
UTHSC, CTSI, 10/2009
13. *Senior Scientist Award - Research to Prevent Blindness*, 1/2010
14. *Treatment of Traumatic Vision Loss in a New Mouse Model of Blast Injury*
USAMRMC, US Army, TATRC, Co-Investigator, 8/2010 – 7/2013
15. *Iris Biometrics - Oak Ridge National Laboratory*, 11/2011 – 10/2012

Clinical Science – Multicenter Clinical Trials

Diabetes Prevention Program Outcomes Studies, DCCT and EDIC: 2005- 2018

Clinical Study Center, Clinical Co-investigator UTHSC study site

Clinical outcomes of diabetes prevention and treatment programs

Age-Related Eye Disease Study II (AREDS2) 2006 - 2016

Clinical Study Center, Clinical Co-investigator UT Memphis study site

Clinical outcomes of diabetes prevention and treatment programs

Publications and Presentations:

A. Basic Science Research and Clinical Retina – Peer-reviewed Manuscripts:

1. Chaum, E., Ellsworth, R.M., Haik, B.G., Kitchin, F.D., Chaganti, R.S.K. (1984) Cytogenetic analysis of retinoblastoma: Evidence for multifocal origin and in vivo gene amplification. *Cytogenet Cell Genet* 38: 82-91.
2. Chaum, E., Doucette, L.A., Ellsworth, R.M., Haik, B.G., Kitchin, F.D., Chaganti, R.S.K. (1984) Bleomycin-induced chromosome breakage in G2 lymphocytes of retinoblastoma patients. *Cytogenet Cell Genet* 38:152-154.
3. Sakai, K., Kanda, N., Shiloh, Y., Donlon, T., Schreck, R., Shipley, J., Dryja, T., Chaum, E., Chaganti, R.S.K., Latt, S. (1985). Molecular and cytologic analysis of DNA amplification in retinoblastoma. *Cancer Genet Cytogenet* 17: 95-112.
4. Chaum E. (1987) Cytogenetic and Molecular Studies of the Role of Oncogenes in Transformation in Retinoblastoma. Cornell University GSMS. Copyright TX 2 084 403.
5. Chaum, E. and Hatton, M.P. (1999) Congenital nystagmus associated with multiple congenital anomalies of extraocular muscles. *J Ped Ophthalmol Strab* 36:155-157.
6. Chaum, E., Hatton, M.P. and Stein, G. (1999) Polyplex-mediated gene transfer into human retinal pigment epithelial cells in vitro. *J Cell Biochem* 76 (1): 153-160.
7. Chaum, E., Drewry, RD, Ware, GT, Charles, S. (2001) Nerve fiber bundle visual field defect resulting from a giant peripapillary cotton-wool spot. *J Neuro-Ophthalmol*, 21:276-277.
8. Chaum, E. (2001) Comparative analysis of the uptake and expression of plasmid vectors in human ciliary and retinal pigment epithelial cells in vitro. *J Cell Biochem*, 83:671-677.
9. Chaum, E. and Greenwald, MA (2002) Retinochoroidal anastomoses and a choroidal neovascular membrane in a macular exudate following treatment for retinal macroaneurysms. *Retina*, 22:363-6.
10. Chaum, E., Yang, H. (2002) Transgenic expression of IGF-1 modifies the proliferative potential of human retinal pigment epithelial cells. *Invest Ophthalmol Vis Sci*, 43:3758-3764.
11. Yang, H., Chaum, E. (2003) A Reassessment of Insulin-like Growth Factor Binding Protein Gene Expression in the Human Retinal Pigment Epithelium. *J Cell Biochem*, 89:933-943.
12. Martin AC., Thornton JD, Liu J, Wang X, Zuo, J, Jablonski MM, Chaum E., Zindy F, Skapek SX. (2004) Pathogenesis of persistent hyperplastic primary vitreous in mice lacking the Arf tumor suppressor gene. *Invest Ophthalmol Vis Sci*, 45(10):3387-96.
13. Ashmore, E, Kerr, NC, Greenwald, M., Chaum, E. (2004) Natural History of Acquired Retinal Oxalosis in a Child. *J Ped Ophthalmol Strab*, 41:308-311.
14. Chaum E., Fawzi A, Chang TS, Shah GK. (2006) Diagnostic and therapeutic challenges. *Retina*. 26:219-22.
15. Yang, H., Yang, X., Lang, J.C., Chaum, E. (2006) Tissue Culture Methods Can Strongly Upregulate Immediate Early Gene Expression in Retinal Pigment Epithelial Cells. *J Cell Biochem*. 98:1560-1569.
16. Karnowski, T.P., Govindasamy, V.P., Tobin, K.W., Chaum, E., “Locating the Optic Nerve in Retinal Images: Comparing Model-Based and Bayesian Decision Methods,” 28th Annual International Conf. of the IEEE EMBS, August 2006.
17. Tobin, K.W., Chaum, E., Govindasamy, V.P., Karnowski, T.P., Sezer, O., “Characterization of the Optic Disk in Retinal Imagery using a Probabilistic Approach”, SPIE International Symposium on Medical Imaging, San Diego, California, Proceedings of SPIE, Vol. 6144:61443F, February 2006.
18. Tobin, K.W., Chaum, E., Govindasamy, V.P., Karnowski, T.P. (2007) “Detection of Anatomic Structures in Human Retinal Imagery,” *IEEE Transactions on Medical Imaging*, 26(12):1729-39.

19. Tobin KW, Abdelrahman, M, Chaum E, Govindasamy VP, Karnowski TP. (2007) A Probabilistic Framework for Content-Based Diagnosis of Retinal Disease. Conf Proc IEEE Eng Med Biol Soc; 2007:6744-6747.
20. Tobin, KW, Abramoff, MD, Chaum, E, Giancardo, L, Govindasamy, VP, Karnowski, TP, Tennant, MTS. (2008) Using a Patient Image Archive to Diagnose Retinopathy. Conf. Proc. IEEE Eng Med Biol Soc 1:5441-5444.
21. Karnowski, TP, Govindasamy, VP, Tobin, KW, Chaum, E, Abramoff, MD. (2008). Retina Lesion and Microaneurysm Segmentation using Morphological Reconstruction Methods with Ground-Truth Data. Conf. Proc. IEEE Eng Med Biol Soc 1:5433-5436.
22. Giancardo, L, Abramoff, MD, Chaum, E, Karnowski, TP, Meriaudeau, F, Tobin, KW. (2008) Elliptical Local Vessel Density: A Fast and Robust Quality Metric for Fundus Images. Conf. Proc. IEEE Eng Med Biol Soc 1:3534-3537.
23. Chaum, E., Karnowski, T.P., Govindasamy, V.P., Tobin, K.W. (2008) Automated Diagnosis of Retinopathy by Content-Based Image Retrieval, Retina, 28:1463-1477.
24. Fung, K, Mastellone, J, Chaum, E., (2008) Macular Neovascularization in Familial Exudative Vitreoretinopathy. Retinal Cases & Brief Reports. 2(4):319-321.
25. Hoehn, ME, Merchant, TE, Chaum, E., (2008) Macular epiretinal membrane formation after low-dose radiation exposure in a child with papilledema from a craniopharyngioma. Retinal Cases & Brief Reports. 2(4):289-291.
26. Karnowski TP, Aykac D, Chaum E, Giancardo L, Li Y, Tobin KW, Abramoff MD. (2009) Practical considerations for optic nerve location in telemedicine. Conf Proc IEEE Eng Med Biol Soc. 2009;1:6205-9.
27. Chaum E, Yin J, Yang H, Thomas F, Lang JC. Quantitative AP-1 gene regulation by oxidative stress in the human retinal pigment epithelium. J Cell Biochem. 2009 Dec 15;108(6):1280-91.
28. Chaum, E. Translating novel engineering concepts into biomedical research programs and clinical medicine, Biomedical Science & Engineering Conference, 2009. BSEC 2009. First Annual ORNL Conference, DOI: 10.1109/BSEC.2009.5090462
29. Giddabasappa A, Bauler M, Yepuru M, Chaum E, Dalton JT, Eswaraka J. 17- β estradiol protects ARPE-19 cells from oxidative stress through estrogen receptor- β . Invest Ophthalmol Vis Sci. 2010 Oct;51(10):5278-87.
30. Boone, A.R.W.; Karnowski, T.P.; Chaum, E.; Giancardo, L.; Li, Y.; Tobin, K.W., Jr. Image processing and hierarchical temporal memories for automated retina analysis, Biomedical Sciences and Engineering Conference (BSEC), 2010, DOI: 10.1109/BSEC.2010.5767510
31. Spentzas T, Henricksen J, Patters AB, Chaum E. (2010) Correlation of intraocular pressure with intracranial pressure in children with severe head injuries. Pediatr Crit Care Med. 2010;11(5):593-8.
32. Karnowski, T.P. Aykac, D. Giancardo, L. Li, Y. Nichols, T. Fox, K. Garg, S. Tobin, K.W. Chaum, E. Combining image and non-image data for automatic detection of retina disease in a telemedicine network. Biomedical Sciences and Engineering Conference, March 2011.
33. Giancardo L, Meriaudeau F, Karnowski TP, Li Y, Tobin KW, Chaum, E. Automatic quality enhancement and nerve fibre layer artefacts removal in retina fundus images by off axis imaging. Image Processing (ICIP), 18th IEEE International Conference, 2011; 49-52.
34. Giancardo, L.; Meriaudeau, F.; Karnowski, T.P.; Li, Y.; Tobin, K.W.; Chaum, E. Automatic retina exudates segmentation without a manually labelled training set. Biomedical Imaging: From Nano to Macro, 2011 IEEE International Symposium, 2011; 1396-1400.
35. Langmaier J, Garay F, Kivlehan F, Chaum E, Lindner E. Electrochemical Quantification of 2,6-Diisopropylphenol (Propofol), Analytica Chimica Acta, 2011, 704 (1-2):63-67.

36. Santos-Villalobos H, Karnowski T, Aykac D, Giancardo L, Li Y, Nichols T, Tobin KW, Chaum E. Statistical characterization and segmentation of drusen in fundus images. *Conf Proc IEEE Eng Med Biol Soc*. 2011 Aug;2011:6236-41.
37. Fowler B, Shen C, Mastellone J, Chaum E. Acute systemic histoplasmosis associated with chorioretinitis in an immunocompetent adolescent. *Dig J Ophthalmol : DJO* 2011;17(3):31-35.
38. Karnowski TP, Aykac D, Giancardo L, Li Y, Nichols T, Tobin KW, Chaum E. Automatic detection of retina disease: Robustness to image quality and localization of anatomy structure. *Conf Proc IEEE Eng Med Biol Soc*. 2011 Aug;2011:5959-64.
39. Giancardo L, Meriaudeau F, Karnowski TP, Li Y, Tobin KW, Chaum E. Microaneurysm detection with radon transform-based classification on retina images. *Conf Proc IEEE Eng Med Biol Soc*. 2011 Aug;2011:5939-42.
40. Devisetti K, Karnowski TP, Giancardo L, Li Y, Chaum E. Geographic atrophy segmentation in infrared and autofluorescent retina images using supervised learning. *Conf Proc IEEE Eng Med Biol Soc*. Aug;2011:3958-61.
41. Li Y, Karnowski TP, Tobin KW, Giancardo L, Morris S, Sparrow SE, Garg S, Fox K, Chaum E (2011) A Health Insurance Portability and Accountability Act–Compliant Ocular Telehealth Network for the Remote Diagnosis and Management of Diabetic Retinopathy, *Telemedicine and e-Health*, 2011 Oct;17(8):627-34.
42. Yin J, Thomas F, Lang JC, Chaum E. Modulation of oxidative stress responses in the human retinal pigment epithelium following treatment with vitamin C. *J Cell Physiol*. 2011;226(8):2025-32.
43. Bhattacharya S, Ray RR, Chaum E, Johnson DA, and Johnson LR. Inhibition of Mdm2 sensitizes human retinal pigment epithelial cells to apoptosis. *Invest. Ophthalmol. Vis. Sci*. 2011;52(6):3368-80.
44. Chaum E, Yin J, Lang JC. Molecular Responses Transduced by Serial Oxidative Stress in the Retinal Pigment Epithelium: Feedback Control Modeling of Gene Expression. *Neurochem Res*. 2011 36:574-582.
45. Giancardo L, Meriaudeau F, Karnowski T, Tobin K, Grisan E, Favaro P, Ruggeri A, Chaum E. Textureless Macula Swelling Detection with Multiple Retinal Fundus Images. *IEEE Trans Biomed Eng*. 2011 Mar;58(3):795-9.
46. Karnowski, T.P. Aykac, D. Giancardo, L. Li, Y. Nichols, T. Tobin, K.W. Chaum, E. Automatic Detection of Retina Disease: Robustness to Image Quality and Localization of Anatomy Structure. *IEEE EMBC 2011, Boston, MA, 20110831*.
47. Bhattacharya S, Chaum E, Johnson DA, Johnson LR. Age-related susceptibility to apoptosis in human retinal pigment epithelial cells is triggered by disruption of p53-Mdm2 association. *Invest Ophthalmol Vis Sci*. 2012; 53(13):8350-66.
48. Garg S, Jani PD, Kshirsagar AV, King B, Chaum E. Telemedicine and Retinal Imaging for Improving Diabetic Retinopathy Evaluation, *Arch Intern Med*. 2012;172(21):1677-1680.
49. Kivlehan FA, Garay F, Guo J, Chaum E, Lindner E. Towards feedback-controlled anesthesia: Voltammetric measurement of propofol (2,6-diisopropylphenol) in serum-like electrolyte solutions. *Anal Chem*. 2012 Sep 18;84(18):7670-6. PMID: 22900668.
50. Paquit VC, Karnowski TP, Aykac D, Li Y, Tobin KW, Chaum E. Detecting flash artifacts in fundus imagery. *Conf Proc IEEE Eng Med Biol Soc*. 2012 Aug; 2012:1442-5. PMID: 23366172
51. Hines-Beard J, Marchetta J, Gordon S, Chaum E, Geisert EE, Rex TS. A mouse model of ocular blast injury that induces closed globe anterior and posterior pole damage. *Exp Eye Res*. 2012;99:63-70
52. Lindner E, Bordelon D, Kim MD, Dergunov SA, Pinkhassik E, Chaum E. Ion-Selective Optodes in a Sampling Capillary for Tear Fluid Analysis. *Electroanalysis*. 2012, 24(1):42–52.
53. Giancardo L, Meriaudeau F, Karnowski TP, Li Y, Garg S, Tobin KW Jr., Chaum E. Exudate-based diabetic macular edema detection in fundus images using publicly available datasets, *Med Image Anal*. *Med Image Anal*. 2012 Jan;16(1):216-26.

54. H.J. Santos-Villalobos, D.R. Barstow, M. Karakaya, C.B. Boehnen, E. Chaum. ORNL biometric eye model for iris recognition. In proceeding of: Biometrics: Theory, Applications and Systems (BTAS), 2012 IEEE Fifth Int'l Conference on Biometrics Compendium. 01/2012; ISBN: 978-1-4673-1384-1.
55. Karnowski, TP, Giancardo, L, Li, Y, Tobin, KW, Chaum, E. "Retina image analysis and ocular telehealth: The Oak Ridge National Laboratory-Hamilton Eye Institute case study," Conf Proc IEEE Eng Med Biol Soc. 2013;2013:7140-3.
56. Ali S, Sidibé D, Adal KM, Giancardo L, Chaum E, Karnowski TP, Mériaudeau F. Statistical atlas based exudate segmentation. *Comput Med Imaging Graph.* 2013 Jul-Sep;37(5-6):358-68.
57. Mériaudeau F, Sidibé D, Ali S, Adal KM, Giancardo L, Karnowski TP, Chaum E. Computer Aided Design for Diabetic Retinopathy. QCAV2013, 11th International Conference on Quality Control by Artificial Vision, Fukuoka, Japan 2013.
58. Ali S, Adal KM, Sidibé D, Chaum E, Karnowski TP, Mériaudeau F. Steerable wavelet transform for atlas based retinal lesion segmentation. QCAV2013, 11th International Conference on Quality Control by Artificial Vision, Fukuoka, Japan 2013.
59. Trucco E, Ruggeri A, Karnowski T, Giancardo L, Chaum E, Hubschman JP, Al-Diri B, Cheung CY, Wong D, Abramoff M, Lim G, Kumar D, Burlina P, Bressler NM, Jelinek HF, Meriaudeau F, Quellec G, Macgillivray T, Dhillon B. Validating Retinal Fundus Image Analysis Algorithms: Issues and a Proposal. *Invest Ophthalmol Vis Sci.* 2013 May 1;54(5):3546-3559.
60. Wing BJ, Schaeffer DA, Hendricks TR, Bennett D, Chaum E, Simpson JT. Structural Manipulation of Microcone Arrays for Microsurgical Modification of Ophthalmic Tissues. *J. Med. Devices.* July 2014; 8(3):034558.
61. Rainey F, Kivlehan F, Chaum E, Lindner E. Toward Feedback Controlled Anesthesia: Automated Flow Analytical System for Electrochemical Monitoring of Propofol in Serum Solutions. *Electroanalysis*, 2014, 26:1295 – 1303.
62. Adal KM, Sidibé D, Ali S, Chaum E, Karnowski TP, Mériaudeau F. Automated detection of microaneurysms using scale-adapted blob analysis and semi-supervised learning. *Comput Methods Programs Biomed.* 2014 Apr;114(1):1-10.
63. Alami NH, Smith RB, Carrasco MA, Williams LA, Winborn CS, Han SS, Kiskinis E, Winborn B, Freibaum BD, Kanagaraj A, Clare AJ, Badders NM, Bilican B, Chaum E, Chandran S, Shaw CE, Eggan KC, Maniatis T, Taylor JP. (2014) Axonal transport of TDP-43 mRNA granules is impaired by ALS-causing mutations. *Neuron.* Feb 5;81(3):536-43.
64. Yin, J, Winborn, C.S., Thomas, F., Tran, Q.T., Lang, J.C. and Chaum, E. Modulation of Oxidative Stress Responses by Vitamin E, or Vitamin A plus Vitamin C Treatment in Human Retinal Pigment Epithelial Cells. *Natural Science*, 2015;7:558-570.
65. Senter K, Sukumar SR, Patton RM, Chaum E. Using Clinical Data, Hypothesis Generation Tools and PubMed Trends to Discover the Association between Diabetic Retinopathy and Anti-hypertensive Drugs”, in the Proc. of the Workshop on Mining Big Data to Improve Clinical Effectiveness in conjunction with the IEEE Conference on Big Data, (2015)pp. 2366-2370.
66. Chaum E, Winborn CS, Bhattacharya S. Genomic regulation of senescence and innate immunity signaling in the retinal pigment epithelium. *Human Genome*, 2015; 26:210-221.
67. Kivlehan F, Chaum E, Lindner E. Propofol Detection and Quantification in Human Blood: The Promise of Feedback Controlled, Closed-loop Anesthesia. *Analyst*, 2015;140(1):98-106.
68. Myers MH, Li Y, Kivlehan F, Lindner E, Chaum E. A Feedback Control Approach to Organic Drug Infusions Using Electrochemical Measurement. *IEEE Trans Biomed Engineer.* 2016 Mar;63(3):506-11.
69. Chaum E, Huddleston S, Mastellone J. Nasal Hemiretinal Vein Occlusion. *Ophthalmology.* 2016, Feb. 123(2):399.

70. Huo W, Zhao G, Yin J, Ouyang X, Wang Y, Yang C, Wang B, Dong P, Wang Z, Watari H, Chaum E, Pfeffer LM, Yue J. Lentiviral CRISPR/Cas9 vector mediated miR-21 gene editing inhibits the epithelial to mesenchymal transition in ovarian cancer cells. *J Cancer* 2017; 8(1):57-64.
71. Toutouchian JJ, Pagadala J, Miller DD, Baudry J, Park F, Chaum E, Yates CR. Novel small molecule JP-153 targets the Src-FAK-paxillin signaling complex to inhibit VEGF-induced retinal angiogenesis. *Mol Pharmacol.* 2017 Jan;91(1):1-13. Journal Cover Article.
72. Bhattacharya S, Yin J, Winborn CS, Zhang Q, Yue J, Chaum E. Prominin-1 is a Novel Regulator of Autophagy in the human retinal pigment epithelium. *Invest Ophthalmol Vis Sci.* 2017;58(4):2366-2387.
73. Recent Advances in Retinal Stem Cell Therapy. Bhattacharya S, Gangaraju R, Chaum E. *Curr Mol Biol Rep.* 2017 Sep;3(3):172-182. Epub 2017 Jul 10. PMID: 29152454
74. Knockdown of survivin results in inhibition of epithelial to mesenchymal transition in retinal pigment epithelial cells by attenuating the TGF β pathway. Zhang P, Zhao G, Ji L, Yin J, Lu L, Li W, Zhou G, Chaum E, Yue J. *Biochem Biophys Res Commun.* 2018 Apr 6;498(3):573-578. Epub 2018 Mar 6. PMID: 29522718

B. Clinical trials manuscripts; DCCT/EDIC Research Group, AREDS2, DRCR Network, others)

1. Shaikh, S., Capone, A., Schwartz, S.D., Gonzales, C., Trese, M.T. for the ROP Photographic Screening Trial (Photo-ROP) Study Group. (2003) Inadvertant skip areas in treatment of Zone 1 retinopathy of prematurity. *Retina* 23:128-131.
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