

**Murat Gunel, MD, FACS**  
Yale University School of Medicine  
Departments of Neurosurgery and Neurobiology  
Anlyan Center for Human Genetics and Genomics  
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**Current Title**

Associate Professor of Neurosurgery and Neurobiology  
Chief, Section of Neurovascular Surgery  
Co-Director, Yale Program on Neurogenetics

**Education**

1984-1991 Istanbul School of Medicine, Istanbul, Turkey  
Doctor of Medicine (MD), 1991

**Board Certification**

American Board of Neurological Surgery, May 2002

**Professional Experience**

1/2007-present Co-Director  
Yale Program on Neurogenetics  
7/2005- present Associate Professor of Neurobiology  
Yale University School of Medicine  
7/2003- present Associate Professor of Neurosurgery  
Yale University School of Medicine  
1/2001- present Chief, Section of Neurovascular Surgery and Neurovascular and  
Neuroscience Intensive Care  
Yale University School of Medicine  
Department of Neurosurgery

1/2001- 1/2003	Medical Director, Neurovascular and Neuroscience Intensive Care Unit, Yale-New Haven Hospital
7/1999-12/2000	Associate Director Yale Neurovascular Program
7/1999-12/2000	Associate Medical Director Neurovascular and Neuroscience Intensive Care Unit Yale- New Haven Hospital
2/1998-6/1999	Acting Chief and Attending Neurosurgery West Haven Veterans Administration Hospital
2/1998-6/2003	Assistant Professor of Neurosurgery Yale University School of Medicine Yale- New Haven Hospital West Haven Veterans Administration Hospital Attending Neurosurgery
1997-1998	Chief Resident, Yale University School of Medicine, Department of Neurosurgery/ Yale-New Haven Hospital
1992-1997	Resident, Yale University School of Medicine, Department of Neurosurgery/Yale-New Haven Hospital
1991-1992	Intern, Yale University School of Medicine, Department of General Surgery/Yale-New Haven Hospital

**Licensure** Connecticut - 036590

**Honors and Awards**

2002	Outstanding Poster Award in Basic Science, 5 <sup>th</sup> Annual Meeting of the AANS/CNS Section of Cerebrovascular Surgery
2001	Outstanding Poster Award in Basic Science, 4 <sup>th</sup> Annual Meeting of the AANS/CNS Section of Cerebrovascular Surgery
1999	American Epilepsy Society, Young Investigator Award
1998-1999	National Pfizer Scholar Award for New Faculty
1996	Ohse Research Award-Yale University

1994-1996	American College of Surgeons Scholarship
1992	Ira Goldenberg Junior Surgical Housestaff Award, Yale University
1991	2 <sup>nd</sup> Prize, National Medical Board Examinations (out of app. 5,000 examinees), Turkey

### **Professional Societies**

Fellow, American College of Surgeons, October 2005

American Association of Neurological Surgeons

Congress of Neurological Surgeons

AANS/CNS Cerebrovascular Joint Section

AANS/CNS Joint Section on Tumors

American Epilepsy Society

Vice-Chair, American Association of Neurological Surgeons/Congress of Neurological Surgeons Cerebrovascular Joint Section, 2007-2008

Executive Board Member, AANS/CNS Cerebrovascular Joint Section, 2005-

Executive Board Member, AANS/CNS Section on International Neurosurgery, 2005-2006

Executive Board Member, Foundation of International Education in Neurological Surgery (FIENS), 2004

CNS Research Committee, 2006

Member, Stroke Council, American Heart Association, 2005- 2007

President, Turkish American Medical Association, 2004-2006

President-Elect, Turkish American Medical Association, 2002-2004

Faculty, Research Update in Neuroscience for Neurosurgeons (RUNN) 2001-present

Co-Chairman, Video Kiosk, CNS, 2000-2002

Annual Meeting Committee, CNS 2001 meeting

Scientific Program Committee, CNS 2002, 2003, 2004 meetings

Scientific Program Committee, AANS 2006 meeting

Scientific Program Chair, AANS/CNS Cerebrovascular Section / American Association of Interventional&Therapeutic Radiology (ASITN) 2005 Meeting

Scientific Program Committee, American Heart Association, International Stroke Conference (ISC), 2006 meeting

Scientific Program Committee, American Heart Association, International Stroke Conference (ISC), 2007 meeting

Scientific Program Committee, American Heart Association, International Stroke Conference (ISC), 2008 meeting

Cerebrovascular Surgery Abstract Grading-CNS 2002 meeting

Cerebrovascular Surgery Abstract Grading- AANS 2002 meeting

Cerebrovascular Surgery Abstract Grading-CNS 2005 meeting

Cerebrovascular Surgery Abstract Grading-CNS 2006 meeting

Cerebrovascular Surgery Abstract Grading-AANS 2006 meeting

Abstract Grading, AHA/ISC Joint Section Meeting 2007

Abstract Grading, AHA/ISC Joint Section Meeting 2008

Cerebrovascular Surgery Abstract Grading-AANS 2008 meeting

**NIH Study Sections:**

Intercellular Interactions, Cell Biology IRG (ZRG1 CB-G90), 6/22-23/06

Molecular, Cellular, and Developmental Neuroscience IRG (ZRG1 MDCN-A), 12/18/06

Intercellular Interactions, Cell Biology IRG, 2/17/07

Retinopathy Studies, CB-G90, 2008/01 ZRG1, 09/25/2007

NINDS, NSD-A study section, 2008, 10/25-26,2007

**Grant Support**

NIH/NINDS, 1RO1 NS046521-01 (PI: Gunel, M) 07/01/04-06/31/09

Functional Genomics of the Cavernous Malformation Gene \$375,000

30% effort

NIH/NINDS, 1RO1 NS057756 (PI: Gunel, M) 04/01/07- 03/31/12  
Molecular Genetic Pathogenesis of Intracranial Aneurysms \$375,000  
20% effort

**Completed**

1P50HL55007 (PI: Lifton, RP) 02/01/01 – 01/31/06 SCOR:  
\$904,199

5% effort  
Molecular Genetics of Hypertension

Yale University School of Medicine (PI: Gunel, M) 07/01/04-6/31/06  
Pilot Project in Translational Research \$65,000  
Molecular Genetic Approaches for Diagnosis and Treatment of Intracranial Aneurysms

NIH/NINDS, 5 R01 NS36194-0 (PI: Gunel, M) 03/15/98-01/31/2004  
40% effort \$334,396  
Pathobiology of Cerebral Cavernous Malformation (PI: Richard Lifton)

Howard Hughes Medical Institute Pilot Grant (PI: Gunel, M) 07/01/03-6/31/04  
\$25,000

**Editorial Board**

Editor, AANS/CNS Joint Cerebrovascular Section Newsletter, 2004-present  
Associate Editor, AANS/CNS Joint Cerebrovascular Section, Newsletter 2003-2004  
Associate Editor, Clinical Neurosurgery, 2003-present  
Editorial Board Member, Neurosurgery, 2003-present  
Editorial Board Member, Neurooncology 2002-present

Manuscript reviews for Journal of Neurosurgery, Stroke, Journal of Neurology, Neurosurgery and Psychiatry, Human Molecular Genetics, Proceedings of the National Academy of Sciences USA

## **Mentored Trainees**

### Undergraduate Students:

David Beynet (99): Yale 99-Stanford Medical School 04, UCLA Dermatology Residency (2005)

Ozgun Gokce (01): Bogazici University 01-European Union, Nervous System Repair PhD program (exp. gra. 08)

Jennifer Voorhees (02-04) Yale 04- Yale University School of Medicine (YMS 08)

Tanya Maiers (03-04) Yale 04- Emory University

Abigail Hawkins (03-05) Yale 05- English School, Japan

Katie Pricola (03-05) Yale 04- Stanford Medical School (SMS 09)

Undergraduate Students (summer rotation): Candice Carpenter Yale 04, Tirzah Enumah Yale 04, Simge Aykan Bogazici University 05

### Medical Students-Thesis:

Michael Diluna, BS (MD 03, HHMI medical student training grant): The Genetics of Cerebral Cavernous Malformation. *current position* :Yale Neurosurgery Residency Prog.

Maxwell Laurans, BA\*(MD 03, HHMI medical student training grant): Functional Genomics of KRIT1. \*Thesis Honors. *current position*: Yale Neurosurgery Residency Prog.

Nduka Amankulor, BS (MD 04): CCM1 molecule is involved in focal adhesions. *current position*: Yale Neurosurgery Residency Prog.

Grahame Gould, BS (MD 04): Dissection of the Cerebral Cavernous Malformation-1 Gene Pathway by Microarray Analysis. *current position*: Yale Neurosurgery Residency Prog.

Brian Nahed, BS (MD 05, Doris-Duke medical student training grant): Pathogenesis of Intracranial Aneurysms. *current position*: Harvard, Mass Gen Hosp Neurosurgery Residency Prog.

Ali Kemal Ozturk, BS (MD 06, Doris-Duke medical student training grant): Genetic Heterogeneity of Intracranial Aneurysms. *current position*: Yale Neurosurgery Residency Prog.

Arianne Boylan, BS (MD 07) CCM2 Molecular Signaling Pathway. *current position*: University of Colorado Neurosurgery Residency Prog.

Active:

Mohammed Bydon, BS (MD 08-exp)

Ryan Hebert (MD 08-exp)

Luis Kolb ((MD 09-exp)

John Berry-Candelario (Harvard Medical School, MD 09-exp)

Other

Nikhil Nayak, BS (MD 09- exp)

Robert.Leone, BS (MD 09- exp)

Qi (Chee) Zheng, BS (MD 09- exp)

Larry Lo (YMS, '09)

Winson Ho (YMS, '10)

Medical Students-Summer Rotation: Micah Jacobs (00), Ragui Sadeek (00), Jacqueline Park (01), Abdirahman Mahamud (05), David Gimbel (05), Mark McRae (05), Judah Weathers (05), Fahir Sencan (06)

Graduate Students-PhD thesis:

Ozlem Kayisli (PhD 03-Akdeniz University, Dept. of Molecular Biology): Pathogenesis of Cerebral Cavernous Malformation

Dana Shin, BS (04-05) Yale University, Interdepartmental Neuroscience Program

Gamze Tanriover (PhD 07-exp, Akdeniz University, Dept. of Histology)

Kaya Bilguvar (PhD 07-exp, Marmara University, Dept. of Molecular Biology)

Postdoctoral Fellows: Ertugrul Cakir, MD (01), Masahiro Noha, MD, PhD (01-02), Askin Seker, MD (03-04), Kenneth Vives, MD (99-00), Hasan Kocaeli, MD (04), Soner Buyukkinaci, MD (05),

Bulent Guclu, MD (04-05), Ethem Goksu, MD (05-06), Gulsah Bademci, MD (05), Fatih Bayrakli, MD (06-present)

## Manuscripts

1. de Lanerolle NC, Gunel M, Sundaresan S, Kim JH, Spencer DD: Vasoactive intestinal polypeptide changes in human temporal lobe epilepsy. **Brain Research** 686:182-193, 1995.
2. Gunel M, Awad IA, Anson J, Lifton RP: Mapping of a gene causing cerebral cavernous malformation to 7q11.2-q21. **Proc. Nat. Acad. Sciences U SA** 92: 6620-6624, 1995.
3. Piepmeyer J, Gunel M: Management of low grade gliomas: radiation treatment at time of recurrence. **Clinical Neurosurgery** 42: 495-507, 1995.
4. Gunel M, Awad IA, Finberg K, Anson JA, Steinberg GK, Batjer HH, Kopitnik TA, Morrison L, Giannotta SL, Nelson-Williams C, Lifton RP: A founder mutation as a cause of cerebral cavernous malformation in Hispanic Americans. **New Eng J Med** 334: 946-951, 1996.
5. Gunel M, Awad IA, Finberg K, Steinberg GK, Craig HD, Cepeda O, Nelson-Williams C, Lifton RP: Genetic heterogeneity of inherited cerebral cavernous malformations. **Neurosurgery** 38: 1265-1271, 1996.
6. Gunel M, Lifton RP: Counting strokes. **Nature Genetics**, 13:384-385, 1996.
7. Craig HD, Gunel M, Cepeda O, et al., and Lifton RP. Multilocus linkage identifies two new loci for a mendelian form of stroke, cerebral cavernous malformation, at 7p15-13 and 3q25.2-27. **Human Mol Gen.** 7: 1851-1858, 1998.
8. Gunel M, Awad IA. Carotid Endarterectomy Prevention Strategies and Complications Management. **Neurosurg Clin N Am** 11: 351-364, 2000.
9. Ng PY, Huddle D, Gunel M, Awad IA. Intraoperative Endovascular Adjunct in Microsurgical Clipping of Paraclinoid Aneurysms. **J Neurosurg** 93:554-560, 2000.
10. Wilson FH, Disse-Nicodeme S, Choate KA, Ishikawa K, Nelson-Williams C, Desitter I, Gunel M, et al, Lifton RP: Human hypertension caused by mutations in WNK kinases. **Science**, 293: 1107-1112, 2001.

11. Gunel M, Laurans MS, Shin D, DiLuna ML, Voorhees J, Choate K, Nelson-Williams C, Lifton RP: KRIT1, a gene mutated in cerebral cavernous malformation, encodes a microtubule-associated protein. **Proc Natl Acad Sci U S A** 99(16):10677-82, 2002.
12. Anderson RC, Connolly ES, Jr., Ozduman K, Laurans MS, Gunel M, Khandji A, Faust PL, Sisti MB: Clinicopathological review: giant intraventricular cavernous malformation. **Neurosurg** 53:374-378.
13. State MW, Greally JM, Cuker A, Bowers PN, Henegariu O, Morgan TM, Gunel M, DiLuna M, King RA, Nelson C, Donovan A, Anderson GM, Leckman JF, Hawkins T, Pauls DL, Lifton RP, Ward DC: Epigenetic abnormalities associated with a chromosome 18(q21-q22) inversion and a Gilles de la Tourette syndrome phenotype. **Proc Natl Acad Sci U S A** 100:4684-4689, 2003.
14. Laurans MS, DiLuna ML, Shin D, Niazi F, Voorhees JR, Nelson-Williams C, Johnson EW, Siegel AM, Steinberg GK, Berg MJ, Scott RM, Tedeschi G, Enevoldson TP, Anson J, Rouleau GA, Ogilvy C, Awad IA, Lifton RP, Gunel M: Mutational analysis of 206 families with cavernous malformations. **J Neurosurg** 99:38-43, 2003.
15. Komuro A, Masuda Y, Kobayashi K, Babbitt R, Gunel M, Flavell RA, Marchesi VT: The AHNAKs are a class of giant propeller-like proteins that associate with calcium channel proteins of cardiomyocytes and other cells. **Proc Natl Acad Sci U S A** 101:4053-4058, 2004.
16. Guzeloglu-Kayisli O, Amankulor N, Voorhees J, Luleci G, Lifton RP, Gunel M: KRIT1/Cerebral cavernous malformation 1 protein localizes to vascular endothelium, astrocytes, and pyramidal cells of the adult human cerebral cortex. **Neurosurg** 54(4):943-92004.
17. Guzeloglu-Kayisli O, Amankulor N, Voorhees J, Luleci G, Lifton RP, Gunel M: Krev1 interaction trapped-1/cerebral cavernous malformation-1 protein expression during early angiogenesis. **J Neurosurg**, 100(5 Suppl Pediatrics):481-7. 2004.
18. Jayaraman T, Berenstein V, Li X, Mayer J, Silane M, Shin YS, Yoshino Y, Niimi Y, Gunel M, Berenstein A: Tumor Necrosis Factor Alpha in Cerebral Aneurysms: A Key Modulator in Inflammation, **Neurosurg** 57(3):558-564, 2005.

19. Guclu B, Ozturk AK, Pricola K, Bilguvar K, Shin D, O'Roak B, Gunel M: Mutations in apoptosis related gene, PDCD10, cause Cerebral Cavernous Malformation 3, **Neurosurg** 57(5):1008-1013, 2005.
20. Nahed BV, Seker A, Guclu B, Ozturk AK, Finberg K, Hawkins AA, DiLuna ML, State M, Lifton RP, Gunel M: Mapping a Mendelian form of intracranial aneurysm to 1p34.3-p36.13. **Am J Hum Genet** 76(1):172-9, 2005.
21. Nahed B, DiLuna M, Morgan T, Ocal E, Hawkins A, Ozduman K, Kahle K, Chamberlain A, Amar A, Gunel M: Hypertension, age, and location predict rupture of small intracranial aneurysms, **Neurosurg** 57(4):676-683, 2005.
22. Guclu B, Ozturk AK, Pricola K, Seker A, Ozek M, Gunel M: Cerebral venous malformations have distinct genetic origin from cerebral cavernous malformations, **Stroke** 36(11):2479-80 2005.
23. Bilguvar K, Ozturk AK, Guclu B, Gunel M: Response to Letter by Stahl and Felbor. **Stroke** 37:2215, 2006.
24. Kilic T, Sohrabifar M, Kurtkaya O, Yildirim O, Elmaci I, Gunel M, Pamir N: Expression of structural proteins and angiogenic factors in normal arterial and unruptured and ruptured aneurysm walls. **Neurosurg**, 57(5):997-1007, 2005.
25. Abelson JF, Kwan KY, O'Roak BJ, Baek DY, Stillman AA, Morgan TM, Mathews CA, Pauls DL, Rašin MR, Gunel M, Davis NR, Ercan-Sencicek AG, Guez DH, Spertus JA, Leckman JF, Dure LS IV, Kurlan R, Singer HS, Gilbert DL, Farhi A, Louvi A, Lifton RP, Estan N, State MW: Sequence variants in SLITRK1 are associated with Tourette's syndrome, **Science** 310(5746):317-320, 2005.
26. Seker A, Pricola KL, Guclu B, Ozturk AK, Louvi A, Gunel M: CCM2 Expression parallels that of CCM1, **Stroke** 37(2): 518-523, 2006.
27. Seker A, Yildirim O, Kurtkaya O, Sav A, Gunel M, Pamir MN, Kilic T: Expression of integrins in cerebral arteriovenous and cavernous malformations, **Neurosurg** 58(1):159-168, 2006.
28. Ozturk AK, Nahed BV, Bydon M, Bilguvar K, Goksu E, Bademci G, Guclu B, Johnson MH, Amar A, Lifton RP, Gunel M: Analysis of two large kindreds with intracranial aneurysms confirms linkage to 11q24-25 and 14q23-31, **Stroke** 37(4):1021-7, 2006.

28. Nahed BV, Bydon M, Ozturk AK, Bilguvar K, Bayrakli F, Gunel M: Genetics of Intracranial Aneurysms, **Neurosurg**, 60(2):213-25, 2007.
29. DiLuna ML, Amankulor NM, Johnson MH, Gunel M: Neurovascular Complications of Aarskog-Scott Syndrome, **Neurorad**, 49(5):457-61, 2007.
30. Güzel A, Tatli M, Bilguvar K, Diluna, ML, Bakkaloglu B, Ozturk AK, Bayrakli F, Gunel M: Apparently novel genetic syndrome of pachygyria, mental retardation, seizure, and arachnoid cysts., **Am J Med Genet**, 143(7):672-7, 2007.
31. Bayrakli F, Bilguvar K, Mason CE, Diluna ML, Bayri Y, Gungor L, Terzi M, Mane SM, Lifton RP, State MW, Gunel M. Rapid identification of disease-causing mutations using copy number analysis within linkage intervals. **Hum Mutat**. 2007, Aug 3; [Epub ahead of print]
32. Bilguvar K, Bydon M, Bayrakli F, Ercan-Sencicek G, Bayri Y, Mason C, DiLuna ML, Seashore M, Bronen R, Lifton RP, State M, Gunel M : A Novel Syndrome of Cerebral Cavernous Malformation and Greig Cephalopolysyndactyly, **J Neurosurg**, 107:495-499, 2007.
33. DiLuna ML, Bydon MA, Johnson MH, Gunel M: Complications from cervical intra-arterial heroin injection, *in print*, **J Neurol Neurosurg Psych** 2007.
34. Tanriover G, Boylan A, DiLuna ML, Pricola K, Louvi A, Gunel M: PDCD10, the gene mutated in Cerebral Cavernous Malformation 3 (CCM3) is expressed in the Neurovascular Unit, *in review*, **Neurosurg** 2007.
35. Tüysüz B, Bayrakli F, Bilguvar K, Yalcinkaya C, Bursali A, Ozdamar E, Korkmaz B, Ozturk AK., DiLuna ML Bayri Y, Lifton RP, State M, Gunel M: Novel NTRK1 mutations associated with Hereditary Sensory and Autonomic Neuropathy type IV: evidence for a founder mutation in the Turkish population, *submitted* **Hum Genet**, 2007.
36. Goksu E, Bilguvar K, Akyuz M, Ozturk AK, DiLuna ML. Bademci G, Bydon M, Johnson MH, Morgan T, Tuncer R and Gunel M. Results of Screening Asymptomatic, At-Risk Members of Two Large Intracranial Aneurysm Families. *submitted*, **AJNR**, 2007.

## Chapters

1. Gunel M, Piepmeier J: Management of low-grade gliomas, in Contemporary Neurosurgery 19: # 9, Williams & Wilkins, Baltimore, 1997.

2. Gunel M, Spencer DD. Molecular biology and genetics of epilepsy syndromes, in The Molecular Biology of Neurosurgical Disease, pp 340-359, Williams & Wilkins, Baltimore, 1997.
3. Gunel M, Piepmeier J: Perioperative assessment and technical considerations, in Essential Neuro-oncology, Thieme, New York, 1998.
4. Gunel M, Awad IA, Lifton R: Molecular Biology of Cerebrovascular Diseases. In Current Techniques, Salcman M (Ed.) Springer, Philadelphia: 164-176, 1998.
5. Diluna M, Gunel M, Awad IA. Molecular Biology. In Intracranial Arteriovenous Malformations, Stieg PE, Batjer HH and Samson DS eds. Quality Medical Publishing, Inc, 2002.
6. Diluna, M.L., Lee, S., Awad, I., and Gunel, M: History of Aneurysm Management and Surgery. In Management of Cerebral Aneurysms, Le Roux, P.D. and Winn, H.R. eds. Philadelphia: W.B. Saunders, pp 1-11, 2003.
7. Vives KP, Gunel M, Awad IA. Surgical Management of Supratentorial Cavernous Malformations. In “Youman’s Neurological Surgery, 5<sup>th</sup> Edition”, Winn HR (ed-in-chief). W.B. Saunders Publishers, pp 2305-2319, 2003.
8. DiLuna ML and Gunel M: Molecular Approaches to Neurovascular Disease. In “Controversies in Neurological Surgery: Evolving a Multidisciplinary Approach to Neurovascular Diseases”, Lawton, MT, Gress, DR, and Higashida, RT eds. Lebanon, NH: AANS, *submitted*, 2006.
9. DiLuna ML and Gunel M: Supratentorial Cavernous Malformation in Fundamentals of Operative Techniques in Neurosurgery, Connolly S, McKhann G, Huang J, Choudhri T, and Mocco J, eds, Thieme, New York, 2006.
10. Moliterno J and Gunel M: Infratentorial Cavernous Malformation in Fundamentals of Operative Techniques in Neurosurgery, Connolly S, McKhann G, Huang J, Choudhri T, and Mocco J, eds, Thieme, New York, 2006.
11. Diluna M, Bilguvar K, Tanriover G, Gunel M: Hemorrhagic Brain Disease *in print* in Molecular Neurology, Waxman S,ed, Elsevier/Academic Press, San Diego, 2006.

## Letters and Invited Comments

1. Gunel M, Awad IA, Lifton R. KRIT1 Mutations in cavernous malformations. Neurosurgery 46: 1277, 2000.
2. Gunel M: AANS/CNS Section on Cerebrovascular Surgery, Cerebrovascular News, Fall 2001 issue: Hot Topics Presented in Toronto.
3. Gunel M: AANS/CNS Section on Cerebrovascular Surgery, Cerebrovascular News, Winter 2001-02 issue: 2001 CNS Meeting: Reinventing Neurosurgery.
4. Gunel M: AANS/CNS Section on Cerebrovascular Surgery, Cerebrovascular News, Spring 2002 issue: Fifth Annual Joint Meeting Enjoys Success.
5. Gunel M: AANS/CNS Section on Cerebrovascular Surgery, Cerebrovascular News, Fall 2002 issue: 2002 AANS Meeting Review in Chicago.
6. Gunel M: AANS/CNS Section on Cerebrovascular Surgery, Cerebrovascular News, Fall 2002 issue: What Would You Do? Expert Opinion.
7. Piepmeier J, Diluna M, Gunel M, comment for: “Engineering of the Extracellular Matrix: Working toward Neural Stem Cell Programming and Neurorestoration Concept and Progress Report” by Liu C et al. in Neurosurgery, 52: 5, 1154, 2003.
8. Laurans M, Gunel M, comment for: “Angiogenic Factors in the Central Nervous System” by Harrigan M in Neurosurgery, 53: 3, 639, 2003.
9. Diluna M, Gunel M, comment for: “Penetration of the Optic Nerve by an Internal Carotid Artery-Ophthalmic Artery Aneurysm: Case Report and Literature Review” by Jea A in Neurosurgery, 53:4, 996, 2003.
10. Gunel M, comment for: “Guha A: Angiogenesis in Nervous System Disorders” in Neurosurgery 53:6, 1375-1376, 2003.

### **Invited Lectures and Presentations**

1. Molecular genetics and pathology of intracranial aneurysms. Massachusetts General Hospital Annual Course on Cerebrovascular Malformations and Aneurysms, Boston, Massachusetts, June 28-29, 1995.
2. Genetic approaches to inherited brain vascular disorders. Yale Cerebrovascular Center, New Haven, CT, 1995.
3. Molecular genetics of cerebral cavernous malformations. Department of Surgery Grand Rounds, North Shore University Hospital, New York, NY, October 1997.

4. Molecular genetics and pathobiology-recent advances, *Special Course on Neurocutaneous Syndromes*. Presented at the 48th Annual Meeting of the Congress of Neurological Surgeons, Seattle, Washington, October 5-7, 1998.
5. Cavernous malformations. Luncheon seminar at the 48th Annual Meeting of the Congress of Neurological Surgeons, Seattle, Washington, October 5-7, 1998.
6. Cavernous malformations. Breakfast seminar at the Annual Meeting of the American Association of Neurological Surgeons, New Orleans, Louisiana, April 26-28, 1999.
7. Intracerebral hemorrhage. Breakfast seminar at the Annual Meeting of the American Association of Neurological Surgeons, New Orleans, Louisiana, April 26-28, 1999.
8. Molecular Genetics of Cerebrovascular Disorders I&II. Yale Cerebrovascular Center, New Haven, CT, 1999.
9. Microsurgical carotid endarterectomy. Department of Surgery Grand Rounds, Bridgeport Hospital, Bridgeport, CT January 6, 2000.
10. Role of clot lysis and catheter aspiration in management of intraparenchymal hemorrhage. Luncheon seminar at the 49<sup>th</sup> Annual Meeting of the Congress of Neurological Surgeons, Boston, Massachusetts, October 29-November 1, 1999.
11. Frontiers in Neurological Surgery in the New Millennium. Northern Westchester Hospital Center, New York, March 22, 2000.
12. Intracranial Hemorrhage at the Practical Clinic Entitled “Cerebrovascular Critical Care”, Annual Meeting of the American Association of Neurological Surgeons, San Francisco, California, April 8, 2000.
13. Underlying lesions- intraparenchymal hemorrhage. Luncheon seminar at the 50<sup>th</sup> Annual Meeting of the Congress of Neurological Surgeons, San Antonio, Texas, September 25-28 2000.
14. Intracerebral Hematoma: Treatment Options and Controversies. Luncheon seminar at the 50<sup>th</sup> Annual Meeting of the Congress of Neurological Surgeons, San Antonio, Texas, September 26, 2000.
15. Signaling pathways and Neural Cell Fate. Presented at Review and Update in Neurobiology for Neurosurgeons (RUNN Course), Woods Hole, Massachusetts, October 17, 2000.
16. Surgical Treatment of Intracranial Aneurysms, Northern Westchester Hospital Center, New York, September, 2001.

17. Neural Signaling Pathways, Presented at Review and Update in Neurobiology for Neurosurgeons (RUNN Course), Woods Hole, Massachusetts, October 26, 2001.
18. Molecular Biology of Krit 1, the Gene Mutated in Cerebral Cavernous Malformation, Annual Meeting of the American Academy of Neurological Surgery, Palm Beach, Florida, November 15, 2001.
19. Everything you need to know about Neurovascular Surgery, Yale University School of Medicine, Department of General Surgery Grand Rounds, New Haven, CT, December 2001.
20. The Genetics and Molecular Biology of Cerebral Cavernous Malformations, Department of Neurosurgery Grand Rounds, Columbia University, New York, NY, March 28, 2002.
21. Molecular Genetics of Cerebrovascular Disease, Yale University School of Medicine, Department of Clinical Genetics Grand Rounds, New Haven, CT., April 2, 2002.
22. Section of Cerebrovascular Surgery I, 51<sup>th</sup> Annual Meeting of the Congress of Neurological Surgeons, Philadelphia, September 23, 2002.
23. Cerebral Aneurysm Surgery: Complication Avoidance and Management. Luncheon seminar at the 51<sup>th</sup> Annual Meeting of the Congress of Neurological Surgeons, Philadelphia, September 24, 2002.
24. Genetics of Hemorrhagic Stroke: A Minisymposium, Boston Stroke Society, October 2, 2002.
25. Neural Signaling Pathways, Presented at Review and Update in Neurobiology for Neurosurgeons (RUNN Course), Woods Hole, Massachusetts, October 2002.
26. Functional Genomics of KRIT1, the Gene Mutated in Cerebral Cavernous Malformation 1, Department of Neurosurgery Grand Rounds, Brigham and Women's Hospital/Harvard Medical School, February 12, 2003.
27. Signaling Pathways: Molecular Genetics and Biology of Cavernous Malformations, Presented at Review and Update in Neurobiology for Neurosurgeons (RUNN Course), Woods Hole, Massachusetts, October 2003.
28. Management of Anterior Circulation Aneurysms, Annual Joint Meeting of the Cerebrovascular Section of the AANS and CNS and The American Society of Therapeutic and Interventional Neuroradiology, (Moderator), San Diego, February 3, 2004.
29. Molecular Genetics and Biology of Cerebral Vascular Malformations. Neuroscience Grand Rounds, Yale University School of Medicine, April 14, 2004.

30. Signaling Pathways: Molecular Genetics and Biology of Cavernous Malformations, Presented at Review and Update in Neurobiology for Neurosurgeons (RUNN Course), Woods Hole, Massachusetts, October 2004.
31. Health and Biomedical Sciences, 1<sup>st</sup> Annual Meeting of the Turkish American Scientists and Scholars Association (TASSA) (Moderator), Washington DC, February 19, 2005.
32. Molecular Genetics of Intracranial Aneurysms, Plenary Session, Congress of Neurological Surgeons, New Orleans, LA, September, 2004.
33. Monitoring and Treatment of Neurovascular Disease, Yale Univ. Sch. of Med., SICU Multidisciplinary Conference Lecture Series March 1, 2005.
34. Molecular Approaches to Genetics of Cerebral Vascular Malformations, Turkish Neurosurgical Society Meeting, Antalya, Turkey, May 2005
35. Molecular Genetics and Biology of Cerebral Vascular Malformations, Presented at Review and Update in Neurobiology for Neurosurgeons (RUNN Course), Woods Hole, Massachusetts, October 2005.
36. Intracranial Aneurysm Genetics. Presented at American Heart Association International Stroke Conference, February 2006.
37. Molecular Genetics and Biology of Cavernous Malformations and Intracranial Aneurysms. Presented at Review and Update in Neurobiology for Neurosurgeons (RUNN Course), Woods Hole, Massachusetts, October 2006.
38. Outlier Approaches to Study the Genetic Basis of Intracranial Aneurysms, AHA Scientific Sessions-Chicago, November 14, 2006.
39. CCM2 Signaling Pathway. Presented at the Angioma Alliance Meeting, Washington DC, November 17, 2006.
40. Molecular Genetic Approaches to Study Cerebral Vascular Malformations and Aneurysms. Department of Neurosurgery Grand Rounds, Harvard University, Massachusetts General Hospital, Boston, March 29, 2007.
41. Intracranial Aneurysm Molecular Genetics. Presented at the Scandinavian Neurosurgical Congress meeting, Helsinki, June 2007.
42. Molecular Genetics of Cavernous Malformations: Implications for Therapeutic Interventions. Plenary Session, Congress of Neurological Surgeons Annual Meeting San Diego, California, September 19, 2007.

43. Recent Advances in Management of Intracranial Aneurysms. American College of Surgeons, New Orleans, October 2007.
44. Whole Genome Association (WGA) Studies in Genetics of Cerebral Vascular Malformations. Presented at Review and Update in Neurobiology for Neurosurgeons (RUNN Course), Woods Hole, Massachusetts, October 2007.
45. Intracranial Aneurysm Genetics, Turkish Neurosurgical Society Meeting, December 2007.

**Presentations:**

46. Gunel M, Thomas PG, Cornell-Bell AH, Brines ML, Spencer DD, de Lanerolle NC: Human glia cultured from epileptogenic foci demonstrate increased basal and glutamate- induced calcium fluxes. Presented to the Annual Meeting of American Epilepsy Society, San Diego, CA, December 1991 (*Epilepsia* 32S3:66, 1991).
47. de Lanerolle NC, Gunel M, Spencer DD, Trombley PQ, Brines ML.: Primary cultures obtained from adult human epileptic brain contain diverse neurons and glia. Presented to the Society of Neuroscience Meeting, 1991 (*Soc Neurosci Abstr* 17:369.2, 1991).
48. Cornell-Bell AH, Gunel M, Thomas PG, Brines ML, Spencer DD, de Lanerolle NC.: Glia cultured from hyperexcitable human epileptogenic foci exhibit marked increases in Ca<sup>2+</sup> oscillations and intracellular calcium waves. Presented to the Society of Neuroscience Meeting, 1991 (*Soc Neurosci Abstr* 17:369.1, 1991).
49. Gunel M, Awad IA, Batjer H, Giannotta S, Steinberg G, Anson J, Lifton RP: Molecular Genetics of Cerebral Cavernous Malformations: refined chromosomal localization and genetic dysequilibrium analysis. Presented to the Annual Meeting of The Congress of Neurological Surgeons, San Francisco, California, October 13-20, 1995 (*Neurosurg* 77:576, 1995).
50. Gunel M, de Lanerolle N, Kim J, & Spencer DD: The role of integrated research in defining substrates of temporal lobe epilepsy Presented to the Annual Meeting of the American Association of Neurological Surgeons, Orlando, Florida, April 23-27, 1995.
51. Gunel M: Linkage analysis and its applications to cerebrovascular disease. Presented to the Annual Meeting of Joint Section on Cerebrovascular Surgery of the American Association of Neurological Surgeons and the Congress of Neurological Surgeons, San Antonio, Texas, January 23-25, 1996.

52. Gunel M, Awad IA, Feinberg K, Steinberg G, Lifton RP: Single mutation from a common ancestor is responsible for cavernous malformations in Mexican Americans of Hispanic descent. Presented to the Annual Meeting of the American Association of Neurological Surgeons, Minneapolis, Minnesota, April 27-May 2, 1996 (*J Neurosurg* 84:365A, 1996.).
53. Gunel M: Molecular genetics of cerebrovascular disease. Third Annual Meeting of the Section on Cerebrovascular Surgery of the American Association of Neurological Surgeons and The Congress of Neurological Surgeons, Orlando, Florida, February 2, 1998.
54. Baev N, Wong J, Zao G, Kim, J, Gunel M, Awad IA: Endothelial cell phenotype in human cerebral cavernous malformations. Presented to the 60<sup>th</sup> Annual Meeting of the American Academy of Neurosurgery, Santa Barbara, California, November 6, 1998.
55. Gunel M, Craig H, Choate K et al., and Lifton RP: Positional cloning of the CCM1 gene and identification of two new loci for cavernous malformation, CCM2 and CCM3, by multilocus linkage. Presented to the Annual Meeting of the American Association of Neurological Surgeons, New Orleans, Louisiana, April 26-28, 1999.
56. Vives K, Beynet D, Choate K, Piepmeier J, Artavanis-Tsakonas S, Gunel M: Notch Signaling Pathway in Human Brain Tumors. Presented to The 49<sup>th</sup> Annual Meeting of the Congress of Neurological Surgeons, Boston, Massachusetts, October 29-November 1, 1999.
57. Vives K, Park J, Altieri D, Piepmeier J, Artavanis-Tsakonas S, Gunel M: Surviving Expression in Glial Tumors. Presented to Annual Meeting of the American Association of Neurological Surgeons, San Francisco, California, April 10-12, 2000.
58. Ng PY, Huddle D, Gunel M, Awad IA. Endovascular Adjunct in Microsurgical Treatment of Paraclinoid Aneurysms. Presented to the Annual Joint Meeting of the Cerebrovascular Section of the AANS and CNS and The American Society of Therapeutic and Interventional Neuroradiology, New Orleans, Louisiana, February 6-9, 2000.
59. Vives K, Choate K, Park J, Piepmeier J, Artavanis-Tsakonas S, Gunel M: Notch-1 Expression in Glial Tumors. Presented to Annual Meeting of the American Association of Neurological Surgeons, San Francisco, California, April 10-12, 2000.
60. Gunel M, Diluna M, Shin D, Davies R, Lifton RP: Molecular Biology of Krit1, the gene mutated in cavernous malformation (CCM1) Presented to the Annual Joint Meeting of the Cerebrovascular Section of the AANS and CNS and The American Society of Therapeutic and Interventional Neuroradiology, Hawaii, February 2001.

61. Gunel M, Diluna M, Niazi F et al and Lifton RP: Mutations in KRIT1, a protein interacting with Ras family of GTPases, result in CCM1: Presented to the Annual Joint Meeting of the Cerebrovascular Section of the AANS and CNS and The American Society of Therapeutic and Interventional Neuroradiology, Hawaii, February 2001.
62. Gunel, M. (Teaching Lecture) Clinical Correlations – Cerebral Vascular anomalies, Neuroscience 500b Course, Yale University School of Medicine, New Haven, CT, May 4, 2001.
63. Gunel, M.; DiLuna, M.L.; Vives, K.P.; Noha, M.; Shin, D.H.: Notch1 Signaling Represents a Novel Pathway in Manipulation of Brain Tumors. Presented to the Congress of Neurological Surgeons, San Diego, CA, September, 2001.
64. Gunel, M.; DiLuna, M.L.; Vives, K.P.: Notch1 Positive Cells From the Adult Human Temporal Lobe Are Neuronal Stem Cells. Presented to the Congress of Neurological Surgeons, San Diego, CA, September, 2001.
65. Gunel, M.; DiLuna, M.L.; Shin, D.H.; Lifton, R.P.: Krit1 expression on capillary-like tubes formed by endothelial cells *in vitro*. Presented to the Congress of Neurological Surgeons, San Diego, CA, September, 2001.
66. Gunel, M.; Laurans, M.; DiLuna, M.L.; Shin, D.H.; Lifton, R.P.: KRIT1, the CCM1 Protein, is a Microtubule Associated Protein and is Important in Endothelial Capillary-like Tube Formation During *in vitro* Angiogenesis. Presented to the Annual Joint Meeting of the Cerebrovascular Section of the AANS and CNS and The American Society of Therapeutic and Interventional Neuroradiology, Dallas, February 2002.
67. Gunel, M.; Laurans, M.; DiLuna, M.L.; Shin, D.H.; Lifton, R.P.: KRIT1, the CCM1 protein, is Involved in Muscle Differentiation. Presented to the Annual Joint Meeting of the Cerebrovascular Section of the AANS and CNS and The American Society of Therapeutic and Interventional Neuroradiology, Dallas, February 2002.
68. Gunel, M. (Teaching Lecture) Clinical Correlations - Cerebral Vascular anomalies, Neuroscience 500b Course, Yale University School of Medicine, May 3, 2002.
69. Gunel, M; Piepmeier, J.: Lateral Ventricle Meningiomas, Presented to the Turkish Neurosurgical Society, Istanbul, Turkey, June 2002.

70. Gunel, M.; Laurans, M.; Shin, D.H.; DiLuna, M.L.; Voorhees, J; Lifton, R.P.: KRIT1 Expression in Two In Vitro Angiogenic Models. Presented to the Congress of Neurological Surgeons, Philadelphia, PA, September, 2002.
71. Laurans, M.; Kayisli, U.; Shin, D.H.; DiLuna, M.L.; Voorhees, J; Lifton, R.P.; Gunel, M.: The Cerebral Cavernous Malformation 1 Protein is Expressed by Newly Forming Vasculature. Presented to the Congress of Neurological Surgeons, Philadelphia, PA, September, 2002.
72. Laurans, M.; Shin, D.H.; DiLuna, M.L.; Voorhees, J; Lifton, R.P.; Gunel, M.: KRIT1 Signaling: A New Angiogenic Pathway? Presented to the Congress of Neurological Surgeons, Philadelphia, PA, September, 2002.
73. Gunel, M. (Teaching Lecture) Clinical Correlations - Cerebral Vascular anomalies, Neuroscience 500b Course, Yale University School of Medicine, April 2003.
74. Amankulor, N.M.; Voorhees, J.R.; Gould, G.C.; Nahed, B.V.; Seker, A.; Gunel, M.: Over-expression and suppression of KRIT1 protein affects cellular phenotypes and function. Presented to the Annual Joint Meeting of the Cerebrovascular Section of the AANS and CNS and The American Society of Therapeutic and Interventional Neuroradiology, San Diego, February 2004.
75. Voorhees,J.; Seker, A.; Gokce, O.; Kayislioglu, O.; Amankulor, N.; Gould,G.; Pricola, K.; Lifton, R.; Gunel, M.: KRIT1 Involvement In The Formation Of The Blood-Retina Barrier During Early Angiogenesis. Presented to the Annual Joint Meeting of the Cerebrovascular Section of the AANS and CNS and The American Society of Therapeutic and Interventional Neuroradiology, San Diego, February 2004.
76. Nahed; B. V; Kahle, K.T.; Chamberlain, A.; Amankulor, N.M.; Ozduman, K.; Gould, G.C.; Gunel,M.: Subarachnoid Hemorrhage (SAH) caused by Aneurysms less than 7mm: Implications for Treatment of Unruptured Aneurysms. Presented to the Annual Joint Meeting of the Cerebrovascular Section of the AANS and CNS and The American Society of Therapeutic and Interventional Neuroradiology, San Diego, February 2004.
77. Seker, A.; Guzeloglu; Gokce, O.; Kilic, T.; Voorhees, J.; Amankulor, N.; Pamir, N. Gunel, M.: Mutational analysis of cerebral cavernous patients. Presented to the 3<sup>rd</sup> Annual Turkish Neuroscience Conference, Denizli, Turkey, April 2004.

78. Seker, A.; Voorhees, J.; Gokce, O.; Amankulor, N.; Kilic, T.; Pamir, M.N.; Gunel, M.:  
Involvement in the formation of the blood-retina barrier during early angiogenesis.  
Presented to the 3<sup>rd</sup> Annual Turkish Neuroscience Conference, Denizli, Turkey, April 2004.
79. Guzeloglu-Kayisli, O.; Gokce, O.; Luleci, G.; Gunel, M.; Investigation of KRIT1/cerebral  
cavernous malformation 1 protein localization in diverse human tissues. Presented to the 3<sup>rd</sup>  
Annual Turkish Neuroscience Conference, Denizli, Turkey, April 2004.
80. Gunel, M. (Teaching Lecture) Clinical Correlations - Cerebral Vascular anomalies,  
Neuroscience 500b Course, Yale University School of Medicine, April 2004.
81. Nahed, B.; Kahle, K.; Amankulor, N; Gould, G.C.; Lifton, R ; Gunel, M.: Prospective  
Screening for Intracranial Aneurysms in Glucocorticoid-Remediable Hyperaldosteronism.  
Presented to the Annual Meeting of the American Association of Neurological Surgeons,  
Orlando, May 2004.
82. Gould, G.C.; Seker,A.; Amankulor, N.M.; Nahed, B.; Voorhees, J.; Gunel, M.: Dissection of  
the Cerebral Cavernous Malformation - One Gene Pathway with Microarray Analysis.  
Presented to the Annual Meeting of the American Association of Neurological Surgeons,  
Orlando, May 2004.
83. Amar, A.; Stoffman, M.; Gunel, M.; Larsen, D.; Teitelbaum, G.; Wang, M.; Johnson, M.:  
Coil Embolization of Ruptured Hypoglossal Artery Aneurysms. Presented to the Annual  
Joint Meeting of the Cerebrovascular Section of the AANS and CNS and The American  
Society of Therapeutic and Interventional Neuroradiology, San Diego, February 2005.
84. Amar, A.; Thaiyananthanan, T.; Gunel, M.: Use of Frameless Stereotaxy for Distal  
Intracranial Aneurysms. Presented to the Annual Joint Meeting of the Cerebrovascular  
Section of the AANS and CNS and The American Society of Therapeutic and Interventional  
Neuroradiology, San Diego, February 2005.
85. Gunel, M. (Teaching Lecture) Clinical Correlations - Cerebral Vascular anomalies,  
Neuroscience 500b Course, Yale University School of Medicine, April 2005.
86. Amar, A.; Stoffman, M.; Gunel, M.; Larsen, D.; Teitelbaum, G.; Wang, M.; Johnson, M.:  
Coil Embolization of Ruptured Hypoglossal Artery Aneurysms. Presented to the Annual  
Meeting of the American Association of Neurological Surgeons, New Orleans, May 2005.

87. Amar, A.; Thaiyananthanan, T.; Gunel, M.: The use of Frameless Stereotaxy for Distal Intracranial Aneurysms. Presented to the Annual Meeting of the American Association of Neurological Surgeons, New Orleans, May 2005.
88. Gunel M, McRae M, Gimbel D, Pricola K, Louvi A: Expression of CCM2 parallels that of CCM1. Presented to the Annual Joint Meeting of the Cerebrovascular Section of the AANS and CNS and The American Society of Therapeutic and Interventional Neuroradiology, February 2006.
89. Gunel M, Ozturk AK, Bydon, M Nahed B, Guclu B, Bilguvar K, Goksu E, Bademci G, Amar A: Genetic Heterogeneity of Intracranial Aneurysm. Presented to the Annual Joint Meeting of the Cerebrovascular Section of the AANS and CNS and The American Society of Therapeutic and Interventional Neuroradiology, February 2006.
90. Gunel, M. (Teaching Lecture) Clinical Correlations - Cerebral Vascular anomalies, Neuroscience 500b Course, Yale University School of Medicine, April 2006.
91. Gunel M, McRae M, Gimbel D, Pricola K, Boylan A, Louvi A: Both CCM1 and CCM2 signal through stress-responsive MAPK signaling pathways. Presented to the Annual Meeting of the American Association of Neurological Surgeons, San Francisco, April 2006.
92. Gunel M, Guclu B, Ozturk AK, Bydon M, Bilguvar K, Pricola K, Seker A, Ozek M: Cerebral venous malformations have distinct genetic origin from cerebral cavernous malformations. Presented to the Annual Meeting of the American Association of Neurological Surgeons, San Francisco, April 2006.
93. Gunel M, Bademci G, Bydon M, Bilguvar K Ozturk AK, Goksu E: Lack of TGFBR Mutations In Intracranial Aneurysm. Presented to the Annual Meeting of the American Association of Neurological Surgeons, San Francisco, April 2006.
94. Bayrakli F, Bademci G, Bilguvar K, Ozturk AK, Goksu E, Bydon M, Gunel M: Lack of Association between Type I or Type II TGF- $\beta$  Receptor Mutations and Familial Forms of Intracranial Aneurysm. Presented to the Congress of Neurological Surgeons, Chicago, October 2006.
95. Ozturk AK, Nahed B, Bilguvar K, Bayrakli F, Bydon M, Gunel M: Molecular Genetic Analysis of 2 Large Kindreds with Intracranial Aneurysms Demonstrates Linkage to 11q24-25 and 14q23-31. Presented to the Congress of Neurological Surgeons, Chicago, October 2006.

96. Bilguvar K, Ozturk AK, Bayrakli F, Goksu E, Bydon M, Tuncer R, Gunel M: The Yield of Radiological Screening of At-Risk Asymptomatic Members in Large Intracranial Aneurysm Families. Presented to the Congress of Neurological Surgeons, Chicago, October 2006.
97. Gunel, M. (Teaching Lecture) Clinical Correlations - Cerebral Vascular anomalies, Neuroscience 500b Course, Yale University School of Medicine, April 10, 2007.
98. Bydon M, Bilguvar K, Bayrakli F, Bayri Y, Mason CE, Diluna ML, Öztürk AK, Gunel M: Deletion within CCM2 intervals causes a novel syndrome of cerebral cavernous malformation and Greig cephalopolysyndactyly. Presented to the Congress of Neurological Surgeons Annual Meeting San Diego, California, September 15-20 2007.
99. Bayrakli F, Bilguvar K, Bayri Y, Diluna ML, Bydon M, Öztürk AK, Gunel M: Linkage analysis identifies a novel locus for MRI-negative generalized tonic clonic epilepsy. Presented to the Congress of Neurological Surgeons Annual Meeting San Diego, California, September 15-20 2007.
100. Bayrakli F, Bilguvar K, Diluna ML, Bayri Y, Bydon M, Mason CE, Öztürk AK, Lifton RP, State M, Gunel M. Rapid identification of disease causing mutation in a family with autosomal recessive Parkinson disease using copy number analysis within linkage intervals. Presented to the Congress of Neurological Surgeons Annual Meeting San Diego, California, September 15-20 2007.
101. Bilguvar K, Bayrakli F, Bayri Y, Öztürk AK, Diluna ML, Bydon M, Gunel M: Linkage and copy number variation analysis of large families and sibling pairs demonstrates locus heterogeneity for familial intracranial aneurysms. Oral Presentation to the Congress of Neurological Surgeons Annual Meeting San Diego, California, September 15-20 2007.