

# Stanford

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## Karen G. Hirsch, MD

Associate Professor of Neurology and, by courtesy, of Neurosurgery  
Neurology & Neurological Sciences

### CLINICAL OFFICES

- **Stanford Neurocritical Care Program**

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Stanford, CA 94304

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### ACADEMIC CONTACT INFORMATION

- **Administrative Contact**

Haihong Nguyen - Administrative Associate

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**Tel** 650-723-7193

### Bio

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### CLINICAL FOCUS

- Neurology
- Stroke
- Traumatic Brain Injury
- Cardiac Arrest
- Coma
- Brain Death
- Hypoxic ischemic Brain Injury

### ACADEMIC APPOINTMENTS

- Associate Professor - University Medical Line, Neurology & Neurological Sciences
- Associate Professor - University Medical Line (By courtesy), Neurosurgery
- Member, Cardiovascular Institute
- Member, Wu Tsai Neurosciences Institute

### ADMINISTRATIVE APPOINTMENTS

- Division Chief, Neurocritical Care, Stanford University, Department of Neurology, (2018- present)

### BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Emergency Cardiovascular Care Committee, American Heart Association (2019 - present)

- Task Force Member, Adult Life Support, International Liaison Committee on Resuscitation (ILCOR) (2020 - present)
- Board of Directors, Neurocritical Care Society (2019 - present)

## PROFESSIONAL EDUCATION

- Board Certification: Neurocritical Care, American Board of Internal Medicine (2021)
- Board Certification: Neurology, American Board of Psychiatry and Neurology (2010)
- Fellowship: UCSF Dept of Neurology (2012) CA
- Residency, Johns Hopkins University , Neurology (2010)
- Internship, Stanford University , Internal Medicine (2007)
- MD, Stanford University (2006)
- Board Certification: Neurocritical Care, United Council for Neurologic Subspecialties (2013)

## Research & Scholarship

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### CURRENT RESEARCH AND SCHOLARLY INTERESTS

Dr. Karen G. Hirsch cares for critically ill patients with neurologic disorders in the intensive care unit. Dr. Hirsch's research focuses on using continuous and discrete multi-modal data to develop phenotypes and identify signatures of treatment responsiveness in patients with coma after cardiac arrest. She is the Co-PI of PRECICECAP (PRrecision Care In Cardiac ArrEst - ICECAP, NINDS R01 NS119825-01) and works closely with collaborators in data science at Stanford and with industry partners to apply machine learning analyses to the complex multi-modal ICU data. Dr. Hirsch also studies neuro-imaging in post-cardiac arrest coma and traumatic brain injury.

Additional research interests include a broad array of topics and Dr. Hirsch greatly appreciates the importance of team science and collaboration. Along with colleagues in Biomedical Ethics, Dr. Hirsch studies brain death and organ donation with a focus on ethical challenges and prediction models. Along with colleagues in Cardiac Anesthesia and Cardiothoracic Surgery, Dr. Hirsch studies neurologic outcomes in patients on mechanical circulatory support including ECMO.

Dr. Hirsch is broadly interested in improving neurologic outcomes after acute brain injury and identifying early phenotypes to guide precision medicine in neurocritical care, especially in patients with post-cardiac arrest brain injury.

## Teaching

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### COURSES

#### 2022-23

- Modern Ethical Challenges in Neuroscience and Organ Transplantation: HUMBIO 171E, MED 142 (Spr)

#### 2021-22

- A cultural, ethical, medical and legal exploration of Japanese and American Societies: OSPGEN 29 (Sum)
- Modern Ethical Challenges in Neuroscience and Organ Transplantation: HUMBIO 171E, MED 142 (Spr)

#### 2020-21

- Modern Ethical Challenges in Neuroscience and Organ Transplantation: MED 142 (Spr)

#### 2019-20

- Modern Ethical Challenges in Neuroscience and Organ Transplantation: MED 142 (Spr)

## Publications

### PUBLICATIONS

- **2022 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Pediatric Life Support; Neonatal Life Support; Education, Implementation, and Teams; and First Aid Task Forces** *CIRCULATION*  
Wyckoff, M. H., Greif, R., Morley, P. T., Ng, K., Olasveengen, T. M., Singletary, E. M., Soar, J., Cheng, A., Drennan, I. R., Liley, H. G., Scholefield, B. R., Smyth, M. A., Welsford, et al  
2022; 146 (25): E483-E557
- **Collateral status, hyperglycemia, and functional outcome after acute ischemic stroke.** *BMC neurology*  
Arteaga, D. F., Ulep, R., Kumar, K. K., Southerland, A. M., Conaway, M. R., Faber, J., Wintermark, M., Joyner, D., Sharashidze, V., Hirsch, K., Giurgiutiu, D., Hannawi, Y., Aziz, et al  
2022; 22 (1): 408
- **Effect of Rapid Response EEG on Anti-Seizure Medication Usage**  
Kurup, D., Davey, Z., Hoang, P., Wu, C., Werbaneth, K., Shah, V., Hirsch, K. G., Govindarajan, P., Meador, K. J.  
WILEY.2022: S88-S89
- **Correction to: Proceedings of the Second Curing Coma Campaign NIH Symposium: Challenging the Future of Research for Coma and Disorders of Consciousness.** *Neurocritical care*  
Mainali, S., Aiyagari, V., Alexander, S., Bodien, Y., Boerwinkle, V., Boly, M., Brown, E., Brown, J., Claassen, J., Edlow, B. L., Fink, E. L., Fins, J. J., Foreman, et al  
2022
- **Proceedings of the Second Curing Coma Campaign NIH Symposium: Challenging the Future of Research for Coma and Disorders of Consciousness.** *Neurocritical care*  
Mainali, S., Aiyagari, V., Alexander, S., Bodien, Y., Boerwinkle, V., Boly, M., Brown, E., Brown, J., Claassen, J., Edlow, B. L., Fink, E. L., Fins, J. J., Foreman, et al  
2022
- **Moving towards precision medicine in post-cardiac arrest care: Using cerebrovascular autoregulation to individualize blood pressure.** *Resuscitation*  
Rivera Lara, L., Genevieve Hirsch, K.  
2022
- **Prognostication of ICU Patients by Providers with and without Neurocritical Care Training.** *Neurocritical care*  
Finley Caulfield, A., Mlynash, M., Eyngorn, I., Lansberg, M. G., Afjei, A., Venkatasubramanian, C., Buckwalter, M. S., Hirsch, K. G.  
2022
- **Prediction of good neurological outcome in comatose survivors of cardiac arrest: a systematic review.** *Intensive care medicine*  
Sandroni, C., D'Arrigo, S., Cacciola, S., Hoedemaekers, C. W., Westhall, E., Kamps, M. J., Taccone, F. S., Poole, D., Meijer, F. J., Antonelli, M., Hirsch, K. G., Soar, J., Nolan, et al  
2022
- **Precision Care in Cardiac Arrest: ICECAP (PRECICECAP) Study Protocol and Informatics Approach.** *Neurocritical care*  
Elmer, J., He, Z., May, T., Osborn, E., Moberg, R., Kemp, S., Stover, J., Moyer, E., Geocadin, R. G., Hirsch, K. G., PRECICECAP Study Team  
2022
- **2021 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Neonatal Life Support; Education, Implementation, and Teams; First Aid Task Forces; and the COVID-19 Working Group** *CIRCULATION*  
Wyckoff, M. H., Singletary, E. M., Soar, J., Olasveengen, T. M., Greif, R., Liley, H. G., Zideman, D., Bhanji, F., Andersen, L. W., Avis, S. R., Aziz, K., Bendall, J. C., Berry, et al  
2022; 145 (9): E645-E721
- **Effect of rapid EEG on anti-seizure medication usage.** *Epileptic disorders : international epilepsy journal with videotape*  
Kurup, D., Davey, Z., Hoang, P., Wu, C., Werbaneth, K., Shah, V., Hirsch, K. G., Govindarajan, P., Meador, K. J.  
2022; 24 (5): 1-7

- **2021 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations Summary From the Basic Life Support; Advanced Life Support; Neonatal Life Support; Education, Implementation, and Teams; First Aid Task Forces; and the COVID-19 Working Group** *RESUSCITATION*  
Wyckoff, M. H., Singletary, E. M., Soar, J., Olasveengen, T. M., Greif, R., Liley, H. G., Zideman, D., Bhanji, F., Andersen, L. W., Avis, S. R., Aziz, K., Bendall, J. C., Berry, et al  
2021; 169: 229-311
- **Incidence of Cardiac Interventions and Associated Cardiac Arrest Outcomes in Patients with Nonshockable Initial Rhythms and No ST Elevation Post Resuscitation.** *Resuscitation*  
Harhash, A. A., May, T., Hsu, C., Seder, D. B., Dankiewicz, J., Agarwal, S., Patel, N., McPherson, J., Riker, R., Soreide, E., Hirsch, K. G., Stammet, P., Dupont, et al  
2021
- **Beyond the 'Good' in Good Neurologic Outcome: Recovery as a Critical Link in the Chain of Survival after Cardiac Arrest.** *Resuscitation*  
Vogelsong, M. A., Hirsch, K. G.  
2021
- **Proceedings of the First Curing Coma Campaign NIH Symposium: Challenging the Future of Research for Coma and Disorders of Consciousness.** *Neurocritical care*  
Claassen, J., Akbari, Y., Alexander, S., Bader, M. K., Bell, K., Bleck, T. P., Boly, M., Brown, J., Chou, S. H., Diringier, M. N., Edlow, B. L., Foreman, B., Giacino, et al  
2021; 35 (Suppl 1): 4-23
- **Risk Stratification Among Survivors of Cardiac Arrest Considered for Coronary Angiography.** *Journal of the American College of Cardiology*  
Harhash, A. A., May, T. L., Hsu, C., Agarwal, S., Seder, D. B., Mooney, M. R., Patel, N., McPherson, J., McMullan, P., Riker, R., Soreide, E., Hirsch, K. G., Stammet, et al  
2021; 77 (4): 360–71
- **Influence of sex on survival, neurologic outcomes, and neurodiagnostic testing after out-of-hospital cardiac arrest.** *Resuscitation*  
Vogelsong, M. A., May, T., Agarwal, S., Cronberg, T., Dankiewicz, J., Dupont, A., Friberg, H., Hand, R., McPherson, J., Mlynash, M., Mooney, M., Nielsen, N., O'Riordan, et al  
2021
- **Part 3: Adult Basic and Advanced Life Support 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care** *CIRCULATION*  
Panchal, A. R., Bartos, J. A., Cabanas, J. G., Donnino, M. W., Drennan, I. R., Hirsch, K. G., Kudenchuk, P. J., Kurz, M. C., Lavonas, E. J., Morley, P. T., O'Neil, B. J., Peberdy, M., Rittenberger, et al  
2020; 142: S366–S468
- **The association of partial pressures of oxygen and carbon dioxide with neurological outcome after out-of-hospital cardiac arrest: an explorative International Cardiac Arrest Registry 2.0 study.** *Scandinavian journal of trauma, resuscitation and emergency medicine*  
Ebner, F., Riker, R. R., Haxhija, Z., Seder, D. B., May, T. L., Ullen, S., Stammet, P., Hirsch, K., Forsberg, S., Dupont, A., Friberg, H., McPherson, J. A., Soreide, et al  
2020; 28 (1): 67
- **Prognostic value of diffusion-weighted MRI for post-cardiac arrest coma.** *Neurology*  
Hirsch, K. G., Fischbein, N., Mlynash, M., Kemp, S., Bammer, R., Eyngorn, I., Tong, J., Moseley, M., Venkatasubramanian, C., Caulfield, A. F., Albers, G.  
2020
- **A Standardized Checklist Improves the Transfer of Stroke Patients from the Neurocritical Care Unit to Hospital Ward.** *The Neurohospitalist*  
Murray, N. M., Joshi, A. N., Kronfeld, K., Hobbs, K., Bernier, E., Hirsch, K. G., Gold, C. A.  
2020; 10 (2): 100-108
- **A Standardized Checklist Improves the Transfer of Stroke Patients from the Neurocritical Care Unit to Hospital Ward** *NEUROHOSPITALIST*  
Murray, N. M., Joshi, A. N., Kronfeld, K., Hobbs, K., Bernier, E., Hirsch, K. G., Gold, C. A.  
2020; 10 (2): 100–108
- **Global Survey of Outcomes of Neurocritical Care Patients: Analysis of the PRINCE Study Part 2** *NEUROCRITICAL CARE*  
Rao, C., Suarez, J., Martin, R. H., Bauza, C., Georgiadis, A., Calvillo, E., Hemphill, J., Sung, G., Oddo, M., Taccone, F., LeRoux, P. D., Domeniconi, G., Alberto Camputaro, et al  
2020; 32 (1): 88–103

- **Will We Ever Make Headway in Severe Traumatic Brain Injury Treatment Trials?** *JAMA neurology*  
Murray, N. M., Threlkeld, Z. D., Hirsch, K. G.  
2020
- **Unsupervised learning of early post-arrest brain injury phenotypes.** *Resuscitation*  
Elmer, J. n., Coppler, P. J., May, T. L., Hirsch, K. n., Faro, J. n., Solanki, P. n., Brown, M. n., Puyana, J. S., Rittenberger, J. C., Callaway, C. W.  
2020
- **Early Head Computed Tomography Abnormalities Associated with Elevated Intracranial Pressure in Severe Traumatic Brain Injury.** *Journal of neuroimaging : official journal of the American Society of Neuroimaging*  
Murray, N. M., Wolman, D. N., Mlynash, M. n., Threlkeld, Z. D., Christensen, S. n., Heit, J. J., Harris, O. A., Hirsch, K. G.  
2020
- **Guidelines for the Acute Treatment of Cerebral Edema in Neurocritical Care Patients.** *Neurocritical care*  
Cook, A. M., Morgan Jones, G. n., Hawryluk, G. W., Mailloux, P. n., McLaughlin, D. n., Papangelou, A. n., Samuel, S. n., Tokumaru, S. n., Venkatasubramanian, C. n., Zacko, C. n., Zimmermann, L. L., Hirsch, K. n., Shutter, et al  
2020
- **2019 American Heart Association Focused Update on Systems of Care: Dispatcher-Assisted Cardiopulmonary Resuscitation and Cardiac Arrest Centers An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care** *CIRCULATION*  
Panchal, A. R., Berg, K. M., Cabanas, J. G., Kurz, M. C., Link, M. S., Del Rios, M., Hirsch, K. G., Chan, P. S., Hazinski, M., Morley, P. T., Donnino, M. W., Kudenchuk, P. J.  
2019; 140 (24): E895–E903
- **2019 American Heart Association Focused Update on Advanced Cardiovascular Life Support Use of Advanced Airways, Vasopressors, and Extracorporeal Cardiopulmonary Resuscitation During Cardiac Arrest An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care** *CIRCULATION*  
Panchal, A. R., Berg, K. M., Hirsch, K. G., Kudenchuk, P. J., Del Rios, M., Cabanas, J. G., Link, M. S., Kurz, M. C., Chan, P. S., Morley, P. T., Hazinski, M., Donnino, M. W.  
2019; 140 (24): E881–E894
- **Functional outcomes associated with varying levels of targeted temperature management after out-of-hospital cardiac arrest - An INTCAR2 registry analysis.** *Resuscitation*  
Johnsson, J., Wahlstrom, J., Dankiewicz, J., Annborn, M., Agarwal, S., Dupont, A., Forsberg, S., Friberg, H., Hand, R., Hirsch, K. G., May, T., McPherson, J. A., Mooney, et al  
2019
- **Correction to: Variability in functional outcome and treatment practices by treatment center after out-of-hospital cardiac arrest: analysis of International Cardiac Arrest Registry.** *Intensive care medicine*  
May, T. L., Lary, C. W., Riker, R. R., Friberg, H., Patel, N., Soreide, E., McPherson, J. A., Uden, J., Hand, R., Sunde, K., Stammet, P., Rubertsson, S., Belohlvaek, et al  
2019
- **Early withdrawal of life support after resuscitation from cardiac arrest is common and may result in additional deaths** *RESUSCITATION*  
Teresa, M. L., Robin, R., Richard, R. R., Hans, F., Nainesh, P., Eldar, S., Robert, H., Pascal, S., Allison, D., Karen, H. G., Sachin, A., Michael, W. J., Josef, et al  
2019; 139: 308–13
- **Translating Protective Hypothermia During Cardiac Arrest Into Clinical Practice** *JAMA-JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION*  
Hirsch, K. G., Callaway, C. W.  
2019; 321 (17): 1673–75
- **Variability in functional outcome and treatment practices by treatment center after out-of-hospital cardiac arrest: analysis of International Cardiac Arrest Registry** *INTENSIVE CARE MEDICINE*  
May, T. L., Lary, C. W., Riker, R. R., Friberg, H., Patel, N., Soreide, E., McPherson, J. A., Uden, J., Hand, R., Sunde, K., Stammet, P., Rubertsson, S., Belohlvaek, et al  
2019; 45 (5): 637–46
- **Variability in functional outcome and treatment practices by treatment center after out-of-hospital cardiac arrest: analysis of International Cardiac Arrest Registry.** *Intensive care medicine*  
May, T. L., Lary, C. W., Riker, R. R., Friberg, H., Patel, N., Soreide, E., McPherson, J. A., Uden, J., Hand, R., Sunde, K., Stammet, P., Rubertsson, S., Belohlvaek, et al

2019

- **Early withdrawal of life support after resuscitation from cardiac arrest is common and may result in additional deaths.** *Resuscitation*  
May, T. L., Ruthazer, R., Riker, R. R., Friberg, H., Patel, N., Soreide, E., Hand, R., Stammel, P., Dupont, A., Hirsch, K. G., Agarwal, S., Wanscher, M. J., Dankiewicz, et al  
2019
- **Translating Protective Hypothermia During Cardiac Arrest Into Clinical Practice.** *JAMA*  
Hirsch, K. G., Callaway, C. W.  
2019; 321 (17): 1673–75
- **The Prognostic Value of Quantitative Diffusion-Weighted MRI after Pediatric Cardiopulmonary Arrest.** *Resuscitation*  
Yacoub, M., Birchansky, B., Mlynash, M., Berg, M., Knight, L., Hirsch, K. G., Su, F., Revive Initiative at Stanford Childrens Health  
2018
- **2018 American Heart Association Focused Update on Advanced Cardiovascular Life Support Use of Antiarrhythmic Drugs During and Immediately After Cardiac Arrest: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care** *CIRCULATION*  
Panchal, A. R., Berg, K. M., Kudenchuk, P. J., Del Rios, M., Hirsch, K. G., Link, M. S., Kurz, M. C., Chan, P. S., Cabanas, J. G., Morley, P. T., Hazinski, M., Donnino, M. W.  
2018; 138 (23): E740–E749
- **The neuron specific enolase (NSE) ratio offers benefits over absolute value thresholds in post-cardiac arrest coma prognosis** *JOURNAL OF CLINICAL NEUROSCIENCE*  
Chung-Esaki, H. M., Mui, G., Mlynash, M., Eyngorn, I., Catabay, K., Hirsch, K. G.  
2018; 57: 99–104
- **Variation in Sedation and Neuromuscular Blockade Regimens on Outcome After Cardiac Arrest** *CRITICAL CARE MEDICINE*  
May, T. L., Riker, R. R., Fraser, G. L., Hirsch, K. G., Agarwal, S., Duarte, C., Friberg, H., Soreide, E., McPherson, J., Hand, R., Kent, D., Nielsen, N., Seder, et al  
2018; 46 (10): E975–E980
- **Quantitative EEG Metrics Differ Between Outcome Groups and Change Over the First 72 h in Comatose Cardiac Arrest Patients** *NEUROCRITICAL CARE*  
Wiley, S., Razavi, B., Krishnamohan, P., Mlynash, M., Eyngorn, I., Meador, K. J., Hirsch, K. G.  
2018; 28 (1): 51–59
- **Practical Pearl: Use of MRI to Differentiate Pseudo-subarachnoid Hemorrhage from True Subarachnoid Hemorrhage.** *Neurocritical care*  
Ho, A. L., Sussman, E. S., Pendharkar, A. V., Iv, M. n., Hirsch, K. G., Fischbein, N. J., Dodd, R. L.  
2018
- **QUANTITATIVE DIFFUSION-WEIGHTED MRI PREDICTS OUTCOMES IN SURVIVORS OF PEDIATRIC CARDIAC ARREST**  
Yacoub, M., Birchansky, B., Mlynash, M., Berg, M., Knight, L., Hirsch, K., Su, F.  
LIPPINCOTT WILLIAMS & WILKINS.2018: 149
- **The author replies.** *Critical care medicine*  
Hirsch, K. G.  
2017; 45 (3): e339-e340
- **Functional Neurologic Outcomes Change Over the First 6 Months After Cardiac Arrest.** *Critical care medicine*  
Tong, J. T., Eyngorn, I., Mlynash, M., Albers, G. W., Hirsch, K. G.  
2016; 44 (12): e1202-e1207
- **Development of a Mobile Tool That Semiautomatically Screens Patients for Stroke Clinical Trials.** *Stroke; a journal of cerebral circulation*  
Spokoyny, I., Lansberg, M., Thiessen, R., Kemp, S. M., Aksoy, D., Lee, Y., Mlynash, M., Hirsch, K. G.  
2016; 47 (10): 2652-2655
- **Multi-Center Study of Diffusion-Weighted Imaging in Coma After Cardiac Arrest.** *Neurocritical care*  
Hirsch, K. G., Mlynash, M., Eyngorn, I., Pirsaheli, R., Okada, A., Komshian, S., Chen, C., Mayer, S. A., Meschia, J. F., Bernstein, R. A., Wu, O., Greer, D. M., Wijman, et al  
2016; 24 (1): 82-89

- **Prognostic Value of Quantitative Diffusion-Weighted MRI in Patients with Traumatic Brain Injury.** *Journal of neuroimaging*  
Shakir, A., Aksoy, D., Mlynash, M., Harris, O. A., Albers, G. W., Hirsch, K. G.  
2016; 26 (1): 103-108
- **Prognostic Value of A Qualitative Brain MRI Scoring System After Cardiac Arrest** *JOURNAL OF NEUROIMAGING*  
Hirsch, K. G., Mlynash, M., Jansen, S., Persoon, S., Eyngorn, I., Krasnokutsky, M. V., Wijman, C. A., Fischbein, N. J.  
2015; 25 (3): 430-437
- **Very Early Administration of Progesterone for Acute Traumatic Brain Injury** *NEW ENGLAND JOURNAL OF MEDICINE*  
Wright, D. W., Yeatts, S. D., Silbergleit, R., Palesch, Y. Y., Hertzberg, V. S., Frankel, M., Goldstein, F. C., Caveney, A. F., Howlett-Smith, H., Bengelink, E. M., Manley, G. T., Merck, L. H., Janis, et al  
2014; 371 (26): 2457-2466
- **An Update on Neurocritical Care for the Patient With Kidney Disease** *ADVANCES IN CHRONIC KIDNEY DISEASE*  
Hirsch, K. G., Josephson, S. A.  
2013; 20 (1): 39-44
- **Treatment of Elevated Intracranial Pressure with Hyperosmolar Therapy in Patients with Renal Failure** *NEUROCRITICAL CARE*  
Hirsch, K. G., Spock, T., Koenig, M. A., Geocadin, R. G.  
2012; 17 (3): 388-394
- **Boomerang Sign on MRI** *NEUROCRITICAL CARE*  
Hirsch, K. G., Hoesch, R. E.  
2012; 16 (3): 450-451
- **Cerebral blood flow and cerebrovascular autoregulation in a swine model of pediatric cardiac arrest and hypothermia** *CRITICAL CARE MEDICINE*  
Lee, J. K., Brady, K. M., Mytar, J. O., Kibler, K. K., Carter, E. L., Hirsch, K. G., Hogue, C. W., Easley, R. B., Jordan, L. C., Smielewski, P., Czosnyka, M., Shaffner, D. H., Koehler, et al  
2011; 39 (10): 2337-2345
- **Clinical and Radiographic Natural History of Cervical Artery Dissections** *JOURNAL OF STROKE & CEREBROVASCULAR DISEASES*  
Schwartz, N. E., Vertinsky, A. T., Hirsch, K. G., Albers, G. W.  
2009; 18 (6): 416-423
- **Occurrence of Perimesencephalic Subarachnoid Hemorrhage During Pregnancy** *NEUROCRITICAL CARE*  
Hirsch, K. G., Froehler, M. T., Huang, J., Ziai, W. C.  
2009; 10 (3): 339-343
- **Inhibition of PI-3 kinase sensitizes human leukemic cells to histone deacetylase inhibitor-mediated apoptosis through p44/42 MAP kinase inactivation and abrogation of p21(CIP1/WAF1) induction rather than AKT inhibition** *ONCOGENE*  
Rahmani, M., Yu, C. R., Reese, E., Ahmed, W., Hirsch, K., Dent, P., Grant, S.  
2003; 22 (40): 6231-6242
- **The cyclin-dependent kinase inhibitor (CDKI) flavopiridol disrupts phorbol 12-myristate 13-acetate-induced differentiation and CDKI expression while enhancing apoptosis in human myeloid leukemia cells** *CANCER RESEARCH*  
Cartee, L., Wang, Z. L., Decker, R. H., Chellappan, S. P., Fusaro, G., Hirsch, K. G., Sankala, H. M., Dent, P., Grant, S.  
2001; 61 (6): 2583-2591