Stanford

Ivan Soltesz

James R. Doty Professor of Neurosurgery and Neurosciences

NIH Biosketch available Online

Bio

BIO

Ivan Soltesz received his doctorate in Budapest and conducted postdoctoral research at universities at Oxford, London, Stanford and Dallas. He established his laboratory at the University of California, Irvine, in 1995. He became full Professor in 2003, and served as department Chair from 2006 to July 2015. He returned to Stanford in 2015 as the James R. Doty Professor of Neurosurgery and Neurosciences at Stanford University School of Medicine. His major research interest is focused on neuronal microcircuits, network oscillations, cannabinoid signaling and the mechanistic bases of circuit dysfunction in epilepsy.

His laboratory employs a combination of closely integrated experimental and theoretical techniques, including closed-loop in vivo optogenetics, paired patch clamp recordings, in vivo electrophysiological recordings from identified interneurons in awake mice, 2-photon imaging, machine learning-aided 3D video analysis of behavior, video-EEG recordings, behavioral approaches, and large-scale computational modeling methods using supercomputers. He is the author of a book on GABAergic microcircuits (Diversity in the Neuronal Machine, Oxford University Press), and editor of a book on Computational Neuroscience in Epilepsy (Academic Press/Elsevier). He co-founded the first Gordon Research Conference on the Mechanisms of neuronal synchronization and epilepsy, and taught for five years in the Ion Channels Course at Cold Springs Harbor. He has over 30 years of research experience, with over 20 years as a faculty involved in the training of graduate students (total of 16, 6 of them MD/PhDs) and postdoctoral fellows (20), many of whom received fellowship awards, K99 grants, joined prestigious residency programs and became independent faculty.

ACADEMIC APPOINTMENTS

- Professor, Neurosurgery
- Member, Bio-X
- Member, Maternal & Child Health Research Institute (MCHRI)
- Member, Wu Tsai Neurosciences Institute

ADMINISTRATIVE APPOINTMENTS

- Assistant Professor, University of California, Irvine, (1995-1999)
- Associate Professor, University of California, Irvine, (1999-2003)
- Professor, University of California, Irvine, (2003-2015)
- Chair of Anatomy & Neurobiology, University of California, Irvine, (2006-2015)
- Chancellor's Professor, University of California, Irvine, (2011-2015)
- James R Doty Professor of Neurosurgery and Neurosciences, Stanford University, (2015- present)
- Vice Chair, Neurosurgery, Stanford University, (2015- present)

HONORS AND AWARDS

- Athalie Clark Research Award, University of California, Irvine (2005)
- Javits Neuroscience Investigator Award, NINDS-NIH (2005)
- Michael Prize in Epilepsy Research, Stiftung Michael, Germany (2009)
- Research Recognition Award, Basic Science, American Epilepsy Society (2011)
- Foreign Member, Hungarian Academy of Sciences (2016)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Co-Chair, Founder, Gordon Research Conference on Mechanisms of Epilepsy and Neuronal Synchronization (2006 - 2006)
- Chair, Basic Science Committee, American Epilepsy Society (2006 - 2009)
- Associate Editor, Journal of Neuroscience (2007 - 2012)
- Member, Editorial Board, Epilepsy Research (2008 - 2015)
- Member, Scientific Advisory Board, Citizens United in Research in Epilepsy (CURE) (2009 - 2012)
- Co-Chair, Grants and Fellowship Review Panel, Epilepsy Foundation (2010 - 2012)
- Chair, Clinical Neuroplasticity and Neurotransmitters (CNNT) study section, NIH (2011 - 2013)
- Member, Professional Advisory Board, Epilepsy Foundation (2011 - present)
- Member, Editorial Board, Experimental Neurology (2013 - present)
- Chair, Research recognition Awards Committee, American Epilepsy Society (2016 - present)

PROFESSIONAL EDUCATION

- Postdoc, UT Southwestern , Neuroscience (1994)
- Postdoc, Stanford University , Neuroscience (1993)
- Postdoc, Universite Laval , Neuroscience (1992)
- Postdoc, University of London , Neuroscience (1991)
- Postdoc, Oxford University , Neuroscience (1990)
- Ph.D., Eotvos University, Budapest , Comparative Physiology (1989)
- University Diploma, Eotvos University, Budapest , Biology (1988)

LINKS

- Soltesz Lab: https://solteszlab.com

Teaching

COURSES

2020-21

- NeuroTech Training Seminar: NSUR 239, STATS 242 (Spr)

2019-20

- NeuroTech Training Seminar: NSUR 239, STATS 242 (Spr)

STANFORD ADVISEES

Med Scholar Project Advisor

Mahad Ahmed, Shreya Malhotra

Doctoral Dissertation Reader (AC)

Omer Hazon, Francis Masuda, John Wen

Postdoctoral Faculty Sponsor

Alexandra Chatzikalymniou, Barna Dudok, Jordan Farrell, Tilo Gschwind, Ernie Hwaun, Peter Klein, Prannath Moolchand, Quynh Anh Nguyen

Doctoral Dissertation Advisor (AC)

Darian Hadjiabadi

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Neurosciences (Phd Program)

Publications

PUBLICATIONS

- **GABA-glutamate supramammillary neurons control theta and gamma oscillations in the dentate gyrus during paradoxical (REM) sleep.** *Brain structure & function*
  Billwiller, F., Castillo, L., Elseedy, H., Ivanov, A. I., Scapula, J., Ghestem, A., Carponcy, J., Libourel, P. A., Bras, H., Abdelmeguid, N. E., Krook-Magnuson, E., Soltesz, I., Bernard, et al
  2020

- **In vivo assessment of mechanisms underlying the neurovascular basis of postictal amnesia.** *Scientific reports*
  Farrell, J. S., Colangeli, R., Dudok, B., Wolff, M. D., Nguyen, S. L., Jackson, J., Dickson, C. T., Soltesz, I., Teskey, G. C.
  2020; 10 (1): 14992

- **Connecting Pathological Cellular Mechanisms to Large-Scale Seizure Structures.** *Trends in neurosciences*
  Nguyen, Q., Moolchand, P., Soltesz, I.
  2020

- **Neurological Impairments in Mice Subjected to Irradiation and Chemotherapy.** *Radiation research*
  Dey, D., Parihar, V. K., Szabo, G. G., Klein, P. M., Tran, J., Moayyad, J., Ahmed, F., Nguyen, Q., Murry, A., Merriott, D., Nguyen, B., Goldman, J., Angulo, et al
  2020

- **Optogenetic intervention of seizures improves spatial memory in a mouse model of chronic temporal lobe epilepsy.** *Epilepsia*
  Kim, H. K., Gschwind, T., Nguyen, T. M., Bui, A. D., Felong, S., Ampig, K., Suh, D., Ciernia, A. V., Wood, M. A., Soltesz, I.
  2020

- **Mitigation of helium irradiation-induced brain injury by microglia depletion.** *Journal of neuroinflammation*
  Allen, B. D., Syage, A. R., Maroso, M. n., Baddour, A. A., Luong, V. n., Minasyan, H. n., Giedzinski, E. n., West, B. L., Soltesz, I. n., Limoli, C. L., Baulch, J. E., Acharya, M. M.
  2020; 17 (1): 159

- **Regulation of gamma-frequency oscillation by feedforward inhibition: A computational modeling study** *HIPPOCAMPUS*
  Renno-Costa, C., Teixeira, D., Soltesz, I.
  2019; 29 (10): 957–70

- **Resolving the Micro-Macro Disconnect to Address Core Features of Seizure Networks** *NEURON*
  Farrell, J. S., Quynh-Anh Nguyen, Soltesz, I.
  2019; 101 (6): 1016–28

- **Ripple-related firing of identified deep CA1 pyramidal cells in chronic temporal lobe epilepsy in mice.** *Epilepsia open*
  Marchionni, I. n., Oberoi, M. n., Soltesz, I. n., Alexander, A. n.
  2019; 4 (2): 254–63

- **New Concerns for Neurocognitive Function during Deep Space Exposures to Chronic, Low Dose-Rate, Neutron Radiation.** *eNeuro*
  Acharya, M. M., Baulch, J. E., Klein, P. M., Baddour, A. A., Apodaca, L. A., Kramár, E. A., Alikhani, L. n., Garcia, C. n., Angulo, M. C., Batra, R. S., Fallgren, C. M., Borak, T. B., Stark, et al

2019; 6 (4)

- **Data-Driven Modeling of Normal and Pathological Oscillations in the Hippocampus** *MULTISCALE MODELS OF BRAIN DISORDERS*
  Raikov, I., Soltesz, I., Cutsuridis
  2019; 13: 185–92

- **Plants come to mind: Phytocannabinoids, endocannabinoids, and the control of seizures.** *Addiction (Abingdon, England)*
  Farrell, J. S., Soltesz, I.
  2018

- **Neural stem cell lineage-specific cannabinoid type-1 receptor regulates neurogenesis and plasticity in the adult mouse hippocampus.** *Cerebral cortex (New York, N.Y. : 1991)*
  Zimmermann, T., Maroso, M., Beer, A., Baddenhausen, S., Ludewig, S., Fan, W., Vennin, C., Loch, S., Berninger, B., Hofmann, C., Korte, M., Soltesz, I., Lutz, et al
  2018

- **Proceedings of the Epilepsy Foundation's 2017 Cannabinoids in Epilepsy Therapy Workshop**
  Huizenga, M. N., Fureman, B. E., Soltesz, I., Stella, N.
  ACADEMIC PRESS INC ELSEVIER SCIENCE.2018: 237–42

- **Persistent nature of alterations in cognition and neuronal circuit excitability after exposure to simulated cosmic radiation in mice** *EXPERIMENTAL NEUROLOGY*
  Parihar, V. K., Maroso, M., Syage, A., Allen, B. D., Angulo, M. C., Soltesz, I., Limoli, C. L.
  2018; 305: 44–55

- **CA1 pyramidal cell diversity enabling parallel information processing in the hippocampus** *NATURE NEUROSCIENCE*
  Soltesz, I., Losonczy, A.
  2018; 21 (4): 484–93

- **Dentate gyrus mossy cells control spontaneous convulsive seizures and spatial memory** *Science*
  Bui, A., et al
  2018: 787–90

- **Dentate gyrus mossy cells control spontaneous convulsive seizures and spatial memory.** *Science (New York, N.Y.)*
  Bui, A. D., Nguyen, T. M., Limouse, C. n., Kim, H. K., Szabo, G. G., Felong, S. n., Maroso, M. n., Soltesz, I. n.
  2018; 359 (6377): 787–90

- **Single Bursts of Individual Granule Cells Functionally Rearrange Feedforward Inhibition.** *The Journal of neuroscience : the official journal of the Society for Neuroscience*
  Neubrandt, M. n., Oláh, V. J., Brunner, J. n., Marosi, E. L., Soltesz, I. n., Szabadics, J. n.
  2018; 38 (7): 1711–24

- **Plants come to mind: Phytocannabinoids, endocannabinoids, and the control of seizures** *Addiction*
  Farrell, J. S., Soltesz, I.
  2018: 1343–45

- **Optogenetics: Lighting a Path from the Laboratory to the Clinic** *OPTOGENETICS: A ROADMAP*
  Kim, H. K., Alexander, A. L., Soltesz, I., Stroh, A.
  2018; 133: 277–300

- **Persistent nature of alterations in cognition and neuronal circuit excitability after exposure to simulated cosmic radiation in mice** *Exp Neurol*
  Parihar, V., et al
  2018

- **Single Bursts of Individual Granule Cells Functionally Rearrange Feedforward Inhibition** *Journal of Neuroscience*
  Neubrandt, M., et al
  2018: 1711–24

- **Seizing Control: From Current Treatments to Optogenetic Interventions in Epilepsy** *NEUROSCIENTIST*
  Bui, A. D., Alexander, A., Soltesz, I.
  2017; 23 (1): 68-81

- **Involvement of fast-spiking cells in ictal sequences during spontaneous seizures in rats with chronic temporal lobe epilepsy** *Brain*
  Neumann, A., et al
  2017

- **Hippocampal Dentate Mossy Cells Improve Their CV and Trk into the Limelight.** *Neuron*
  Milstein, A. D., Soltesz, I. n.
  2017; 95 (4): 732–34

- **Involvement of fast-spiking cells in ictal sequences during spontaneous seizures in rats with chronic temporal lobe epilepsy.** *Brain : a journal of neurology*
  Neumann, A. R., Raedt, R. n., Steenland, H. W., Sprengers, M. n., Bzymek, K. n., Navratilova, Z. n., Mesina, L. n., Xie, J. n., Lapointe, V. n., Kloosterman, F. n., Vonck, K. n., Boon, P. A., Soltesz, et al
  2017; 140 (9): 2355–69

- **Extended Interneuronal Network of the Dentate Gyrus.** *Cell reports*
  Szabo, G. G., Du, X. n., Oijala, M. n., Varga, C. n., Parent, J. M., Soltesz, I. n.
  2017; 20 (6): 1262–68

- **Network Models of Epilepsy-Related Pathological Structural and Functional Alterations in the Dentate Gyrus** *REWIRING BRAIN: A COMPUTATIONAL APPROACH TO STRUCTURAL PLASTICITY IN THE ADULT BRAIN*
  Raikov, I., Plitt, M., Soltesz, I., VanOoyen, A., ButzOstendorf, M.
  2017: 485–503

- **Extended Interneuronal Network of the Dentate Gyrus** *Cell Rep*
  Szabo, G., et al
  2017: 1262–68

- **Hippocampal Dentate Mossy Cells Improve Their CV and Trk into the Limelight** *Neuron*
  Milstein, A., Soltesz, I.
  2017

- **Interneuronal mechanisms of hippocampal theta oscillations in a full-scale model of the rodent CA1 circuit.** *eLife*
  Bezaire, M. J., Raikov, I., Burk, K., Vyas, D., Soltesz, I.
  2016; 5

- **Neurophysiology of space travel: energetic solar particles cause cell type-specific plasticity of neurotransmission.** *Brain structure & function*
  Lee, S., Dudok, B., Parihar, V. K., Jung, K., Zöldi, M., Kang, Y., Maroso, M., Alexander, A. L., Nelson, G. A., Piomelli, D., Katona, I., Limoli, C. L., Soltesz, et al
  2016: -?

- **Target-selectivity of parvalbumin-positive interneurons in layer II of medial entorhinal cortex in normal and epileptic animals.** *Hippocampus*
  Armstrong, C., Wang, J., Yeun Lee, S., Broderick, J., Bezaire, M. J., Lee, S., Soltesz, I.
  2016; 26 (6): 779-793

- **Target-Selectivity of Parvalbumin-Positive Interneurons in Layer II of Medial Entorhinal Cortex in Normal and Epileptic Animals** *HIPPOCAMPUS*
  Armstrong, C., Wang, J., Lee, S. Y., Broderick, J., Bezaire, M. J., Lee, S., Soltesz, I.
  2016; 26 (6): 779-793

- **Hippogate: a break-in from entorhinal cortex.** *Nature neuroscience*
  Alexander, A., Soltesz, I.
  2016; 19 (4): 530-532

- **Cannabinoid Control of Learning and Memory through HCN Channels** *NEURON*
  Maroso, M., Szabo, G. G., Kim, H. K., Alexander, A., Bui, A. D., Lee, S., Lutz, B., Soltesz, I.
  2016; 89 (5): 1059-1073

- **Organization and control of epileptic circuits in temporal lobe epilepsy.** *Progress in brain research*
  Alexander, A., Maroso, M., Soltesz, I.
  2016; 226: 127-154

- **Brain State Is a Major Factor in Preseizure Hippocampal Network Activity and Influences Success of Seizure Intervention** *JOURNAL OF NEUROSCIENCE*

Ewell, L. A., Liang, L., Armstrong, C., Soltesz, I., Leutgeb, S., Leutgeb, J. K.
2015; 35 (47): 15635-15648

- **Pass-Through Code of Synaptic Integration.** *Neuron*
  Szabo, G. G., Soltesz, I.
  2015; 87 (6): 1124-1126

- **Optogenetics: 10 years after ChR2 in neurons-views from the community** *NATURE NEUROSCIENCE*
  Adamantidis, A., Arber, S., Bains, J. S., Bamberg, E., Bonci, A., Buzsaki, G., Cardin, J. A., Costa, R. M., Dan, Y., Goda, Y., Graybiel, A. M., Haeusser, M., Hegemann, et al
  2015; 18 (9): 1202–12

- **Regulation of fast-spiking basket cell synapses by the chloride channel ClC-2** *NATURE NEUROSCIENCE*
  Foldy, C., Lee, S., Morgan, R. J., Soltesz, I.
  2010; 13 (9): 1047-1049