

Jumpei Tsukuda reports having received Public Trust Foundation of Marumo ER Medicine & Research Institute (2016) and JSPS KAKENHI Grant Number JP18K16524 (2018).

#### Conflicts of Interest

All authors report that they have no conflicts of interest.

#### Reference

Ahn, A., Nasir, A., Malik, H., D'Orazi, F., & Parnia, S. (2013). A pilot study examining the role of regional cerebral oxygen saturation monitoring as a marker of return of spontaneous circulation in shockable (VF/VT) and non-shockable (PEA/Asystole) causes of cardiac arrest. *Resuscitation*, 84(12), 1713-1716.

doi:10.1016/j.resuscitation.2013.07.026

Asim, K., Gokhan, E., Ozlem, B., Ozcan, Y., Deniz, O., Kamil, K., . . . Selman, Y. (2014).

Near infrared spectrophotometry (cerebral oximetry) in predicting the return of

spontaneous circulation in out-of-hospital cardiac arrest. *Am J Emerg Med*, 32(1), 14-17. doi:10.1016/j.ajem.2013.09.010

Cournoyer, A., Iseppon, M., Chauny, J. M., Denault, A., Cossette, S., & Notebaert, E. (2016). Near-infrared Spectroscopy Monitoring During Cardiac Arrest: A Systematic Review and Meta-analysis. *Acad Emerg Med*, 23(8), 851-862.

doi:10.1111/acem.12980

Deakin, C. D., Yang, J., Nguyen, R., Zhu, J., Brett, S. J., Nolan, J. P., . . . Parnia, S. (2016). Effects of epinephrine on cerebral oxygenation during cardiopulmonary resuscitation: A prospective cohort study. *Resuscitation*, 109, 138-144.

doi:10.1016/j.resuscitation.2016.08.027

Ehara, N., Hirose, T., Shiozaki, T., Wakai, A., Nishimura, T., Mori, N., . . . Shimazu, T. (2017). The relationship between cerebral regional oxygen saturation during extracorporeal cardiopulmonary resuscitation and the neurological outcome in a retrospective analysis of 16 cases. *J Intensive Care*, 5, 20.

doi:10.1186/s40560-017-0216-1

Fire and Disaster Management Agency, M. o. I. A. a. C. (2013). The current state of emergency and rescue, 2013 edition in Tokyo. Japanese edition.

Genbrugge, C., De Deyne, C., Eertmans, W., Anseeuw, K., Voet, D., Mertens, I., . . . Dens, J. (2018). Cerebral saturation in cardiac arrest patients measured with near-infrared technology during pre-hospital advanced life support. Results from Copernicus I cohort study. *Resuscitation*, 129, 107-113. doi:10.1016/j.resuscitation.2018.03.031

Goldberger, Z. D., Chan, P. S., Berg, R. A., Kronick, S. L., Cooke, C. R., Lu, M., . . . Nallamothu, B. K. (2012). Duration of resuscitation efforts and survival after in-hospital cardiac arrest: an observational study. *Lancet*, 380(9852), 1473-1481. doi:10.1016/s0140-6736(12)60862-9

Koenig, M. A. (2014). Brain resuscitation and prognosis after cardiac arrest. *Crit Care Clin*, 30(4), 765-783. doi:10.1016/j.ccc.2014.06.007

Koyama, Y., Wada, T., Lohman, B. D., Takamatsu, Y., Matsumoto, J., Fujitani, S., & Taira, Y. (2013). A new method to detect cerebral blood flow waveform in synchrony with

chest compression by near-infrared spectroscopy during CPR. *Am J Emerg Med*, 31(10), 1504-1508. doi:10.1016/j.ajem.2013.07.002

Larsen, M. P., Eisenberg, M. S., Cummins, R. O., & Hallstrom, A. P. (1993). Predicting survival from out-of-hospital cardiac arrest: a graphic model. *Ann Emerg Med*, 22(11), 1652-1658.

Lee, J. M., Grabb, M. C., Zipfel, G. J., & Choi, D. W. (2000). Brain tissue responses to ischemia. *J Clin Invest*, 106(6), 723-731. doi:10.1172/jci11003

Meaney, P. A., Bobrow, B. J., Mancini, M. E., Christenson, J., de Caen, A. R., Bhanji, F., . . . Leary, M. (2013). Cardiopulmonary resuscitation quality: [corrected] improving cardiac resuscitation outcomes both inside and outside the hospital: a consensus statement from the American Heart Association. *Circulation*, 128(4), 417-435. doi:10.1161/CIR.0b013e31829d8654

Nelskyla, A., Nurmi, J., Jousi, M., Schramko, A., Mervaala, E., Ristagno, G., & Skrifvars, M. B. (2017). The effect of 50% compared to 100% inspired oxygen fraction on

brain oxygenation and post cardiac arrest mitochondrial function in experimental cardiac arrest. *Resuscitation*, 116, 1-7. doi:10.1016/j.resuscitation.2017.04.022

Neumar, R. W., Shuster, M., Callaway, C. W., Gent, L. M., Atkins, D. L., Bhanji, F., . . . Hazinski, M. F. (2015). Part 1: Executive Summary: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*, 132(18 Suppl 2), S315-367.  
doi:10.1161/CIR.000000000000252

Nosrati, R., Lin, S., Ramadeen, A., Monjazebi, D., Dorian, P., & Toronov, V. (2017). Cerebral Hemodynamics and Metabolism During Cardiac Arrest and Cardiopulmonary Resuscitation Using Hyperspectral Near Infrared Spectroscopy. *Circ J*, 81(6), 879-887. doi:10.1253/circj.CJ-16-1225

Perkins, G. D., Jacobs, I. G., Nadkarni, V. M., Berg, R. A., Bhanji, F., Biarent, D., . . . Nolan, J. P. (2015). Cardiac Arrest and Cardiopulmonary Resuscitation Outcome Reports: Update of the Utstein Resuscitation Registry Templates for Out-of-Hospital Cardiac Arrest: A Statement for Healthcare Professionals From a

Task Force of the International Liaison Committee on Resuscitation (American Heart Association, European Resuscitation Council, Australian and New Zealand Council on Resuscitation, Heart and Stroke Foundation of Canada, InterAmerican Heart Foundation, Resuscitation Council of Southern Africa, Resuscitation Council of Asia); and the American Heart Association Emergency Cardiovascular Care Committee and the Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation. *Resuscitation*, 96, 328-340. doi:10.1016/j.resuscitation.2014.11.002

Perkins, G. D., Travers, A. H., Berg, R. A., Castren, M., Considine, J., Escalante, R., . . . Vaillancourt, C. (2015). Part 3: Adult basic life support and automated external defibrillation: 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. *Resuscitation*, 95, e43-69. doi:10.1016/j.resuscitation.2015.07.041

Prosen, G., Strnad, M., Doniger, S. J., Markota, A., Stozer, A., Borovnik-Lesjak, V., & Mekis, D. (2018). Cerebral tissue oximetry levels during prehospital management of

cardiac arrest - A prospective observational study. *Resuscitation*, 129, 141-145.

doi:10.1016/j.resuscitation.2018.05.014

Sandroni, C., D'Arrigo, S., & Nolan, J. P. (2018). Prognostication after cardiac arrest. *Crit*

*Care*, 22(1), 150. doi:10.1186/s13054-018-2060-7

Schnaubelt, S., Sulzgruber, P., Menger, J., Skhirtladze-Dworschak, K., Sterz, F., &

Dworschak, M. (2018). Regional cerebral oxygen saturation during

cardiopulmonary resuscitation as a predictor of return of spontaneous circulation

and favourable neurological outcome - A review of the current literature.

*Resuscitation*, 125, 39-47. doi:10.1016/j.resuscitation.2018.01.028

Sinha, N., & Parnia, S. (2017). Monitoring the Brain After Cardiac Arrest: a New Era. *Curr*

*Neurol Neurosci Rep*, 17(8), 62. doi:10.1007/s11910-017-0770-x

Steppan, J., & Hogue, C. W., Jr. (2014). Cerebral and tissue oximetry. *Best Pract Res Clin*

*Anaesthesiol*, 28(4), 429-439. doi:10.1016/j.bpa.2014.09.002

Tsukuda, J., Fujitani, S., Morisawa, K., Shimozawa, N., Lohman, B. D., Okamoto, K., . . .

Taira, Y. (2018). Near-infrared spectroscopy monitoring during out-of-hospital

cardiac arrest: can the initial cerebral tissue oxygenation index predict ROSC?

*Emerg Med J.* doi:10.1136/emermed-2018-207533

Weng, T. I., Huang, C. H., Ma, M. H., Chang, W. T., Liu, S. C., Wang, T. D., & Chen, W. J.

(2004). Improving the rate of return of spontaneous circulation for out-of-hospital cardiac arrests with a formal, structured emergency resuscitation team.

*Resuscitation*, 60(2), 137-142. doi:10.1016/j.resuscitation.2003.09.007