

## Medical Policy Reference Manual Medical Policy

### 2.01.011 Electrocorticography

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#### Description

Electrocorticography (ECoG) uses epidural or subdural electrodes to record the electroencephalogram (EEG) from the cerebral cortex. ECoG is an invasive procedure; a craniotomy is required for implantation of the electrodes. The purpose of ECoG is to localize a suspected seizure focus in the cerebral cortex in patients who are candidates for surgery.

#### Policy

Operative electrocorticography is considered **medically necessary** for the purpose of recording seizures for surgical evaluation, as outlined in the Policy Guidelines.

Operative ECoG is considered **experimental / investigational** for stimulation and recording in order to determine electrical thresholds of neurons as an indicator of seizure focus as it does not meet TEC criteria # 2 - 5.

The use of electrocorticography is considered **not medically necessary** for all other conditions.

#### Policy Guidelines

Prior to undergoing ECoG for the purpose of recording seizures for surgical evaluation:

- the patient must have debilitating seizures intractable to anticonvulsant medication;
- the patient must have undergone standard testing which does not clearly localize a seizure focus but does indicate strongly the presence of a focus; and
- the suspected seizure focus must be in an area of the brain which is accessible for surgery.

#### Rationale:

No controlled peer-reviewed studies were found which validate the application of electrocorticography for conditions other than those conditions outlined in the Policy Guidelines.

TEC

1. The technology must have final approval from the appropriate U.S. government regulatory bodies
2. The scientific evidence must permit conclusions concerning the effect on health outcomes
3. The technology must improve the net health outcome
4. The technology must be as effective as any established alternatives
5. The improvement must be attainable outside the investigational settings

#### Update 2008:

A search of the peer-reviewed literature was performed for the period of August 2006 through August 2008. Findings in the recent literature do not change the conclusions on electrocorticography. Therefore, the policy statements are unchanged.

#### Update 2010:

A search of the peer-reviewed literature was performed for the period of September 2008 through September 2010. Findings in the recent literature do not change the conclusions on electrocorticography. Therefore, the policy statements are unchanged.

#### Update 2012:

A search of the peer-reviewed literature was performed for the period of September 2010 through October 2012. Findings in the recent literature do not change the conclusions on electrocorticography. Therefore, the policy statements are unchanged.

#### Update 2014

A search of the peer-reviewed literature was performed for the period of November 2012 through October 2014. Findings in the recent literature do not change the conclusions on electrocorticography. Therefore, the policy statements are unchanged.

#### Update 2017:

A search of the peer-reviewed literature was performed for the period of November 2014 through January 2017. Findings in the recent literature do not change the conclusions on electrocorticography. Therefore, the policy statements are unchanged.

#### Update 2019:

A search of the peer-reviewed literature was performed for the period of February 2017 through February 2019. Findings in the recent literature do not change the conclusions on electrocorticography. Therefore, the policy statements are unchanged.

#### Update 2021:

A search of the peer-reviewed literature was performed for the period of February 2019 through March 2021. Findings in the recent literature do not change the conclusions on electrocorticography. Therefore, the policy statements are unchanged.

#### PMA

“Services utilizing devices approved through the pre-market approval (PMA) process are designated as not medically necessary when not meeting the criteria above.”

## **Cross References to Related Policies and Procedures**

*Magnetoencephalography and Magnetic Source Imaging 6.01.036*

## **References**

**The following were among the resources reviewed and considered in developing this policy. By reviewing and considering the resources, CareFirst does not in any way endorse the contents thereof nor assume any liability or responsibility in connection therewith. The opinions and conclusions of the authors of these resources are their own, and may or may not be in agreement with those of CareFirst.**

BlueCross and BlueShield Association. (1996, March 31; 2003, February; 2009-Archived). *Electrocorticography*. (Medical Policy 7.01.34). Chicago: Author.

BlueCross and BlueShield Association. (1988, August). *TEC Evaluation: Specialized techniques in electroencephalography*. Chicago: Author.

BlueCross and BlueShield Association. (2013, October; 2016, September; 2018, July, 2020 November, *Archived* ). Medical Policy 6.01.21. Magnetoencephalography/Magnetic source imaging. Chicago: Author.

BlueCross and BlueShield Association. (2014, May; 2016, May, 2020, May). Medical Policy 7.01.58. Intraoperative neurophysiologic monitoring (sensory-evoked potentials, motor-evoked potentials, EEG monitoring). Chicago: Author.

Brang, D., Dai, Z., Zheng W., Towle, V. L. (2016, November). Registering imaged ECoG electrodes to human cortex: A geometry-based technique. *Journal of Neuroscience Methods*. 273:64-73. doi: 10.1016/j.jneumeth.2016.08.007.

Cascino, G., (2020) Surgical treatment of epilepsy in adults, UptoDate, Waltham, MA (2020).

Ghaffari-Rafi, A., et al (2020). Investigatory pathway and principles of patient selection for epilepsy surgery candidates: a systematic review. *BMC neurology*, 20(1), 100. <https://doi.org/10.1186/s12883-020-01680-w> Jayakar, P., Dunoyer, C., Dean, P., et al (2008, May). Epilepsy surgery in patients with normal or nonfocal MRI scans: integrative strategies offer long-term seizure relief. *Epilepsia*. 49(5):758-64.

Karatas, A., Erdem, A., Savas, A., Kutlu, G., Yagmurlu, B., Erden, I., Bilir, E. (2004, April). Identification and removal of an epileptogenic lesion using Ictal-EEG, functional-neuronavigation and electrocorticography. *Journal Clinical Neuroscience*, (3), 343-346.

Keene, D.L., Whiting, S., Ventureyra, E.C. (2000). *Electrocorticography*. *Epileptic Disorders*, 2(1), 57-63.

Kuruvilla, A., Flink, R. (2003). Intraoperative electrocorticography in epilepsy surgery: useful or not? *Seizure*, (8), 577-584.

Liem, L.K., MD (2007, April). Intraoperative neurophysiological monitoring. *eMedicine*. Retrieved August 7, 2008 from the World Wide Web: <http://www.emedicine.com/neuro/topic102.htm>

Lipson, Michael, MD (2021), Overview of contact lenses, UptoDate, Waltham, MA (2020).

Muh, C. R. (2016, May). Current and emerging surgical therapies for severe pediatric epilepsies. *Seminars in Pediatric Neurology*, 23(2):143-50. doi: 10.1016/j.spen.2016.05.005.

National Institute of Neurological Disorders and Stroke (2008, August). Seizure and Epilepsy: Hope Through Research. Retrieved August 26, 2008 from the World Wide Web: [http://www.ninds.nih.gov/disorders/epilepsy/detail\\_epilepsy.htm](http://www.ninds.nih.gov/disorders/epilepsy/detail_epilepsy.htm)

Oertel, J., Gaab, M.R., Runge, U., Schroeder, H.W., Wagner, W., Piek, J. (2004, March) Neuronavigation and complication rate in epilepsy surgery. *Neurosurgery Review*.

Quesney, L.P. & Niedermeyer, E. (1999). *Electrocorticography*. In Mitchell, C. (Ed.) *Electroencephalography: Basic principles, clinical applications, and related fields*. Baltimore: Williams and Wilkins.

- Qui, B., Ou, S., Song, T., Hu, J., You, L., Wang, Y., & Wang, Y. (2014, June). Intraoperative electrocorticography-guided microsurgical management for patients with onset of supratentorial neoplasms manifesting as epilepsy: a review of 65 cases. *Epileptic Disorders* 16(2), 175-184. doi : 10.1684/epd.2104.0662
- Ramirez, M. I., Rodriguez-Arias, L. R., Santiago, A. O., Pizano, A. O., Zamora, R. L., et al (2016, June). Correlation between bispectral index and electrocorticographic features during epilepsy surgery. *Clinical EEG and Neuroscience*. doi:10.1177/1550059416654850.
- Robertson, F.C., Ullrich, N.J., Manley, P.E., Al-Sayegh, H., Ma, C., Goumnerova, L.C. (2018, July). The impact of intraoperative electrocorticography on seizure outcome after resection of pediatric brain tumors: A cohort study, *Neurosurgery*, nyy342, <https://doi.org/10.1093/neuros/nyy342>
- Surgery for Epilepsy. (1990, March). NIH Consensus Statement [Online]. Retrieved March 17, 2001 from the World Wide Web: [http://odp.od.nih.gov/consensus/cons/077/077\\_statement.htm](http://odp.od.nih.gov/consensus/cons/077/077_statement.htm)
- Symon, L., Thomas, D. & Clark, K. (1989). *Operative surgery: Neurosurgery* (4th ed.). London: Butterworth.
- Templer, J. W., Gavvala, J. R., Tate, M. C., Schuele, S. U. (2016, July). Reexamining the value of intraoperative electrocorticography during awake craniotomy. *World Neurosurgery*, 91:655. doi: 10.1016/j.wneu.2015.10.083.
- Tripathi, M., Garg, A., Gaikwad, S., et al (2010, March). Intra-operative electrocorticography in lesional epilepsy. *Epilepsy Res*, 89(1):133-41
- von Leha, M., Wellmer, J., Urbach, H., et al (2009, October). Epilepsy surgery for insular lesions. *Rev Neurol (Paris)*. 165(10):755-61.
- Wasade, V.S., Elisevich, K., Schultz, L., Jafari-Khouzani, K., et al. (2012, September). Analysis of scalp EEG and quantitative MRI in cases of temporal lobe epilepsy requiring intracranial electrographic monitoring. *Br J Neurosurg*. Retrieved from the world wide web on September 28, 2012 at <http://www.ncbi.nlm.nih.gov/pubmed/22989366>
- Yang, T., Hakimian, S., & Schwartz, T.H. (2014, September). Intraoperative electroCorticoGraphy (ECog): indications, techniques, and utility in epilepsy surgery. *Epileptic Disorders*, 16 (3), 271-279. doi : 10.1684/epd.2014.0675
- Yao, P-S, Zheng, S-F, Wang, F., Kang, D-Z, Lin, Y.Z. (2018, March). Surgery guided with intraoperative electrocorticography in patients with low-grade glioma and refractory seizures. *Journal of Neurosurgery*, Vol 128, Iss 3. DOI: <https://doi.org/10.3171/2016.11.JNS161296>

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