

Corporate Medical Policy

Signal-Averaged ECG

File Name: signal_averaged_ecg
Origination: 7/1992
Last Review: 10/2023

Description of Procedure or Service

Signal-averaged electrocardiography (SAECG) is a technique involving computerized analysis of small segments of a standard EKG to detect abnormalities, termed ventricular late potentials, that would be otherwise obscured by "background" skeletal muscle activity. Ventricular late potentials reflect aberrant, asynchronous electrical impulses arising from viable isolated cardiac muscle bordering an infarcted area and are thought to be responsible for ventricular tachyarrhythmias. Therefore, ventricular late potentials, as measured by SAECG, have been investigated as a risk factor for arrhythmic events in patients with a variety of cardiac conditions, including cardiomyopathy and prior history of myocardial infarction.

Patients considered being at high risk of ventricular arrhythmias and thus sudden death may be treated with drugs to suppress the emergence of arrhythmias or implantable cardiac defibrillators (ICD) to promptly detect and terminate tachyarrhythmias when they occur. Since sudden cardiac death, whether from arrhythmias or pump failure, is one of the most common causes of death after a previous myocardial infarction, there is intense interest in risk stratification to target therapy. Patient groups are divided into those who have not experienced a life-threatening arrhythmia (i.e., primary prevention) and those who have (i.e., secondary prevention).

SAECG is just one of many risk factors that have been investigated. Others include left ventricular ejection fraction, arrhythmias detected on Holter monitor or electrophysiologic studies, heart rate variability, and baroreceptor sensitivity. T-wave alternans is another technique for risk stratifications. T-wave alternans measures beat-to-beat variability, while SAECG measures beat-averaged conduction.

*****Note: This Medical Policy is complex and technical. For questions concerning the technical language and/or specific clinical indications for its use, please consult your physician.**

Policy

Signal-averaged ECG is considered investigational for all applications. BCBSNC does not provide coverage for investigational services or procedures.

Benefits Application

This medical policy relates only to the services or supplies described herein. Please refer to the Member's Benefit Booklet for availability of benefits. Member's benefits may vary according to benefit design; therefore member benefit language should be reviewed before applying the terms of this medical policy.

When Signal-Averaged ECG is covered

Signal-Averaged ECG

Not Applicable

When Signal-Averaged ECG is not covered

Signal-averaged electrocardiography is considered investigational, including, but not limited to, its use:

- as a technique of risk stratification for arrhythmias after prior myocardial infarction;
- in individuals with cardiomyopathy;
- in individuals with syncope;
- as an assessment of success after surgery for arrhythmia;
- in the detection of acute rejection of heart transplants;
- as an assessment of efficacy of antiarrhythmic drug therapy;
- in the assessment of success of pharmacological, mechanical, or surgical interventions to restore coronary artery blood flow.

Policy Guidelines

Signal-averaged ECG has some ability to risk stratify patients at risk for ventricular arrhythmias. However, this predictive ability is modest, and this technique has not been used to stratify patients into clinically relevant categories of risk. Some RCTs have used signal-averaged ECG for selection of patients at high risk of ventricular arrhythmias, but these studies have not demonstrated outcome benefits for the treatments under study. Signal-averaged ECG has also been tested as a diagnostic test for a variety of cardiac-related disorders, but the evidence is insufficient to demonstrate clinical utility for any of the conditions tested. Therefore, signal-averaged ECG has not demonstrated improvements in health outcomes and remains investigational for all indications.

An UpToDate review on “Clinical applications of the signal-averaged electrocardiogram: Overview” (Narayan and Cain, 2014) states “Guideline Recommendations -- We agree with the 2008 American Heart Association (AHA)/American College of Cardiology (ACC)/Heart Rhythm Society (HRS) scientific statement on noninvasive risk stratification and the 2006 ACC/AHA/European Society of Cardiology (ESC) guidelines for management of patients with ventricular arrhythmias, which concluded that the SAECG may be useful to identify patients at low risk for SCD, but its routine use to identify patients at high risk for SCD is not yet adequately supported. Similarly, the 2006 AHA/ACC scientific statement on syncope concluded that routine use of T-wave alternans combined with signal-averaged ECG and assessment of heart rate variability in patients with syncope and a negative initial evaluation is not yet established and currently is not indicated”.

Billing/Coding/Physician Documentation Information

This policy may apply to the following codes. Inclusion of a code in this section does not guarantee that it will be reimbursed. For further information on reimbursement guidelines, please see Administrative Policies on the Blue Cross Blue Shield of North Carolina web site at www.bcbssc.com. They are listed in the Category Search on the Medical Policy search page.

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Applicable service codes: 93278

BCBSNC may request medical records for determination of medical necessity. When medical records are requested, letters of support and/or explanation are often useful, but are not sufficient documentation unless all specific information needed to make a medical necessity determination is included.

Scientific Background and Reference Sources

Independent Review by Senior Medical Director Medical Affairs - 7/92

TEC Bulletin 11/95

Specialty Matched Consultant Advisory Panel - 11/1999

Medical Policy Advisory Group - 12/2/1999

Specialty Matched Consultant Advisory Panel - 12/2001

Specialty Matched Consultant Advisory Panel - 12/2003

Specialty Matched Consultant Advisory Panel - 11/2005

BCBSA Medical Policy Reference Manual [Electronic Version]. 2.02.04, 4/25/06.

BCBSA Medical Policy Reference Manual [Electronic Version]. 2.02.04, 8/02/07

Cain ME, Anderson JL, Arnsdork MF, et al. ACC expert consensus document. Signal-averaged electrocardiography. *J Am Coll Cardiol* 1996; 27(1):238-49. Retrieved 1/27/09 from <http://www.cardiosource.com/guidelines/consensus/signal.pdf>

Zipes DP, Camm AJ, Borggrefe M, Buxton AE, Chaitman B, Fromer M, Gregoratos G, Klein G, Moss AJ, Myerburg RJ, Priori SG, Quinones MA, Roden DM, Silka MJ, Tracy C. ACC/AHA/ESC 2006 guidelines for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death: a report of the American College of Cardiology/American Heart Association Task Force and the European Society of Cardiology Committee for Practice Guidelines (Writing Committee to Develop Guidelines for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death). *J Am Coll Cardiol* 2006;48:e247– e346.

BCBSA Medical Policy Reference Manual [Electronic Version]. 2.02.04, 5/19/09

Okutucu S, Oto A. Risk stratification in nonischemic dilated cardiomyopathy: Current perspectives. *Cardiol J*. 2010;17(3):219-29. Retrieved on September 28, 2010 from <http://www.ncbi.nlm.nih.gov/pubmed/20535711>

Tamaki S, Yamada T, Okuyama Y, Morita T, et al. Cardiac iodine-123 metaiodobenzylguanidine imaging predicts sudden cardiac death independently of left ventricular ejection fraction in patients with chronic heart failure and left ventricular systolic dysfunction: results from a comparative study with signal-averaged electrocardiogram, heart rate variability, and QT dispersion. *J Am Coll Cardiol*. 2009 Feb 3;53(5):426-35. Retrieved on September 28, 2010 from <http://content.onlinejacc.org/cgi/reprint/53/5/426.pdf>

Specialty Matched Consultant Advisory Panel review 10/2010

Signal-Averaged ECG

BCBSA Medical Policy Reference Manual [Electronic Version]. 2.02.04, 12/9/10

Liew, R. (2011), Electrocardiogram-Based Predictors of Sudden Cardiac Death in Patients With Coronary Artery Disease. *Clinical Cardiology*, 34: 466–473. doi: 10.1002/clc.20924. Retrieved on September 16, 2011 from <http://onlinelibrary.wiley.com/doi/10.1002/clc.20924/pdf>

Goldberger JJ, Cain ME, Hohnloser SH et al. American Heart Association/American College of Cardiology Foundation/Heart Rhythm Society Scientific Statement on Noninvasive Risk Stratification Techniques for Identifying Patients at Risk for Sudden Cardiac Death. A scientific statement from the American Heart Association Council on Clinical Cardiology Committee on Electrocardiography and Arrhythmias and Council on Epidemiology and Prevention. *J Am Coll Cardiol* 2008; 52(14):1179-99. Retrieved from <http://circ.ahajournals.org/content/118/14/1497.long>

BCBSA Medical Policy Reference Manual [Electronic Version]. 2.02.04, 12/8/11

BCBSA Medical Policy Reference Manual [Electronic Version]. 2.02.04, 12/10/12

Shturman A, Bickel A, Atar S. The predictive value of P-wave duration by signal-averaged electrocardiogram in acute ST elevation myocardial infarction. *The Israel Medical Association journal* : IMAJ 2012; 14(8):493-7.

Specialty Matched Consultant Advisory Panel review 10/2013

Medical Director review 10/2013

Specialty Matched Consultant Advisory Panel review 11/2014

Senior Medical Director review 12/2014

Narayan SM, Cain ME. Clinical applications of the signal-averaged electrocardiogram: Overview. *UpToDate* [serial online]. Waltham, MA: UpToDate; reviewed September 17, 2015.

Specialty Matched Consultant Advisory Panel review 10/2015

Senior Medical Director review 10/2015

Specialty Matched Consultant Advisory Panel review 10/2016

Senior Medical Director review 10/2016

Specialty Matched Consultant Advisory Panel review 10/2017

Medical Director review 10/2017

Specialty Matched Consultant Advisory Panel review 10/2018

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Policy Implementation/Update Information

7/92	Original policy developed
4/96	Re-evaluated: Statement added “patient must have organic heart disease and history on non-sustained ventricular tachycardia. Signal-averaged EKG in most patients post myocardial infarction who do not have ventricular tachycardia is investigational”.
5/99	Reformatted, description of service changed, medical term definitions added.
12/99	Reaffirmed, Medical Policy Advisory Group
10/00	System coding changes.
12/01	Specialty Matched Consultant Advisory Panel review. No change in criteria.
12/03	Specialty Matched Consultant Advisory Panel review. No change in criteria. Reaffirm policy. Reformatting changes for consistency.
11/17/05	Biennial policy review. Specialty Matched Consultant Advisory Panel review
11/07/05	No change to policy.
11/19/07	Specialty Matched Consultant Advisory Panel review meeting 10/29/07. No change to policy statement. (adn)
8/3/09	Description section revised. Policy statement changed to read, "BCBSNC will not provide coverage for signal-averaged ECG. It is considered investigational and BCBSNC does not cover investigational services." Criteria in the When Covered section was deleted. Statement in the When it is Not Covered section was revised to read: "Signal- averaged electrocardiography is considered investigational, including, but not limited to, its use as a technique of risk stratification for arrhythmias: after prior myocardial infarction; in patients with cardiomyopathy; in patients with syncope; as an assessment of success after surgery for arrhythmia; in the detection of acute rejection of heart transplants; as an assessment of efficacy of antiarrhythmic drug therapy; or in the assessment of success of pharmacological, mechanical, or surgical interventions to restore coronary artery blood flow." Rationale for change to investigational status added to Policy Guidelines section. References updated. Notification given 8/3/09. Effective date 11/9/09. (adn)
12/7/09	Specialty Matched Consultant Advisory Panel review 10/30/09. Policy accepted as written. (adn)

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- 6/22/10 Policy Number(s) removed (amw)
- 11/23/10 Specialty Matched Consultant Advisory Panel review 10/2010. Updated references.(mco)
- 11/8/11 Specialty Matched Consultant Advisory Panel review 10/2011. References updated. Policy Guidelines updated. No changes to Policy Statements. (mco)
- 11/13/12 Specialty Matched Consultant Advisory Panel review 10/2012. References updated. Policy Guidelines updated. No changes to Policy Statements. (mco)
- 1/29/13 References updated. No changes to Policy Statement. (mco)
- 11/12/13 Specialty Matched Consultant Advisory Panel review 10/2013. References updated. Medical Director review 10/2013. No changes to Policy Statements. (mco)
- 1/27/15 References updated. Specialty Matched Consultant Advisory Panel review 11/2014. Senior Medical Director review 12/2014. No changes to Policy intent. (td)
- 12/30/15 Policy Guidelines section updated. References updated. Specialty Matched Consultant Advisory Panel review 10/29/2015. Senior Medical Director review 10/2015. (td)
- 11/22/16 Specialty Matched Consultant Advisory Panel review 10/2016. Senior Medical Director review 10/2016. (jd)
- 11/10/17 Specialty Matched Consultant Advisory Panel review 10/2017. Senior Medical Director review 10/2017. (jd)
- 11/9/18 Specialty Matched Consultant Advisory Panel review 10/2018. Senior Medical Director review 10/2018. (jd)
- 10/29/19 Specialty Matched Consultant Advisory Panel review 10/2019. Senior Medical Director review 10/2019. (jd)
- 11/10/20 Specialty Matched Consultant Advisory Panel review 10/2020. Senior Medical Director review 10/2020. (jd)
- 11/2/21 Specialty Matched Consultant Advisory Panel review 10/2021. Medical Director review 10/2021. (jd)
- 11/1/22 References updated. Specialty Matched Consultant Advisory Panel review 10/2022. Medical Director review 10/2022. (tm)
- 11/7/23 Description section and References updated. Not Covered section edited for clarity, no change to policy statement. Specialty Matched Consultant Advisory Panel review 10/2023. Medical Director review 10/2023. (tm)

Medical policy is not an authorization, certification, explanation of benefits or a contract. Benefits and eligibility are determined before medical guidelines and payment guidelines are applied. Benefits are determined by the group contract and subscriber certificate that is in effect at the time services are rendered. This document is solely provided for informational purposes only and is based on research of current medical literature and review of common medical practices in the treatment and diagnosis of disease. Medical practices and knowledge are constantly changing and BCBSNC reserves the right to review and revise its medical policies periodically.