

<b>Policy</b>	<b>MM-066</b>
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Originated Department	Clinical Operations

## Myocardial Strain Imaging

### Audience

Providers, Members, Brokers, MHC

### Purpose

Medical policies provide general support for applying Mountain Health Co-Op member policy document coverage decisions and must reference the member-specific benefit plan document. The terms of the member-specific Policy document may differ from the standard benefit plan on which this medical policy is based. If there is a conflict between a member-specific policy document and the Mountain Health Co-Op medical policy, the member-specific policy document supersedes this medical policy. Any person(s) applying this medical policy must identify member eligibility, the member-specific policy document, and related policies or guidelines before applying this medical policy, including the existence of any state or federal guidance. Mountain Health Co-Op medical policies are designed for informational purposes only and are not an authorization, explanation of benefits, or contract. Receipt of benefits is subject to satisfaction of all terms and conditions of the member-specific policy document coverage. Mountain Health Co-Op reserves the sole discretionary right to modify all policies and guidelines at any time.

### Definition

Myocardial strain refers to the deformation (shortening, lengthening, or thickening) of the myocardium through the cardiac cycle. Myocardial strain can be measured by tissue Doppler imaging or, more recently, speckle-tracking echocardiography. Speckle-tracking echocardiography uses imaging software to assess the movement of specific markers in the myocardium that are detected in standard echocardiograms. It is proposed that a reduction in myocardial strain may indicate sub-clinical impairment of the heart and can be used to inform treatment before development of symptoms and irreversible myocardial dysfunction.

## Policy/Procedure

**Mountain Health Co-Op does NOT cover myocardial strain imaging/testing in individuals who have exposure to medications or radiation that could result in cardiotoxicity as it is considered investigational.**

**Mountain Health Co-Op does NOT cover myocardial strain imaging/testing for any other circumstance as it is considered investigational.**

### 1. Clinical Rationale

- 1.1** No direct evidence of the clinical utility of myocardial strain imaging (MSI) is currently available. The Strain Surveillance of Chemotherapy for Improving Cardiovascular Outcomes (SUCCOUR) trial is the first randomized controlled trial of MSI and will provide evidence to inform guidelines regarding the place of MSI for surveillance for cardiotoxicity related to cancer chemotherapy. Preliminary descriptive results on the first 86 patients have been published (Negishi, 2018). SUCCOUR is a randomized controlled trial evaluating clinical outcomes for patients who are monitored by myocardial strain imaging or conventional imaging. Patients with an abnormal test result will receive improved blood pressure and glucose control. Protective therapy with ACE inhibitors and beta blockers will be titrated to target dose. This is the first trial to assess clinical outcomes based on myocardial strain imaging compared to conventional imaging (limited to evaluation of ejection fraction and valve disease). The SUCCOUR trial will provide evidence to inform guidelines regarding the place of global longitudinal strain for surveillance for cardiotoxicity. In 2023, a 3 year follow-up from the SUCCOUR trial concluded “The results of this study show that a GLS-based strategy for early detection and treatment of CTRCD was not superior to an EF-based strategy. Rather than being a problem of imaging, these results reflect the low probability of developing LV dysfunction in the overall group and suggest that a more selective strategy for imaging surveillance is warranted.”(Negishi et al.)
- 1.2** Using a modified Delphi approach, the panel rated indications as “appropriate”, “may be appropriate”, and “not appropriate”. The specific studies that formed the basis of the ACC guidelines are not cited, however, they note that they used ACC/American Heart Association clinical practice guidelines whenever possible. Of 81 indications considered for strain rate imaging, the panel rated only 4 as “appropriate”. Three of the four concerned evaluation (initial or follow-up) in patients prior to and following exposure to potentially cardiotoxic agents. The other indication was follow-up testing to clarify initial diagnostic testing for patients with suspected hypertrophic cardiomyopathy. The guidelines did not separate out imaging with speckle tracking and tissue Doppler, and did not make recommendations related to the comparative effectiveness of these imaging modalities. The panel rated 14 other indications “may be appropriate”. According to the panel, interventions in this category should be performed depending on individual clinical patient circumstances and patient and provider preferences, including shared decision making (Hendel, 2018).
- 1.3** In 2017, Reichek notes that evaluation of echocardiographic speckle-tracking (ST) systolic strains and cardiac magnetic resonance imaging (CMR) tagging strain rates have emerged as an important focus in assessment of conditions that impair

myocardial function. Development of focused clinical roles for strain imaging has been very slow, despite the fact that methods for strain imaging have been available for nearly 30 years. There have been recurrent concerns about the reliability of echocardiographic strain values, as ST and CMR do not agree on absolute values of global strains. To fully understand the potential of these tests, integration of physiological analysis with strain and strain rate evaluation is needed. Strains, like all myocardial function indices, are variable over time, and their values at a given point in time are determined by afterload and preload at the myocyte level and intrinsic load-independent myocardial contractility and myocardial composition. Because such determination of material properties in intact heart is not feasible at present, assessment of afterload and preload at the myocardial level is limited and somewhat problematic. Finally, the determination of load-independent contractility noninvasively is challenging. It may be feasible using the single-beat noninvasive ventricular elastance approach, but this has not been explored and might not be adequate for strain applications. In conclusion, strain imaging has a long way to go to realize its full potential.

- 1.4** In a 2021 systematic review McGregor assessed the literature on myocardial strain imaging for detection of cardiotoxicity from chemotherapy in cancer patients. A total of 31 studies were identified. Of these, only two reported hard clinical endpoints such as cardiac events and development of clinical heart failure. No assessment of study quality or meta-analysis was reported. There was some overlap with the 2014 systematic review discussed below, but most studies were published more recently than that systematic review's search dates. The majority of included studies assessed patients with breast cancer, while some included hematologic malignancies, and three included patients with sarcoma. Overall, the review concluded that myocardial strain imaging has benefits, such as helping to overcome limitations of LVEF assessment adding reliability to diagnosis and prognostication regarding subclinical cardiotoxicity, but also limitations, such as variations in strain values based on loading conditions and patient-related factors.
- 1.5** In 2020, Hayes provided a health technology assessment of myocardial strain imaging (MSI) using speckle-tracking echocardiography for diagnosis and prognosis in patients who have dilated cardiomyopathy (DCM). Patients enrolled in the reviewed studies were adults who had known or suspected DCM with ischemic or idiopathic etiology. No studies evaluating the use of MSI in children with DCM met inclusion criteria. The evidence base for this report comprises 13 prospective or retrospective cohort studies and 4 prospective or retrospective case-control studies that evaluated diagnostic or prognostic uses of MSI in patients with DCM. A study of 50 adverse cardiac events (ACE) in 87 DCM patients found that early diastolic strain rate (DSR) had the highest accuracy for prognosis of ACE. Accuracy based on an area under the receiver-operating characteristic curve (AUC) was 0.91 for early DSR, a statistically significant improvement in AUC versus the MSI parameters global longitudinal strain (GLS) (0.79), mechanical dispersion (MD) (0.79), and systolic strain rate (0.69) and all other echocardiographic parameters. No other studies reported measurement of DSR. One study found that left ventricular torsion had 92% sensitivity and 73% specificity for prognosis of myocardial recovery but none of the other studies reported measurement of this

MSI parameter. A study in 130 DCM patients that evaluated MSI for prognosis of response to cardiac resynchronization therapy (CRT) found that radial intraventricular dyssynchrony and right atrial area (RAA) index had significant correlations with response to CRT and that RAA index had 87% sensitivity and 95% specificity for prognosis of response. In conclusion, Hayes found that the available studies have not provided sufficient evidence to evaluate diagnostic uses of MSI in DCM patients. Although some prognostic studies found that certain MSI parameters had statistically significant correlations with health outcomes, results were inconsistent across studies and the parameter that appeared most accurate for prognosis (early DSR) was only measured in one study. Also, no studies of the clinical utility of MSI were identified to evaluate whether the diagnostic and prognostic information obtained from MSI can be used to improve patient management. Therefore, additional studies are needed to identify the optimal MSI parameters in DCM patients and demonstrate that MSI provides meaningful improvements in health outcomes for patients. A 2022 update to the Hayes review continued to have insufficient evidence to evaluate diagnostic uses of MSI in DCM patients due to the small number and diverse applications in MSI diagnostic studies.

- 1.6** In collaboration with 9 other professional organizations, including the American Association for Thoracic Surgery (AATS), American Heart Association (AHA), American Society of Echocardiography (ASE), American Society of Nuclear Cardiology (ASNC), Heart Rhythm Society (HRS), Society for Cardiovascular Angiography and Interventions (SCAI), Society of Cardiovascular Computed Tomography (SCCT), Society for Cardiovascular Magnetic Resonance (SCMR), and the Society of Thoracic Surgeons (STS), the American College of Cardiology (ACC) published appropriate use guidelines for multimodality cardiac imaging in the assessment of cardiac structure and function in nonvalvular heart disease in 2019 (Doherty et. al.). These guidelines state that myocardial strain or strain rate imaging with speckle echocardiography may be appropriate for the following indications related to cardiomyopathy:
- a)** Initial screening evaluation of first-degree relative of patient with inherited cardiomyopathy.
  - b)** Initial evaluation of patients who have signs or symptoms of suspected acquired or inherited cardiomyopathy.
  - c)** Comprehensive evaluation of undefined cardiomyopathy.
  - d)** Reevaluation of known cardiomyopathy with a change in clinical status or cardiac examination or to guide therapy.
- 1.7** There were no indications for which myocardial strain or strain rate imaging were deemed as appropriate in patients with cardiomyopathy. These recommendations do not provide an evidence basis for clinical utility of this testing even in these circumstances.
- 1.8** A 2017 summary (Armenian et. al.) from the American Society of Clinical Oncology (ASCO) guideline on Prevention and Monitoring of Cardiac Dysfunction in Survivors of Adult Cancers found that measurement of strain has been demonstrated to have some diagnostic and prognostic use in patients with cancer receiving cardiotoxic therapies but that there have been no studies demonstrating that early intervention

based on changes in strain alone can result in changes in risk and improved outcomes. The ASCO also notes that screening for asymptomatic cardiac dysfunction using advanced imaging could lead to added distress in cancer survivors.

### **Applicable Coding**

#### **CPT Codes**

**93356** Myocardial strain imaging using speckle tracking-derived assessment of myocardial mechanics (List separately in addition to codes for echocardiography imaging)

#### **HCPCS Codes**

No applicable codes

### **Vendors**

- **Personify**
- **HPS**

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  - K190913: QLAB Advanced Quantification Software 13.0; Philips Healthcare; June 18, 2019;
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Review/Revision/Approval History	
Date	Description
07/11/2024	New Policy
04/27/2026	Reviewed and approved by Mountain Health CO-OP Policy Committee

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