
Medical Policy



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Please reference the appropriate certificate or contract for benefit information. This policy may be updated and is therefore subject to change.

***Current Policy Effective Date: 7/1/26**

(See policy history boxes for previous effective dates)

Title: Stem Cell Transplant for Spinal Cord Injury

Description

Stem cells are immature cells that can develop into specialized cells throughout the body, classified as either adult or embryonic. Adult stem cells are present in developed tissues and act as a repair system, while embryonic stem cells are produced when a newly fertilized egg begins to divide. Embryonic stem cells, derived from early embryos, can become any cell type. Their versatility offers virtually limitless medical applications.

Medical Policy Statement

Stem cell transplantation for the treatment of spinal cord injuries is experimental/investigational. There is insufficient evidence to determine that the technology results in an improvement in net health outcomes.

Inclusionary and Exclusionary Guidelines

N/A

CPT/HCPCS Level II Codes *(Note: The inclusion of a code in this list is not a guarantee of coverage. Please refer to the medical policy statement to determine the status of a given procedure)*

Established codes:

N/A

Other codes (investigational, not medically necessary, etc.):

22899

Background

Stem cells are categorized further by their potency, or their potential to differentiate into other types of cells. Embryonic stem cells are the most potent since they must become every type of cell in the body. The full classification includes:

- **Totipotent.** In the early stages after fertilization, immediately after a sperm and egg join and begin dividing, stem cells are totipotent. These cells can form *any* type of cell, including those cells necessary for an embryo to develop into a human, such as placenta cells.
- **Pluripotent.** Several days after conception, as an embryo begins to develop, its stem cells become pluripotent. Such cells can form any kind of cell found in adults, making them very versatile. However, unlike totipotent stem cells, they cannot become cells necessary for an embryo to develop into a human. Cells with similar properties are also found in fetal cells.
- **Multipotent.** Eventually, pluripotent stem cells become multipotent stem cells, the type found in adults. Multipotent stem cells can no longer develop into all or most cell types. They develop into certain cell types within a specific tissue, organ or system, e.g., bone marrow stem cells can develop into all types of blood cells and stem cells found in the brain can turn into nerve cells and other types of brain cells.

Human fetal stem cell therapy can be compared to a bone marrow transplant, which has proven to be a successful treatment for a variety of malignant, autoimmune and genetic diseases. The primary advantage of fetal stem cell transplantation is that unlike a traditional bone marrow or umbilical cord blood stem cell transplant, there is no need for the difficult task of locating a donor match.

Stem cells from both animal and human tissues are being studied. A major unresolved question is how stem cells develop into cells that facilitate regeneration, e.g., nerve cells or cells that produce myelin versus cells that prevent regeneration, e.g., scar tissue. Once nerve cells can be reliably obtained from stem cells, they must be able to grow according to the type of cell lines described above. Tissue from a growing fetus contains stem cells, progenitor cells (1 that originates or sets a pattern) and various surrounding substances that support growth. These can all help with regeneration. The advantage in using stem cells is that they can develop into several cell types, depending on the signals they receive. Research is examining if these cells can develop and then re-establish lost circuits when transplanted into the spinal cord.

Specialists have harvested and implanted human olfactory tissue into injured spinal cords. Olfactory tissue, which covers about 1 inch of the upper nasal cavity, contains many cells with regenerative potential, including renewable neurons, progenitor stem cells and remyelinating olfactory ensheathing cells. Olfactory neurons readily regenerate from a pool of progenitor stem cells and can produce insulating myelin sheaths around both growing and damaged spinal cord axons, secrete various neuronal growth factors and produce structural and matrix macromolecules that lay the foundation for axonal elongation. Between 2001 and 2003, 7 participants with spinal cord injuries ranging from C4–T6 neurological levels received implanted

human olfactory tissue. The return of bladder sensation was reported in 2 of the 7 participants after the 15th month, and 6 of 7 participants showed some improvement in both motor and sensory function. The researchers noted that overall participants exhibited a modest amount of improvement in function that is not normally observed in complete spinal cord injuries. However, the researchers emphasized that much follow up work is needed to document long-term benefits and any delayed side effects.

Regulatory Status:

N/A

Summary of Evidence:

There are multiple obstacles surrounding stem cell research, including the technical challenge of obtaining stem cells, their ability to transform into different kinds of cells and learning how to manipulate the application of each one, unforeseen alterations in phenotypes, potential risk for tumors, possible immune reactions, and figuring out the best route for safe and efficacious administration based on expected outcomes. Embryonic stem cells are easier to develop into unspecialized cells, but techniques to reproduce them reliably in the laboratory have not been established. Improved techniques for triggering them to differentiate into the specific types of cells are also needed. Ethical questions may also arise because embryonic stem cells are derived from embryos created in vitro, using donated eggs fertilized in a laboratory. Gathering embryonic stem cells requires destroying the embryo that for some may represent the destruction of human life. In addition, there are laws in the United States that place limitations on the use of embryonic stem cells for research.

Rationale

Clinical trials associated with spinal cord injury remains in its infancy. Currently, there are trials in progress using mice, rats and dogs in attempts to repair damaged spinal cords and improve mobility as a result of cord injury. Animal studies have had varied results, including some rodents with improvement in functional movement. Although stem cell transplantation for spinal cord injuries have shown promise, there is no definitive evidence of long-term cell survival or long-term beneficial effects. The most effective treatment strategies, including cell type, dose, route, and timing, is yet to be determined. There are multiple ongoing studies that address spinal cord injuries regarding the cervical, thoracic and lumbar regions and the effect of stem cell transplantation.

Authors agree that spinal cord injury (SCI) is a complicated disease that progresses over time, producing a worsening of the injured nerve tissue that exacerbates the clinical outcome. There are no efficacious and safe treatments available in the management of this pathology. Stem cell transplantation represents a hope in the field of regenerative medicine that aims to find a cure for the devastating disease of spinal cord injury.

Silvestro et al (2020) reported on current clinical studies recorded on ClinicalTrial.gov during 2005-2019 which were aimed at evaluating the use of stem cell-based therapy in SCI. Several

in vivo studies and human trials demonstrated that the use of stem cells as a therapeutic tool induces an improvement of motor function and neurological condition. Although stem cells represent an important therapeutic strategy, they still have several limitations. An overview of the clinical trials indicated a limited understanding in multiple areas of stem cell use. Many of the studies reported a small number of participants. Even though slightly improved sensory function was observed, longitudinal studies with important positive effects in motor function are still missing. It seems clear that stem cell implants warrant additional clinical data. The expected results and future research are needed to optimize the employment of cell therapy in individuals with SCI. Additionally, ongoing trials will be useful for researchers to clarify clinical use of stem cells as therapy for SCI.

Yamazaki et al (2020) reviewed published clinical trials with a focus on the different methodologies used in order to highlight unsolved issues in the treatment of spinal cord injury. The effects, impacts, strategies, and related mechanisms were evaluated. Most of these clinical trials were single-centered, investigator-oriented trials. No consensus was found regarding the most effective methods, including transplantation timing, cell type, cell dosage, and transplantation route. Authors concluded that the heterogeneous results of clinical trials using stem cells for spinal cord injury treatment suggests a need for further assessment and basic experimentation.

Huang et al (2021) investigated the effect of different stem cells on spinal cord injuries. The report focused on stem cell therapies including bone marrow mesenchymal stem cells, umbilical mesenchymal stem cells, adipose-derived mesenchymal stem cells, neural stem cells, neural progenitor cells, embryonic stem cells, induced pluripotent stem cells, and extracellular vesicles. Each cell type was found to target certain features of spinal cord injury pathology. Many preclinical studies and clinical trials found that single-cell treatments had only limited benefits for spinal cord injuries. Authors indicated the growing consensus is that a combined treatment is needed.

Damianakis et al (2022) reviewed 6 clinical trials (n=42) which provided stem cell therapy to individuals with spinal cord injuries. Among the studies reviewed, administration techniques, number of cells per dose, number of treatments, frequency, and follow-up periods had major variances. Spinal cord injuries were found to be an extremely variable population based on the severity, location, and age of the injury. The inconsistency makes it difficult for the trial results to be compared. Authors concluded that although every clinical trial offers great knowledge, stem cell therapy for spinal cord injuries is still in its infancy as several concerns need to be addressed including, ethical issues, tumorigenicity, immunogenicity, and immunotoxicity of various stem cells. A deeper understanding of the pathophysiological mechanisms of spinal cord injury appears to be essential to determine the best treatment. Large, well-designed, long-term clinical trials with control groups need to be completed.

Liu et al (2024) analyzed the number and quality of publications related to stem cell therapy in spinal cord injury between 2018 and 2023. The goal was to gain an intuitive understanding of how the field is progressing. A review of 2,150 valid papers indicated that stem cell transplantation for SCI may be a focus of future research.

Government Regulations

National:

The NCD titled “Stem Cell Transplantation” (110.23) Effective date 1/27/16.
Does not address stem cell transplantation for spinal cord injury.

Local:

There is no LCD for this service.

(The above Medicare information is current as of the review date for this policy. However, the coverage issues and policies maintained by the Centers for Medicare & Medicare Services [CMS, formerly HCFA] are updated and/or revised periodically. Therefore, the most current CMS information may not be contained in this document. For the most current information, the reader should contact an official Medicare source.)

Related Policies

N/A

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The articles reviewed in this research include those obtained in an Internet based literature search for relevant medical references through April 1, 2026, the date the research was completed.

Joint BCBSM/BCN Medical Policy History

Policy Effective Date	BCBSM Signature Date	BCN Signature Date	Comments
12/8/05	12/8/05	12/1/05	Joint medical policy established.
5/1/07	3/1/07	4/30/07	Routine maintenance
1/1/10	10/13/09	10/13/09	Routine maintenance
5/1/12	2/21/12	2/21/12	Routine maintenance; updated references; no change in policy statement
11/1/13	8/22/13	8/27/13	Routine maintenance; updated references; no change in policy statement
3/1/15	12/12/14	12/29/14	Routine maintenance
7/1/16	4/19/16	4/19/16	• Routine maintenance • Title change from "Implantation" to "Transplant"
7/1/17	4/18/17	4/18/17	• Routine maintenance
7/1/18	4/17/18	4/17/18	• Routine maintenance
7/1/19	4/16/19		• Routine maintenance
7/1/20	4/14/20		• Routine maintenance
7/1/21	4/20/21		• Routine maintenance
7/1/22	4/19/22		• Routine maintenance
7/1/23	4/18/23		• Routine maintenance (slp) • Vendor Managed: N/A
7/1/24	4/16/24		• Routine maintenance (slp) • Vendor Managed: Turning Point
7/1/25	4/22/25		• Routine maintenance (slp) • Vendor Managed: Turning Point
7/1/26	4/21/26		• Routine maintenance (slp/no) • Vendor Managed: Turning Point • Policy reformatted • MPS language updated to current language

Next Review Date: 2nd Qtr, 2027

BLUE CARE NETWORK BENEFIT COVERAGE
POLICY: STEM CELL TRANSPLANT FOR SPINAL CORD INJURY

I. Coverage Determination:

Commercial HMO (includes Self-Funded groups unless otherwise specified)	Not covered
BCNA (Medicare Advantage)	Refer to the Medicare information under the Government Regulations section of this policy.
BCN65 (Medicare Complementary)	Coinsurance covered if primary Medicare covers the service.

II. Administrative Guidelines:

- The member's contract must be active at the time the service is rendered.
- Coverage is based on each member's certificate and is not guaranteed. Please consult the individual member's certificate for details. Additional information regarding coverage or benefits may also be obtained through customer or provider inquiry services at BCN.
- The service must be authorized by the member's PCP except for Self-Referral Option (SRO) members seeking Tier 2 coverage.
- Services must be performed by a BCN-contracted provider, if available, except for Self-Referral Option (SRO) members seeking Tier 2 coverage.
- Payment is based on BCN payment rules, individual certificate and certificate riders.
- Appropriate copayments will apply. Refer to certificate and applicable riders for detailed information.
- CPT - HCPCS codes are used for descriptive purposes only and are not a guarantee of coverage.