



BlueCross BlueShield
of Alabama

Name of Blue Advantage Policy:
**Implantation of Intrastromal Corneal Ring Segments (ICRS[®],
INTACS[®])**

Policy #: 080

Latest Review Date: November 2023

Category: Vision

BACKGROUND:

Blue Advantage medical policy does not conflict with Local Coverage Determinations (LCDs), Local Medical Review Policies (LMRPs) or National Coverage Determinations (NCDs) or with coverage provisions in Medicare manuals, instructions or operational policy letters. In order to be covered by Blue Advantage the service shall be reasonable and necessary under Title XVIII of the Social Security Act, Section 1862(a)(1)(A). The service is considered reasonable and necessary if it is determined that the service is:

1. *Safe and effective;*
2. *Not experimental or investigational*;*
3. *Appropriate, including duration and frequency that is considered appropriate for the service, in terms of whether it is:*
 - *Furnished in accordance with accepted standards of medical practice for the diagnosis or treatment of the patient's condition or to improve the function of a malformed body member;*
 - *Furnished in a setting appropriate to the patient's medical needs and condition;*
 - *Ordered and furnished by qualified personnel;*
 - *One that meets, but does not exceed, the patient's medical need; and*
 - *At least as beneficial as an existing and available medically appropriate alternative.*

Routine costs of qualifying clinical trial services with dates of service on or after September 19, 2000, which meet the requirements of the Clinical Trials NCD are considered reasonable and necessary by Medicare. Providers should bill **Original Medicare for covered services that are related to **clinical trials** that meet Medicare requirements (Refer to Medicare National Coverage Determinations Manual, Chapter 1, Section 310 and Medicare Claims Processing Manual Chapter 32, Sections 69.0-69.11).*

POLICY:

Blue Advantage will treat **implantation of intrastromal corneal ring segments** as a **covered benefit** for the treatment of keratoconus in patients 21 years of age or older who meet ALL the following criteria:

- The patient has experienced a progressive deterioration in their vision, such that they can no longer achieve adequate functional vision with contact lenses or spectacles; AND
- Corneal transplantation is the only alternative to improve their functional vision; AND
- The patient has a clear central cornea with a corneal thickness of 450 microns or greater at the proposed incision site.

Blue Advantage will treat **implantation of intrastromal corneal ring segments** as a **non-covered benefit** as a treatment of myopia.

Blue Advantage will treat **implantation of intrastromal corneal ring segments** as a **non-covered benefit** and as investigational for all other conditions.

Blue Advantage does not approve or deny procedures, services, testing, or equipment for our members. Our decisions concern coverage only. The decision of whether or not to have a certain test, treatment or procedure is one made between the physician and his/her patient. Blue Advantage administers benefits based on the members' contract and medical policies. Physicians should always exercise their best medical judgment in providing the care they feel is most appropriate for their patients. Needed care should not be delayed or refused because of a coverage determination.

DESCRIPTION OF PROCEDURE OR SERVICE:

Intrastromal corneal ring segments (ICRS[®]) are composed of microthin soft plastic inserts of variable thickness that are placed in the periphery of the cornea. They have been investigated as a means of improving vision in diseases such as keratoconus and pellucid marginal degeneration (PMD), and for astigmatism following penetrating keratoplasty (PK).

Vision Disorders

Keratoconus is a progressive bilateral dystrophy characterized by paracentral steepening and stromal thinning that impairs visual acuity.

Pellucid marginal degeneration (PMD) is a noninflammatory progressive degenerative disease, typically characterized by bilateral peripheral thinning ectasia of the inferior cornea. Deterioration of functional vision results from the irregular astigmatism induced by asymmetric distortion of the cornea and visual acuity that typically cannot be restored by using spherocylindrical lenses.

Treatment

Initial treatment for keratoconus often consists of hard contact lenses. A penetrating keratoplasty (PK, i.e., corneal grafting) was traditionally considered the next line of treatment in patients who

developed intolerance to contact lenses. While visual acuity is typically improved with PK, perioperative complications are an associated risk; long-term topical steroid use is required and endothelial cell loss occurs over time, which is a particular concern in younger patients. As an alternative, a variety of keratorefractive procedures have been attempted and broadly divided into subtractive and additive techniques. Subtractive techniques include photorefractive keratectomy (PRK) or laser in situ keratomileusis (LASIK), although generally the results of these techniques have been poor. In deep anterior lamellar keratoplasty (DALK), pathologic corneal stromal tissue is selectively removed to the level of the Descemet membrane, followed by transplantation of a donor graft. Implantation of intrastromal corneal ring segments (ICRS) represents an additive technique in which the implants are intended to reinforce the cornea, prevent further deterioration and potentially obviate the need for PK.

Rigid gas permeable contact lenses may be used to treat pellucid marginal degeneration (PMD). Intrastromal corneal ring segments (ICRS[®]), crescentic lamellar keratoplasty (LK), PK, and corneal wedge excision have also been proposed as treatments.

ICRS[®] corrects myopia by flattening the center of the cornea and represents an alternative to LASIK and other refractive surgeries. A proposed advantage of ICRS[®] is that their insertion does not affect the central cornea and thus, their effect is not related to the healing process in the cornea. No corneal tissue is removed and the implants may be removed or replaced. However, mild myopia is effectively treated with spectacles or contact lenses.

Intrastromal Corneal Ring Segments

ICRS[®] are composed of microthin soft plastic inserts of variable thickness that are placed in the periphery of the cornea. They are inserted through an incision made in the cornea, into which channels have been created by rotating a lamellar dissector or by using a femtosecond laser. One or two segments are implanted in each channel and various implants with a range of thicknesses are available for different degrees of correction. These implants affect refraction in the eye by physically changing the shape of the cornea (flattening the front of the eye), thereby correcting the irregular corneal shape and restoring a degree of functional vision. If required, the implants can be removed or replaced later.

KEY POINTS:

The most recent literature review was updated through November 17, 2023.

Summary of Evidence

Clinical input obtained in 2009 strongly supported the use of intrastromal corneal ring segments (ICRS[®]) in a select group of patients with advanced keratoconus whose only other option for restoration of functional vision was the more invasive penetrating keratoplasty (PK). Some clinicians may opt to delay a more invasive procedure, although the success rate of this strategy is yet unproven. Therefore, the use of ICRS[®] may be considered medically necessary in patients with keratoconus who meet the criteria defined in this policy based on the Food and Drug Administration (FDA) and the Humanitarian Device Exemption (HDE).

For individuals who have keratoconus and who receive ICRS[®], the evidence includes primarily single-institution case series. Relevant outcomes are changes in disease status, functional outcomes, and treatment-related morbidity. Several single center case series with sample sizes ranging from 19 to 105 eyes have been published. The series generally report that a substantial proportion of individuals with keratoconus treated with this device have improved vision at one to two years of follow-up. More limited data is available on long-term efficacy. ICRS[®] is associated with several adverse events and explantations. Although a single case series of 572 eyes have suggested that risk of explantation may be modest (6.1%), the evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have Pellucid marginal degeneration (PMD) and who receive ICRS[®], the evidence includes a few case series. Relevant outcomes are changes in disease status, functional outcomes, and treatment-related morbidity. A small number of case series with fewer than 25 eyes per study have been published on ICRS[®] in individuals with PMD. Most of the reports were on devices not available in the United States. In one study that included some individuals who were implanted with Intrastromal corneal ring segments (Intacs[®]), there was no improvement in uncorrected visual acuity six months after surgery. Moreover, explantation occurred in about 20% of eyes due to visual deterioration. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have astigmatism after PK and who receive Intacs[®], the evidence includes a few case series. Relevant outcomes are changes in disease status, functional outcomes, and treatment-related morbidity. Two case series with 9 and 54 individuals were identified. Both used devices that are not available in the United States. Intacs[®] was associated with adverse events such as extrusion and Descemet membrane detachment (DMD). The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

Practice Guidelines and Position Statements

The National Institute for Health and Care Excellence (NICE) issued guidance in 2007 on corneal implants for keratoconus. The guidance, based on nine case series, a nonrandomized controlled trial and specialists' opinions, concluded that current evidence on the safety and efficacy of corneal implants for keratoconus appears adequate to support the use of this procedure and provided that normal arrangements are in place for consent, audit and clinical governance.

U.S. Preventive Services Task Force Recommendations

Not applicable.

KEY WORDS:

Intrastromal corneal ring segments (ICRS), INCRS[®], INTACTS[®], Intacs[®], intracorneal rings, keratoconus, KeraVision[®], Intracorneal Rings, INTACS SK[®], Ferrara intrastromal corneal ring segment (ICRS), Keraring intrastromal corneal ring segments (ICRS), MyoRing intracorneal continuous ring (ICCR), Corneal Allogenic Intrastromal Ring Segments (CAIRS).

APPROVED BY GOVERNING BODIES:

Intacs[®] represents an intrastromal corneal ring that has received approval by the U.S. Food and Drug Administration (FDA) for two indications. In 1999, Intacs[®] inserts were approved through a premarket approval process (PMA) for the following labeled indication:

The KeraVision Intacs[®] are intended for the reduction or elimination of mild myopia (-1.00 to -3.00 diopters spherical equivalent at the spectacle plane) in patients:

- Who are 21 years of age or older
- With documented stability of refraction as demonstrated by a change of less than or equal to 0.50 diopter for at least 12 months prior to the preoperative examination

AND

- Where the astigmatic component is +1.00 diopter or less.

In 2004, INTACS[®] received an additional approval by the FDA through the Humanitarian Device Exemption (HDE) process for the following indication:

This device is indicated for the reduction or elimination of myopia and astigmatism in patients with keratoconus, who are no longer able to achieve adequate vision with their contact lenses or spectacles, so that their functional vision may be restored and the need for a corneal transplant procedure may potentially be deferred. The specific set of keratoconic patients proposed to be treated with INTACS[®] prescription inserts are those patients:

- Who have experienced a progressive deterioration in their vision, such that they can no longer achieve adequate functional vision on a daily basis with their contact lenses or spectacles;
 - Who are 21 years of age or older
 - Who have clear central corneas
 - Who have a corneal thickness of 450 microns or greater at the proposed incision site
- AND
- Who have corneal transplantation as the only remaining option to improve their functional vision.

Note: The HDE does not require manufacturers to provide data confirming the efficacy of the device but rather data supporting its “probable” benefit. The HDE process is available for devices, treating conditions that affect fewer than 4,000 Americans per year.

Intrastromal corneal ring segments available outside of the United States include:

- Intacs SK[®]
- Ferrara intrastromal corneal ring segment (ICRS)
- Keraring intrastromal corneal ring segments (ICRS)
- MyoRing intracorneal continuous ring (ICCR)

FDA product code: LQE.

BENEFIT APPLICATION:

Coverage is subject to member's specific benefits. Group-specific policy will supersede this policy when applicable.

CURRENT CODING:**CPT Codes:**

65785	Implantation of intrastromal conceal ring segments
-------	--

REFERENCES:

1. Alfonso JF, Lisa C, Merayo-Llodes J, Fernández-Vega Cueto L, Montés-Micó R. Intrastromal corneal ring segment implantation in paracentral keratoconus with coincident topographic and coma axis. *J Cataract Refract Surg.* 2012 Sep; 38(9):1576-82.
2. Alio JL, Shabayek MH, Belda JI et al. Analysis of results related to good and bad outcomes of Intacs implantation for keratoconus correction. *J Cataract Refract Surg* 2006; 32(5):756-61.
3. Arriola-Villalobos P, Diaz-Valle D, Guell JL et al. Intrastromal corneal ring segment implantation for high astigmatism after penetrating keratoplasty. *J Cataract Refract Surg* 2009; 35(11):1878-84.
4. Bedi R, Touboul D, Pinsard L et al. Refractive and topographic stability of Intacs in eyes with progressive keratoconus: five-year follow-up. *J Refract Surg* 2012; 28(6):392-6.
5. Boxer Wachler BS, Christie JP, Chandra NS, Chou B, Korn T, Nepomuceno R. Intacs for keratoconus. *Ophthalmology.* 2003 May; 110(5):1031-40.
6. Colin J. Current surgical options for keratoconus. *J Cataract Refract Surg* 2003; 29(2):379-86.
7. Colin J. European clinical evaluation: use of Intacs for the treatment of keratoconus. *J Cataract Refract Surg.* May 2006; 32(5):747-755.
8. Colin J, Cochener B, Savary G, Malet F, Holmes-Higgin D. INTACS inserts for treating keratoconus; one-year results. *Ophthalmology* 2001; 108(8): 1409-14.
9. Colin J, Malet FJ. Intacs for the correction of keratoconus: Two-year follow-up. *J Cataract Refract Surg* 2007; 33(1):69-74.
10. Colin J & Velou S. Utilization of refractive surgery technology in keratoconus and corneal transplants. *Current Opinion in Ophthalmology* 2002; 13: 230-34.
11. Coscarelli S, Ferrara G, Alfonso JF, et al. Intrastromal corneal ring segment implantation to correct astigmatism after penetrating keratoplasty. *J Cataract Refract Surg.* Jun 2012; 38(6):1006-1013.
12. Deshmukh R, Ong ZZ, Rampat R, Alió Del Barrio JL, Barua A, Ang M, Mehta JS, Said DG, Dua HS, Ambrósio R Jr, Ting DSJ. Management of keratoconus: an updated review. *Front Med (Lausanne).* 2023 Jun 20; 10:1212314.

13. Fernandez-Vega Cueto L, Lisa C, Poo-Lopez A, et al. Intrastromal corneal ring segment implantation in 409 paracentral keratoconic eyes. *Cornea*. Nov 2016; 35(11):1421-1426.
14. Ferrer C, Alio JL, Montanes AU et al. Causes of intrastromal corneal ring segment explantation: clinicopathologic correlation analysis. *J Cataract Refract Surg* 2010; 36(6):970-7.
15. Heikal MA, Abdelshafy M, Soliman TT, et al. Refractive and visual outcomes after Keraring intrastromal corneal ring segment implantation for keratoconus assisted by femtosecond laser at 6 months follow-up. *Clin Ophthalmol*. 2017; 11:81-86.
16. Hladun L and Harris M. Contact lens fitting over intrastromal corneal rings in a keratoconic patient. *Optometry* 2004; 75(1):48-54.
17. IOM (Institute of Medicine). 2011. *Clinical Practice Guidelines We Can Trust*. Washington, DC: The National Academies Press.
18. Izquierdo L, Mannis MJ, Mejias Smith JA, et al. Effectiveness of Intrastromal Corneal Ring Implantation in the Treatment of Adult Patients With Keratoconus: A Systematic Review. *J Refract Surg*. 2019 Mar 1; 35(3): 191-200.
19. Kanellopoulos AJ, Pe LH, Perry HD et al. Modified intracorneal ring segment implantations (INTACS) for the management of moderate to advanced keratoconus: efficacy and complications. *Cornea* 2006; 25(1):29-33.
20. Kang MJ, Byun YS, Yoo YS, et al. Long-term outcome of intrastromal corneal ring segments in keratoconus: Five-year follow up. *Sci Rep*. 2019 Jan 22; 9(1): 315.
21. Kubaloglu A, Sari ES, Cinar Y et al. A single 210-degree arc length intrastromal corneal ring implantation for the management of pellucid marginal corneal degeneration. *Am J Ophthalmol* 2010; 150(2):185-92 e1.
22. Kymionis GD, Siganos CS, Tsiklis NS et al. Long-term follow-up of Intacs in keratoconus. *Am J Ophthalmol* 2007; 143(2):236-44.
23. Levinger S, Pokroy R. Keratoconus managed with intacs: one-year results. *Arch Ophthalmol* 2005; 123(10):1308-14.
24. Mirafteb M, Hashemi H, Hafezi F, Asgari S. Mid-Term Results of a Single Intrastromal Corneal Ring Segment for Mild to Moderate Progressive Keratoconus. *Cornea*. 2017 May; 36(5):530-534.
25. Miranda D, Satori M, et al. Ferrara intrastromal corneal ring segments for severe keratoconus. *J Refract Surg* 2003; 19(6):645-53.
26. National Institute for Health and Care Excellence (NICE). Corneal implants for keratoconus [IPG227]. 2007; www.nice.org.uk/guidance/IPG227.
27. Nguyen N, Gellees JD, Greenstein SA, et al. Incidence and associations of intracorneal ring segment explantation. *J Cataract Refract Surg*. 2019 Feb; 45(2).
28. Ozertürk Y, Sari ES, Kubaloglu A, Koytak A, Piñero D, Akyol S. Comparison of deep anterior lamellar keratoplasty and intrastromal corneal ring segment implantation in advanced keratoconus. *J Cataract Refract Surg*. 2012 Feb; 38(2):324-32.
29. Pinero DP, Alio JL, Morbelli H et al. Refractive and corneal aberrometric changes after intracorneal ring implantation in corneas with pellucid marginal degeneration. *Ophthalmology* 2009; 116(9):1656-64.

30. Sakellaris D, Balidis M, Gorou O, Szentmary N, Alexoudis A, Grieshaber MC, Sagri D, Scholl H, Gatziofufas Z. Intracorneal Ring Segment Implantation in the Management of Keratoconus: An Evidence-Based Approach. *Ophthalmol Ther.* 2019 Oct; 8(Suppl 1):5-14.
31. Samimi S, Leger F, Touboul D, et al. Histopathological findings after intracorneal ring segment implantation in keratoconic human corneas. *J Cataract Refract Surg* 2007; 33(2):247-53.
32. Schanzlin DJ, Abbott RL, Asbell PA et al. Two-year outcomes of intrastromal corneal ring segments for the correction of myopia. *Ophthalmology* 2001; 108(9):1688-94.
33. Siganos CS, Kymionis GD et al. Management of keratoconus with Intacs. *Am J Ophthalmol* 2003; 135(1):64-70.
34. Torquetti L, Ferrara G, Almeida F, et al. Intrastromal corneal ring segments implantation in patients with keratoconus: 10-year follow-up. *J Refract Surg.* 2014 Jan; 30(1):22-26.
35. U.S. Food and Drug Administration (FDA). PMA – Premarket Approval. ICRS (Intrastromal Corneal Ring Segments). [IN//www.accessdata.fda.gov/scripts/cdrh/cjdocs/cjPMA/pma.cfm?id=13054](http://www.accessdata.fda.gov/scripts/cdrh/cjdocs/cjPMA/pma.cfm?id=13054).
36. Vega-Estrada A, Alio JL, Brenner LF et al. Outcomes of intrastromal corneal ring segments for treatment of keratoconus: Five-year follow-up analysis. *J Cataract Refract Surg* 2013; 39(8):1234-40.
37. Zadnik K, Money S, Lindsley K. Intrastromal corneal ring segments for treating keratoconus. *Cochrane Database Syst. Rev.* 2019 May; 5: CD011150.
38. Ziaei M, Barsam A, Shamie N, et al. Reshaping procedures for the surgical management of corneal ectasia. *J Cataract Refract Surg.* Apr 2015; 41(4):842-872.

POLICY HISTORY:

Adopted for Blue Advantage, March 2005
 Available for comment May 1-June 14, 2005
 Medical Policy Group, July 2005
 Available for comment August 18-October 3, 2005
 Medical Policy Group, December 2006
 Available for comment January 11-February 24, 2007
 Medical Policy Group, February 2008
 Medical Policy Group, September 2009
 Available for comment October 2-November 16, 2009
 Medical Policy Group, September 2011
 Medical Policy Group, March 2013
 Available for comment April 18 through June 5, 2013
 Medical Policy Group, November 2013
 Medical Policy Group, September 2014
 Medical Policy Group, September 2015
 Medical Policy Group, December 2015
 Medical Policy Group, March 2016
 Medical Policy Group, March 2017

Medical Policy Group, February 2018

Medical Policy Group, April 2020: Reinstated policy effective March 24, 2020.

Medical Policy Group, March 2021

Medical Policy Group, December 2021: Reviewed by consensus. No new published peer-reviewed literature available that would alter the coverage statement in this policy.

Medical Policy Group, November 2022: Reviewed by consensus. No new published peer-reviewed literature available that would alter the coverage statement in this policy.

Medical Policy Group, November 2023: Reviewed by consensus. No new published peer-reviewed literature available that would alter the coverage statement in this policy.

UM Committee, December 2023: Policy approved by UM Committee for use for Blue Advantage business.

This medical policy is not an authorization, certification, explanation of benefits, or a contract. Eligibility and benefits are determined on a case-by-case basis according to the terms of the member's plan in effect as of the date services are rendered. All medical policies are based on (i) research of current medical literature and (ii) review of common medical practices in the treatment and diagnosis of disease as of the date hereof. Physicians and other providers are solely responsible for all aspects of medical care and treatment, including the type, quality, and levels of care and treatment.

This policy is intended to be used for adjudication of claims (including pre-admission certification, pre-determinations, and pre-procedure review) in Blue Cross and Blue Shield's administration of plan contracts.