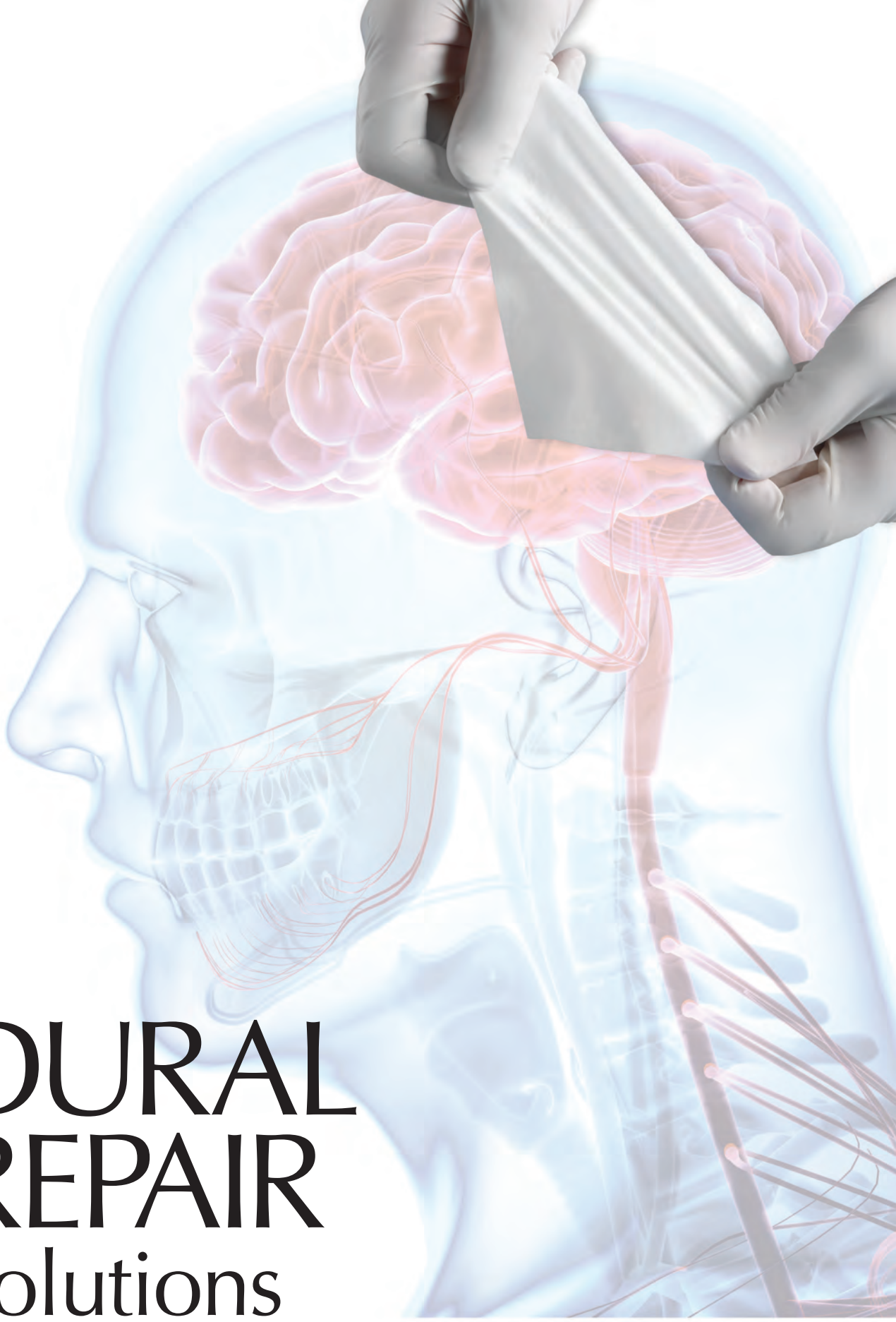
Dural Repair



DURAL REPAIR
Solutions

COLLAGEN MATRIX
SCIENCE • TECHNOLOGY • INNOVATION

Science • Technology • Innovation

At Collagen Matrix we are passionate about advancing the science of tissue repair and regeneration. That's why we're the driving force in the design, development and manufacturing of advanced collagen and mineral based medical devices that support the body's natural ability to regenerate.

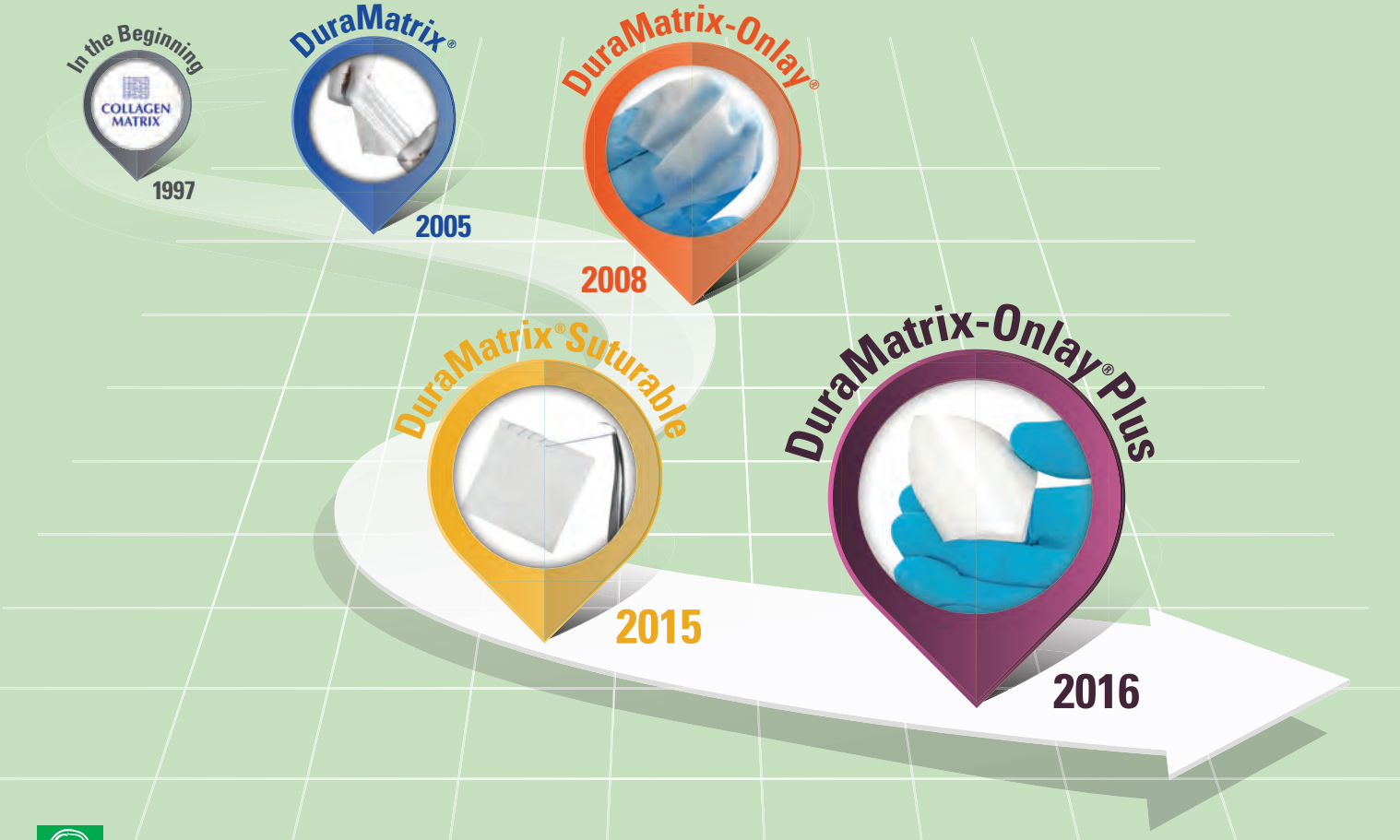
Over our 20 years of proven performance, we have focused our proprietary technologies and innovative products to meet clinical needs through five key business units – Dental, Spine, Orthopaedic, Dural Repair and Nerve Repair.

Proven Performance
Six Platform Technologies

We have developed six proprietary tissue engineering technologies to expand our broad line of collagen and mineral based medical device solutions.

T1 – Reconstituted Collagen
T2 – Intact Collagen
T3 – Natural Carbonate Apatite Mineral
T4 – Collagen and Mineral Composites
T5 – Collagen Coatings
T6 – Crosslinking

Evolution of **DuraMatrix®** Products



7.5 million

Our products have helped patients worldwide with over 7.5 million medical devices that have been produced across all five key business units.

Why Use a Dural Repair Substitute?

When the dura mater that encases the brain and spinal cord is damaged or impaired, it risks cerebrospinal fluid (CSF) leakage, which can cause serious complications to the patient. A dural repair substitute provides a scaffold for host dura to regenerate.

Innovative Solutions

We have engineered collagen dural repair products that are CSF leak resistant and which have collagen scaffold properties that allow for native dural tissue to naturally regenerate resulting in the protection, closure and repair of dural defects.

DuraMatrix® Portfolio of Collagen Dural Repair Products

Dural Repair Product	Bovine Collagen Source	Conformability	Suture Pull Out Strength [5]	Leak Resistant [4,5]	Resorption Time [3,4]	Sterile Saline Hydration
DuraMatrix-Onlay® Plus	Achilles Tendon	Completely	Low[1]	Yes	8 weeks	Prior to use
DuraMatrix® Suturable	Intact Dermis	Moderately	Very High	Yes	9 months	1 minute
DuraMatrix-Onlay®	Achilles Tendon	Highly	Moderately[2]	Yes	6-9 months	30 seconds
DuraMatrix®	Achilles Tendon	Moderately	High	Yes	6-9 months	5 minutes

DuraMatrix-Onlay® Plus

COLLAGEN DURAL REGENERATION MATRIX

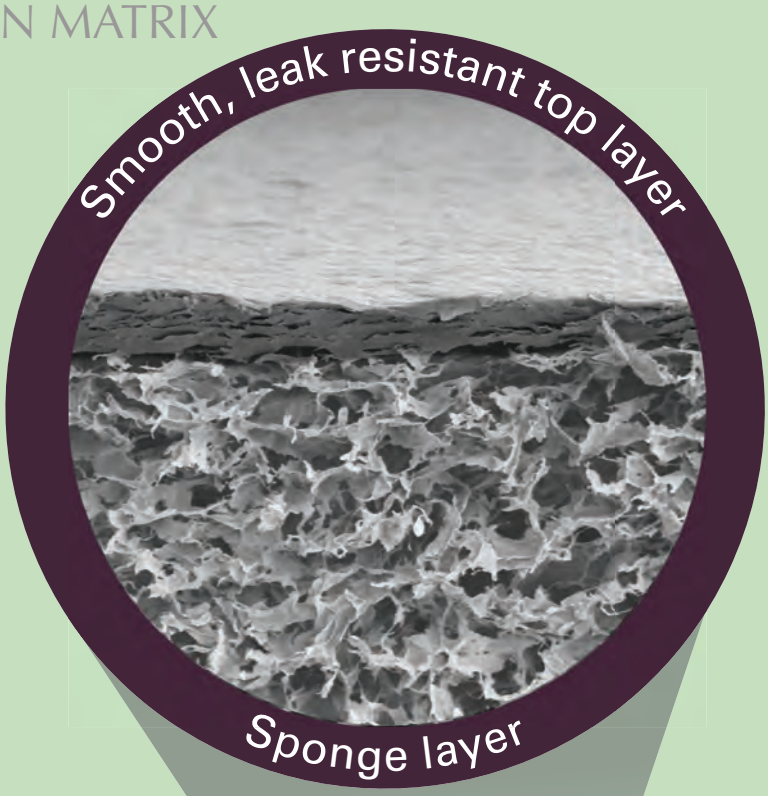
A sponge-like onlay with a leak resistant top layer that provides effective protection against CSF leakage. When hydrated, this highly drapeable matrix is easily repositionable and conforms to the complex surfaces of the brain or spinal cord. The completely resorbable matrix does not adhere to surgical instruments or gloves.

Leak resistant top layer

- Proprietary collagen coating technology
- Film on top surface also improves wet handling characteristics

Porous sponge bottom layer

- Provides drapeability, onlay application and resists sideways movement
- Conforms to brain contours



Scanning Electron Micrograph of matrix cross section at 50x magnification

50x more leak resistant than DuraGen® Plus in liquid permeability test[4,5]

Scan here to view leakage test video

DuraMatrix® Suturable

COLLAGEN DURA MEMBRANE

This suturable membrane is derived from intact bovine dermis. The natural collagen fibers are then biochemically reinforced through a proprietary crosslinking process to provide high mechanical strength and CSF leak resistance.

Nearly twice the suture pull out strength as Durepair[4,5]

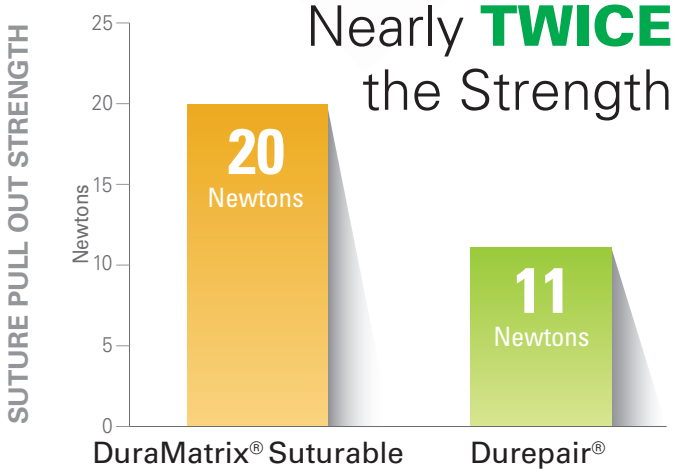
- Densely packed collagen fibers
- Mechanically strong, yet conformable

Almost double the resorption time as Durepair[4,5]

- DuraMatrix® Suturable stays long enough to act as a scaffold to allow new dura to regenerate.

Scan here to view high suture pull out strength video

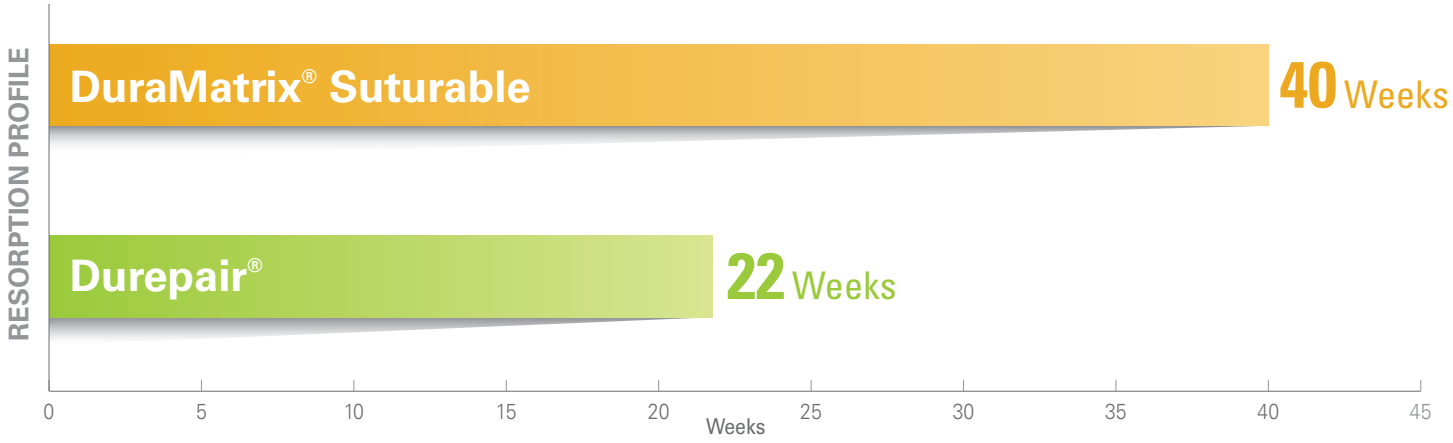
Nearly **TWICE** the Strength



DuraMatrix® Suturable shows significantly higher suture pull out strength, nearly twice the strength when compared to Durepair®.[4,5]

Almost **DOUBLE** the Resorption Time

DuraMatrix® Suturable has a resorption time of about 38-40 weeks compared to 20-22 weeks for Durepair® in a rabbit duraplasty study.[3,4] Balanced resorption allows for optimal time for tissue regeneration.



DuraMatrix-Onlay®

COLLAGEN DURA MEMBRANE

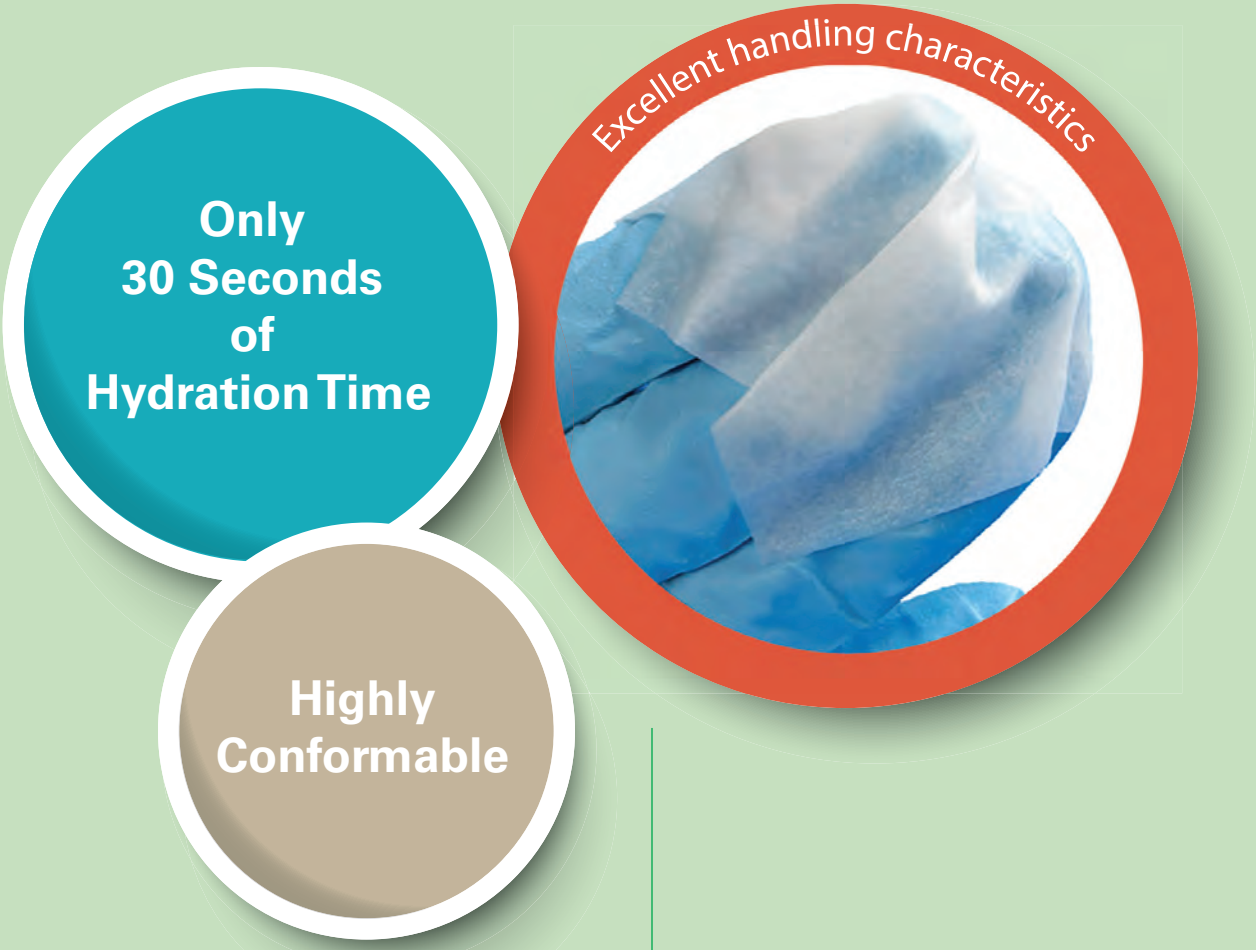
DuraMatrix-Onlay® is a thinner alternative to DuraMatrix-Onlay® Plus and can be implanted without sutures. This onlay conforms to the contours of the brain or spinal cord creating a CSF leak resistant membrane and is completely resorbable.

Highly conformable

- Conforms closely to the complex surfaces of the exposed brain or spinal cord

Onlay application

- Designed for implantation without sutures



DuraMatrix®

COLLAGEN DURA MEMBRANE

Our original dural repair membrane was designed to optimize conformability and strength. It has a thickness similar to native dura and can be applied as an onlay or suturable membrane. It has an effective balanced resorption and tissue replacement resorption profile.

Flexible, yet strong

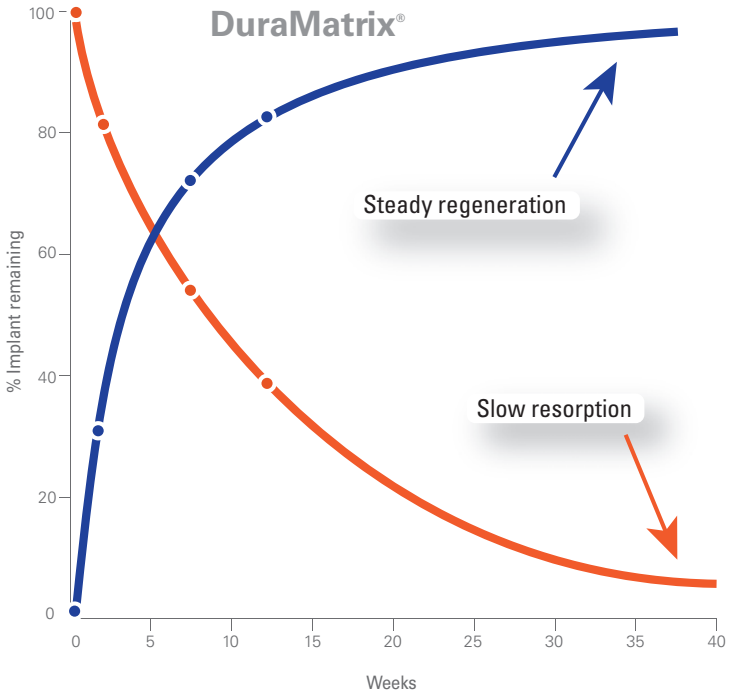
- Conforms to defects

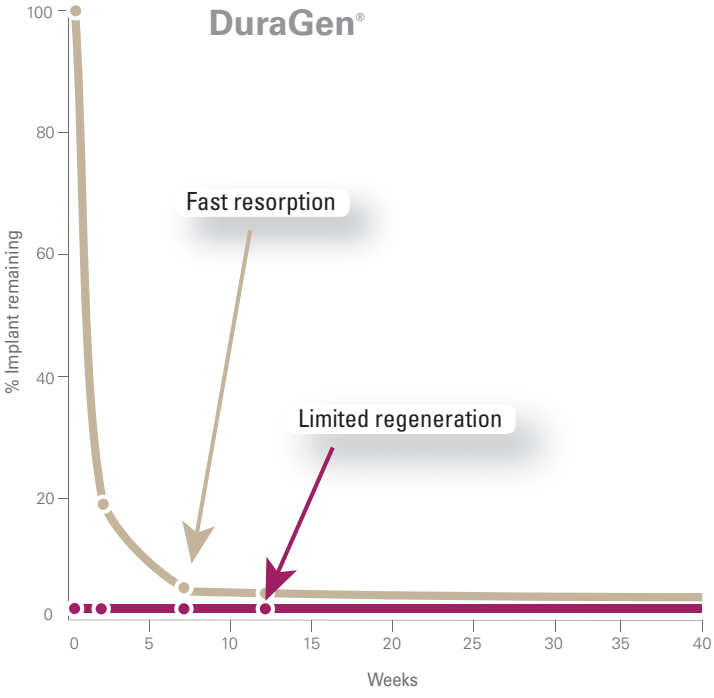
Versatile application

- Implantable with or without sutures

More **BALANCED RESORPTION** than DuraGen®

DuraMatrix® has a resorption time of about 26-38 weeks compared to <12 weeks for DuraGen® in a rabbit duraplasty study.[4,6] DuraMatrix® was specifically designed to resorb at a balanced rate that gives the native tissue sufficient time to regenerate.





DuraMatrix-Onlay® Plus

Catalog No.	Dimensions
DMOP11	1 x 1 in (2.5 x 2.5 cm)
DMOP13	1 x 3 in (2.5 x 7.5 cm)
DMOP22	2 x 2 in (5 x 5 cm)
DMOP33	3 x 3 in (7.5 x 7.5 cm)
DMOP45	4 x 5 in (10 x 12.5 cm)
DMOP57	5 x 7 in (12.5 x 17.5 cm)

DuraMatrix® Suturable

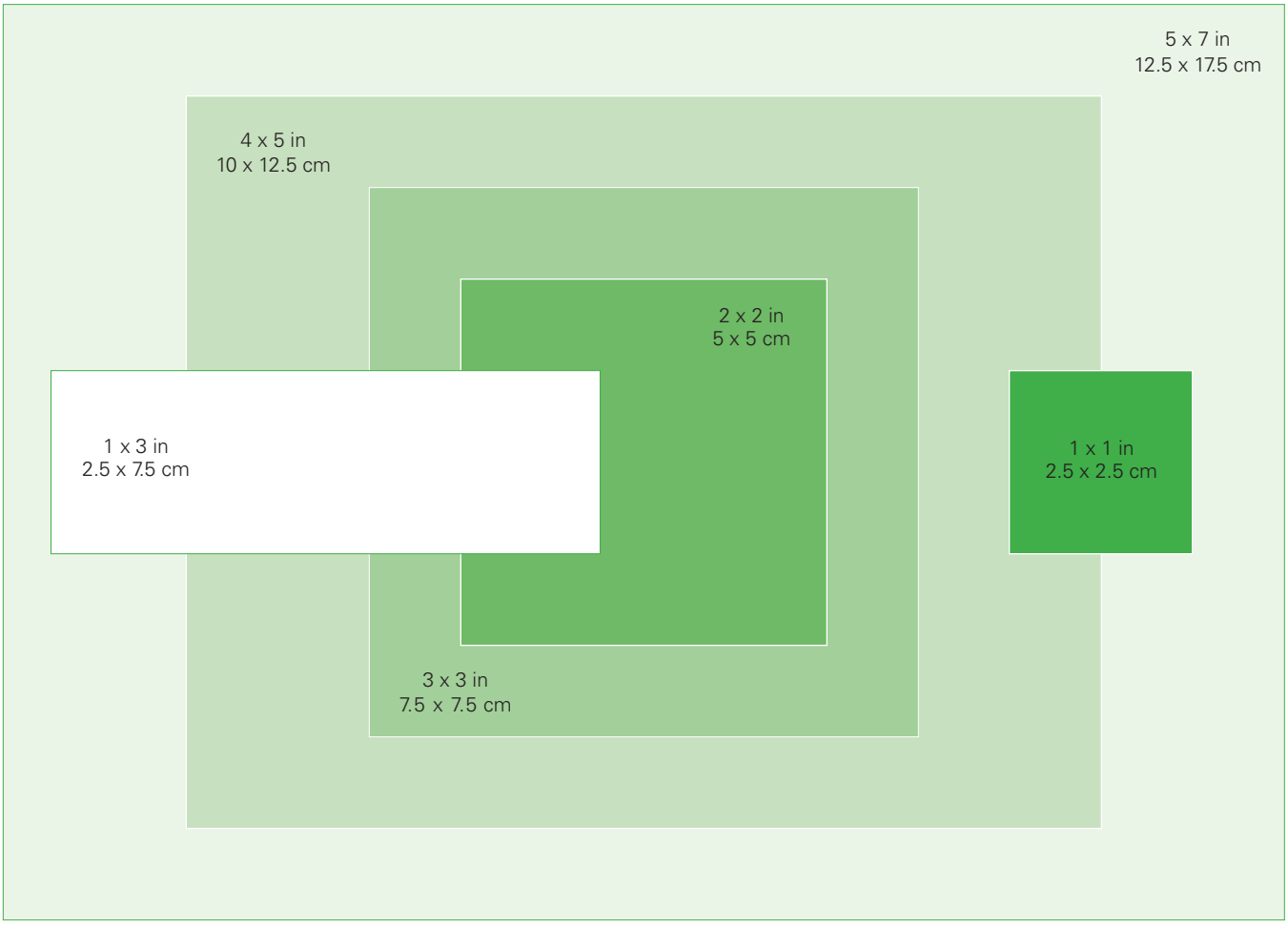
Catalog No.	Dimensions
DMS11	1 x 1 in (2.5 x 2.5 cm)
DMS13	1 x 3 in (2.5 x 7.5 cm)
DMS22	2 x 2 in (5 x 5 cm)
DMS33	3 x 3 in (7.5 x 7.5 cm)
DMS45	4 x 5 in (10 x 12.5 cm)

DuraMatrix-Onlay®

Catalog No.	Dimensions
CDSLM11	1 x 1 in (2.5 x 2.5 cm)
CDSLM13	1 x 3 in (2.5 x 7.5 cm)
CDSLM22	2 x 2 in (5 x 5 cm)
CDSLM33	3 x 3 in (7.5 x 7.5 cm)
CDSLM45	4 x 5 in (10 x 12.5 cm)
CDSLM57	5 x 7 in (12.5 x 17.5 cm)

DuraMatrix®

Catalog No.	Dimensions
CDSM11	1 x 1 in (2.5 x 2.5 cm)
CDSM13	1 x 3 in (2.5 x 7.5 cm)
CDSM22	2 x 2 in (5 x 5 cm)
CDSM33	3 x 3 in (7.5 x 7.5 cm)
CDSM45	4 x 5 in (10 x 12.5 cm)



References:
1. Indicated for onlay application; Suturing is not required, but tensionless, atraumatic stay sutures may be used if desired. 2. Indicated for onlay application; Suturing is not required, but if desired, minimal tension sutures may be used. 3. Rabbit duraplasty study: Data on file at Collagen Matrix, Inc. 4. The results of pre-clinical and in vitro studies may not be indicative of human clinical outcomes. 5. In vitro data on file at Collagen Matrix, Inc. 6. Ulreich JB, French MH, Fryburg K, White, MJN, Ho, WY, Hamilton AJ. DuraMatrix, A Novel Collagen Dura Substitute: Comparison with DuraGen and Dura-Guard. Society for Biomaterials 30th Annual Meeting Transactions. p.147, 2004.

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