3Helix

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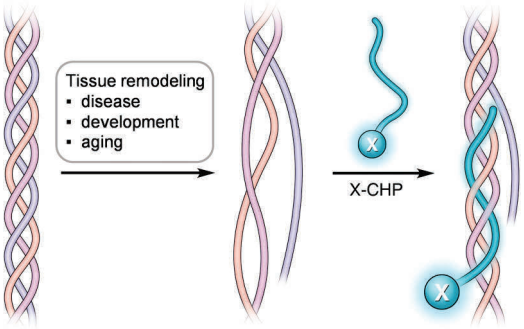
Labeled Collagen Hybridizing Peptides for Detecting Damaged Collagen Molecules in Disease and Injury

Targeting degraded collagen with Collagen Hybridizing Peptide (CHP)

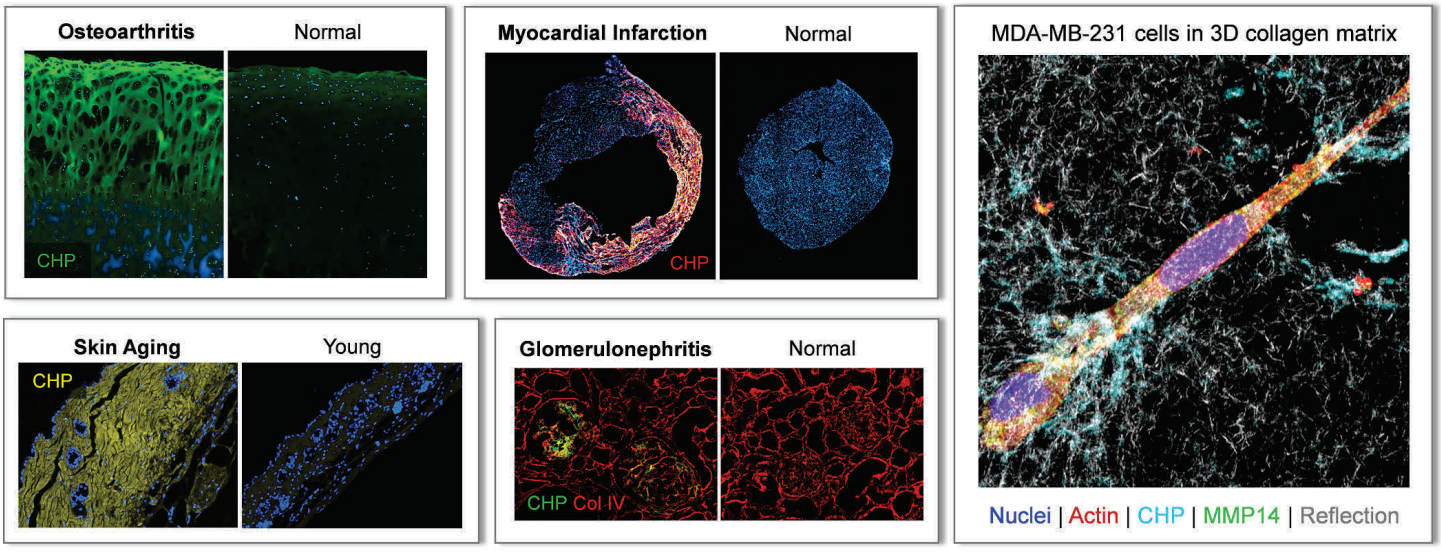
Collagen is the most abundant protein in mammals. It is the major structural component of almost all organs and tissues. Excessive collagen degradation is implicated in a variety of pathological conditions, such as cancer, arthritis, and fibrosis [1].

The **triple helix** is the hallmark structure of collagen. During tissue remodeling, the triple helical collagen molecules are degraded by specific proteases (e.g., MMP or cathepsin K) and become unfolded at body temperature. **3Helix**'s **Collagen Hybridizing Peptide (CHP)** is a synthetic peptide that can specifically bind to such denatured collagen strands through hydrogen bonding in histology [2], *in vivo* [3], and *in vitro* (3D cell culture) [4]. CHP is an extremely specific probe for unfolded collagen: it has negligible affinity to intact collagen molecules due to the lack of binding sites; it is also inert towards non-specific binding because of its neutral and hydrophilic nature [5].



By sharing the structural and sequence motif of natural collagen, CHP has a strong capability to hybridize with denatured collagen strands, in a fashion that is similar to a DNA fragment annealing to its complimentary DNA strand during PCR.

- CHP is a powerful **histopathology** tool which enables straightforward detection of tissue damage caused by a large variety of diseases, as well as tissue remodeling during development and aging (left panels below) [3]
- In **cell imaging**, CHP robustly visualizes the pericellular collagen turnover caused by proteolytic migration of cancer cells within 3D collagen matrix, without the use of synthetic fluorogenic matrices or genetically modified cells (bottom right image) [4].



See product information and references on the back...

Products

Products	SKU #	Size	Price ($)
Collagen Hybridizing Peptide, 5-FAM Conjugate (F-CHP)	FLU60	60 μg	198.00
	FLU300	300 μg	550.00
Collagen Hybridizing Peptide, Biotin Conjugate (B-CHP)	BIO60	60 μg	198.00
	BIO300	300 μg	550.00
Collagen Hybridizing Peptide, Cy3 Conjugate (R-CHP)	RED60	60 μg	198.00
	RED300	300 μg	550.00

Applications

immunofluorescence, immunohistochemistry, cell imaging, SDS-PAGE (in-gel western)

Features

- More informative, reliable and convenient than zymography, DQ collagen, SHG, and TEM
- High affinity and unparalleled specificity to collagen with essentially no nonspecific binding
- Applicable to all types of collagen from all species, relying on collagen's secondary structure instead of any defined sequence for binding
- Suitable for both frozen and paraffin-embedded sections with no need for antigen retrieval
- A non-antibody approach with no species restrictions against any co-staining antibody
- Small size (2% of IgG by MW) enabling facile tissue penetration and whole specimen staining without sectioning
- Stable in solution under 4 °C, eliminating the need to aliquot for storage

	CHP	Sirius red / Masson's trichrome	Collagen antibodies	C1,2C antibody	In situ zymography	SHG	TEM
Detecting denatured collagen	✓	✗	✗	✓	✓	✓	✓
A direct method	✓			✓	✗	✗	✗
Applicable to multiple collagen types	✓			✗		✗	✗
Applicable to mm-sized tissue samples	✓				✓	✓	✗
No control test needed	✓				✗	✓	✓
No advanced instrument or specialized skill needed	✓					✗	✗

Key Publications

1. Targeting and mimicking collagens *via* triple helical peptide assemblies. ***Curr. Opin. Chem. Biol.***, 2013.
2. *In situ* imaging of tissue remodeling with collagen hybridizing peptides. ***ACS Nano***, 2017.
3. Targeting collagen strands by photo-triggered triple-helix hybridization. ***Proc. Natl. Acad. Sci. U.S.A.***, 2012.
4. Visualizing collagen proteolysis by peptide hybridization: From 3D cell culture to *in vivo* imaging. ***Biomaterials***, 2018.
5. Direct detection of collagenous proteins by fluorescently labeled collagen mimetic peptides. ***Bioconjug. Chem.***, 2013.
6. Molecular level detection and localization of mechanical damage in collagen enabled by collagen hybridizing peptides. ***Nat. Commun.***, 2017.
7. Molecular assessment of collagen denaturation in decellularized tissues using the collagen hybridizing peptide. ***Acta Biomater.***,2017.

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