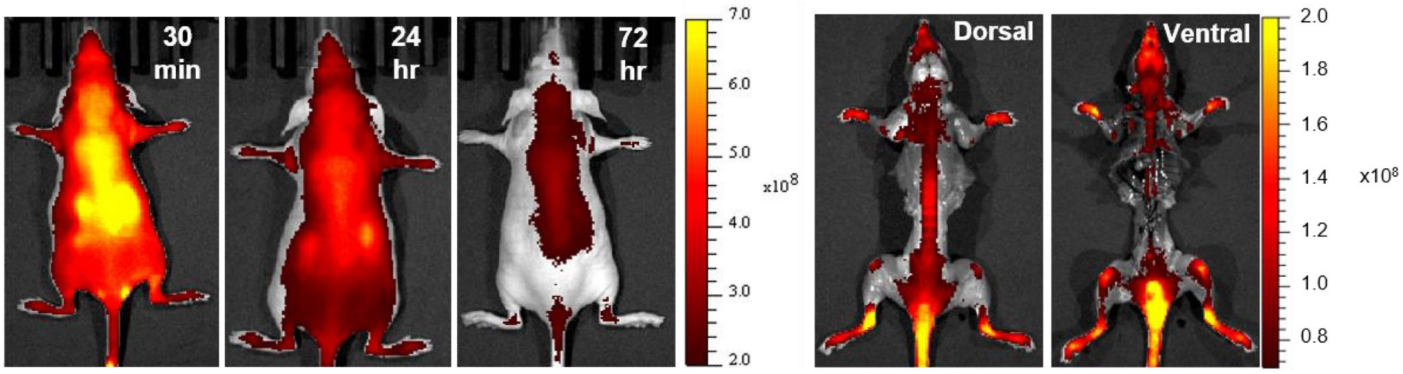
Collagen Hybridizing Peptides (CHP) *In Vivo* Probe

Targeting degraded collagen in vivo



Special features

- CHP *In Vivo* Probe allows for *in vivo* imaging in small living animals
- A non-antibody approach without species restrictions
- Relies on collagen's secondary triple helix structure instead of a defined sequence
- High affinity with essentially no nonspecific binding
- Applicable to nearly every tissue type
- Stable at 4 °C, no need to aliquot for storage

Applications

- **Pathology**: CHP marks tissue damage and remodeling during pathological and physiological events[1,2]
- **Mechanical damage**: With the help of CHP mechanical injury to collagenous tissue can be measured and localized at the molecular level in various tissues (e.g. bone, cartilage, tendon, ligament, blood vessel, skin etc.)[3]
- **Tissue decellularization**: CHP allows direct and quantitative assessment of denatured collagen in ECM materials[4]

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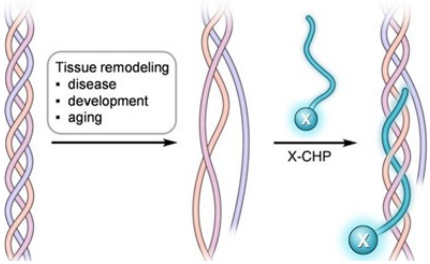
Targeting degraded collagen with Collagen Hybridizing Peptide (CHP)

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[5].

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. The **Collagen Hybridizing Peptide** (**CHP**) is a synthetic peptide that can specifically bind to such denatured collagen strands through hydrogen bonding in histology[1], *in vivo*[2], and *in vitro* (3D cell culture)[6]. 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[7].

Principle of the Collagen Hybridizing Peptide (CHP)

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 tool which enables straightforward detection of tissue damage caused by a large variety of diseases, as well as tissue remodeling during development and aging[2].
- The **CHP *In Vivo* Probe** can be used for systemic or *in situ* injection, which allows to image degraded collagen in small living animals.

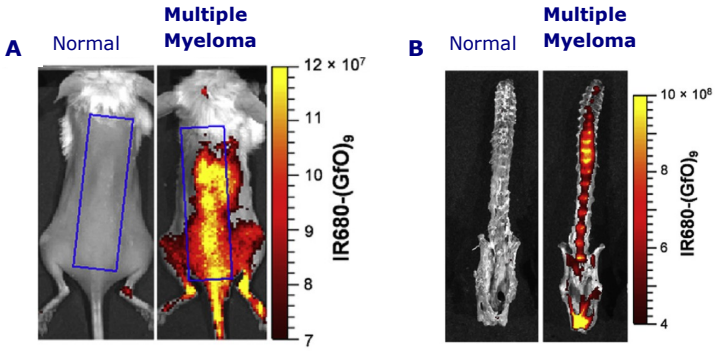


*Figure: In vivo imaging of bone destruction in a mouse model of multiple myeloma (MM). **(A)** N-terminal near-infrared fluorescence (NIRF) images of the normal control mouse and the MM mouse, acquired 3 hours after intravenous injection with CHP In Vivo Probe, demonstrating elevated CHP signal around the spine region from the MM mouse. **(B)** NIRF images of the spine harvested from the mouse. Images obtained from Bennink et al.*[6].

Available products

Item	Description	Regulatory status	Package size	Product Code
Target-sCy7.5-CHP[1]	CHP *In Vivo* Probe Targeted conjugated with sulfo-cyanine-7.5	RUO	3 doses	INVIVOTGT7.5
Control-sCy7.5-scCHP[1]	CHP *In Vivo* Probe Control conjugated with sulfo-cyanine-7.5	RUO	3 doses	INVIVOCTL7.5
sCy7.5 In Vivo Kit[1]	CHP *In Vivo* kit conjugated with sulfo-cyanine-7.5	RUO	10 doses Targeted, 3 doses Control	INVIVOKIT7.5

[1]Distributed for 3Helix Inc., Salt Lake City, USA

References

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

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