BOTM: August 2009

Corgel™ BioHydrogel Lifecore Biomedical's Crosslinked Tyramine-Substituted Sodium Hyaluronate (TS-NaHy)

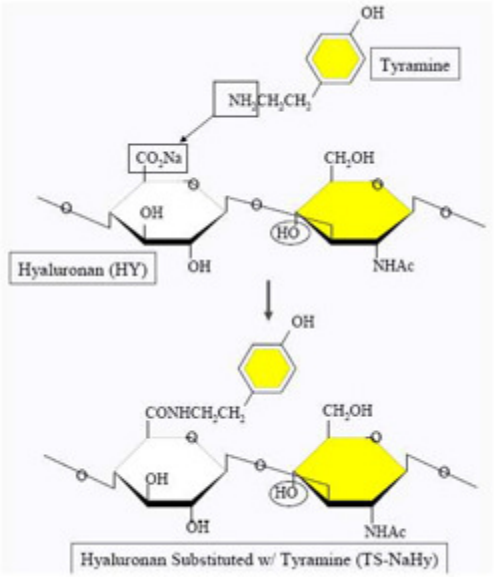
Corgel™ is a hyaluronan (hyaluronic acid) based biocompatible hydrogel. It was initially conceived and developed by scientists at Cleveland Clinic as a cartilage repair biomaterial, tissue bulking agent and cell and/or delivery matrix. The tunability of the matrix and the biocompatibility allows for the direct inclusion of cells or bioactive agents.

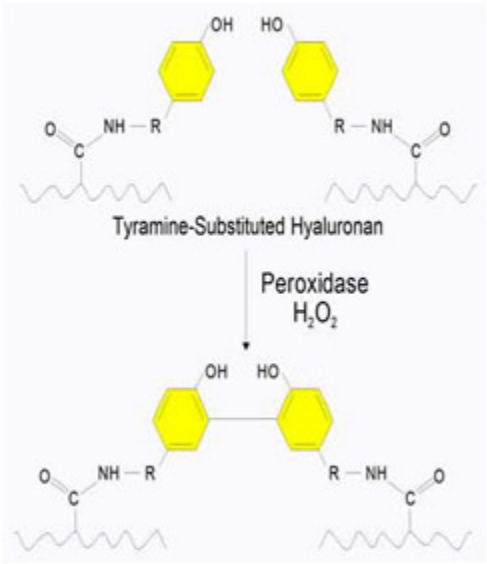
Lifecore procured an exclusive license with Cleveland Clinic in 2007 and has been actively developing the technology by completing ISO 10993 biological evaluation of medical devices studies, as well as exploring modifications and variables to the technology. Lifecore now looks forward to collaborative development for use in surgical and transcatheter applications in vascular surgery, cardiology, ophthalmology, orthopedics, aesthetics, ENT, drug delivery, tissue engineering and regenerative medicine and several other medical fields.

The novel hyaluronan-based hydrogels are produced through a two-step process.

First, tyramine is introduced into hyaluronan (HY) using EDC chemistry at Lifecore. The degree of tyramine substitution of HY can be varied (0.1% - 10%), while maintaining many attributes of the native HY structure. The tyramine substituted HY (TS-NaHy) is then purified as an intermediate/product for hydrogel formation as a dry powder. In the second step in the researcher's lab, the dried TS-NaHy is resuspended in aqueous solution to a desired gel concentration and then cross-linked by forming stable dihydroxyphenyl covalent bonds through an enzyme driven reaction. Both the TS-NaHy and the resulting cross-linked hydrogel have unique photometric properties that allow for easy evaluation of the degree of substitution and cross-linking. A benefit of this hydrogel technology is that the hydrogels can be formed under physiologic conditions in situ, which allows for the direct inclusion of cells or bioactive agents during cross-linking, or alternatively, cross-linking directly adjacent to living tissue, maintaining cell and tissue viability.

The resulting hydrogels are optically clear to slightly colored with a wide range of physical properties depending on the initial TS-NaHy concentration and degree of tyramine substitution. Hydrogels formed from TS-NaHy solutions of 5-100 mg/ml display a wide range of physical properties that include those of
a loose gel, a paste, or a stiff gel.


OH
Tyramine
NH2CH2CH2
CO2Na
CH2OH
O
OH
HO
NHAc
Hyaluronan (HY)
CONHCH2CH2
Hyaluronan Substituted w/ Tyramine (TS-NaHy)


OH
HO
NH
R
C
O
Tyramine-Substituted Hyaluronan
Peroxidase
H2O2