



Jellagen®

A next generation collagen matrix for Cell Culture & Tissue Engineering Applications

MediWales

3rd March 2020

Who are Jellagen?

Jellagen® is a UK based marine biotechnology company manufacturing to **ISO13485:2016** high value purified collagen derived from jellyfish. Founded in 2015 by Pr. Andrew Mearns Spragg, a Scottish marine biotechnology pioneer.

Our next generation jellyfish collagen is a breakthrough innovation in the fields of cell culture and regenerative medicine.



Jellyfish collagen addresses many of the challenges associated today with animal-derived biomaterials, allowing customers to use a substrate that is both non-mammalian and entirely natural.

Why use collagen as a biomaterial?

- Collagen makes up 1/3 of the protein in the human body.
- Found in bones, muscles, skin, and tendons.
- Chemically conserved amongst higher species with types I, II, and III being most abundant forms (80-90%).
- Non-cytotoxic and bioresorbable
- Can be formed into compacted solids or lattice-like gels.
- Has a diverse range of functions and is naturally occurring making it clinically versatile for various medical purposes.
 - Various formulations approved by EMA and FDA (80% of regenerative medicine applications use collagen).
- Historically, collagen for medical use originated from humans, cows, pigs, or sheep

Challenges around Existing Collagen Supplies

- Disease risk (BSE and virus transfer) (Bovine and Porcine)
- Batch-to-batch inconsistency (Rat Tail)
 - Students often make rat tail collagen in the lab
 - Non-translatable technology.
- Unsustainable carbon footprint from mammalian sources.
- FDA/EPA and other regulatory bodies scrutinizing and banning new product registrations and use of mammal testing.
- Synthetics often based on B-structured fibrous materials present issues on biocompatibility.
- Recombinant collagen is very expensive



The screenshot shows the Science magazine website interface. At the top, there is a navigation bar with the Science logo and links for Contents, News, Careers, and Journals. Below the navigation bar, there is a 'SHARE' section with social media icons for Facebook (9K shares), Twitter, LinkedIn, and Email (587 shares). The main content area features a large image of a person wearing blue gloves holding a small white mouse. Below the image, the article title is 'U.S. EPA to eliminate all mammal testing by 2035', followed by the author 'By David Grimm' and the date 'Sep. 10, 2019, 6:00 PM'. The article text states: 'The U.S. Environmental Protection Agency (EPA) in Washington, D.C., announced today that it will stop conducting or funding studies on mammals by 2035. The move, which is already eliciting strong reactions from groups supporting or opposing experiments on animals, makes EPA the first federal agency to put a hard deadline on phasing out animal research.'

<https://www.sciencemag.org/news/2019/09/us-epa-eliminate-all-mammal-testing-2035>

Why Jellyfish Collagen?

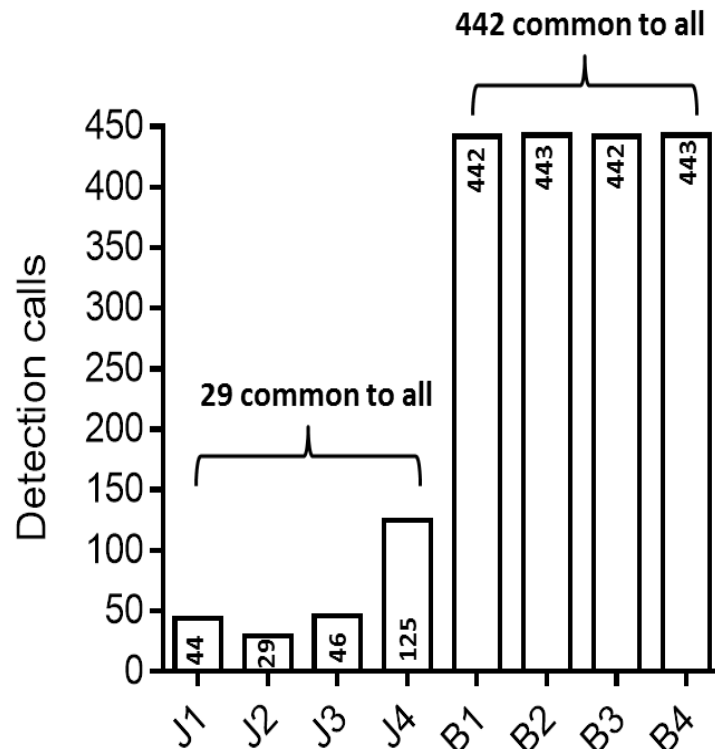
The reasons to adopt jellyfish collagen compared with mammalian collagens include:

- Prion & disease-vector free material.
- Non-reactive & significantly cleaner at the miRNA level.
- Biocompatible offering a low immunogenicity profile.
- Consistent from one batch to another because of the simplistic physiology of jellyfish.
- Similar to mammalian and human type I, II, III, V collagens because of the ancient chemical lineage.
- Compatible with all existing cell culture methodologies (self coating, imaging, etc).



Ancient lineage - cleaner at the microRNA level

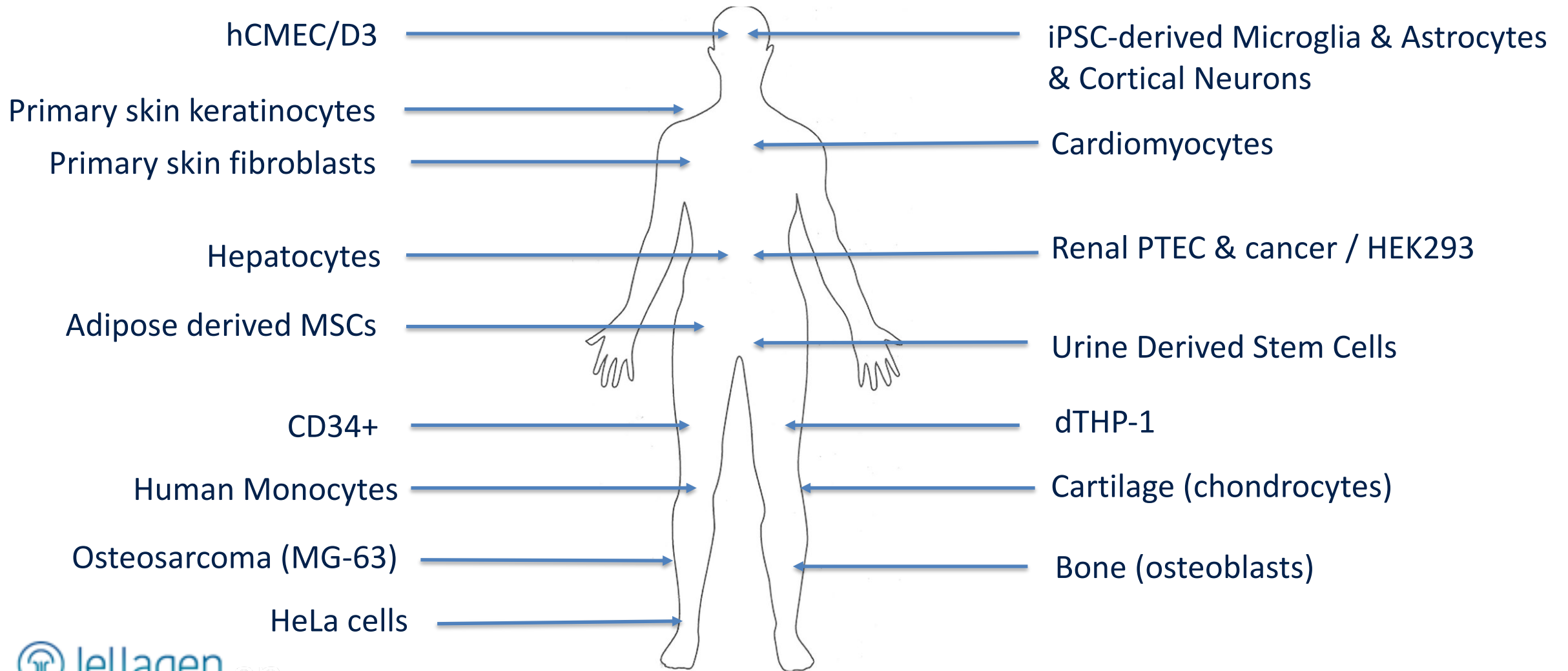
Jellyfish collagen confirmed “cleaner” than standard collagen sources in terms of non-specific microRNA interference.



Jellagen collagen samples (J1 J2 J3 J4) vs Bovine Samples (B1 B2 B3 B4) comparison for miRNA content.

Figure illustrates that Jellagen’s jellyfish collagen is a “cleaner” product in terms of non-specific miRNA-based effects compared to the established standard collagen sources such as bovine.

Biocompatible with human cells.



The background of the slide is a dark blue, almost black, underwater scene filled with numerous jellyfish. The jellyfish are illuminated from above, creating a soft, ethereal glow. They vary in size and orientation, with some appearing as bright, glowing discs and others as more translucent, bell-shaped structures. The overall effect is a serene and scientific atmosphere.

Cardiomyocyte Study

Cardiomyocyte – Downstream Differentiation

Cardiomyocyte Experimental Scheme:

Human Induced Pluripotent Stem Cells (hiPSCs)

D0 - D2

Mesoderm

D3 - D4

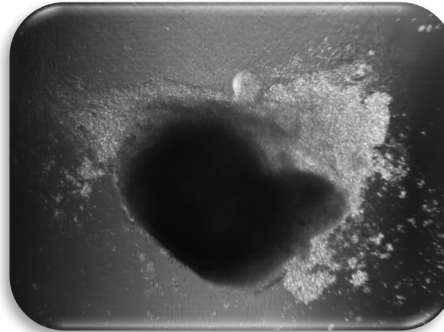
Cardiac Mesoderm

D6 - D19

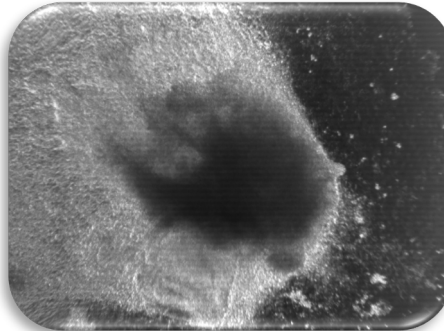
Contracting CM-Spheroids

Morphology:

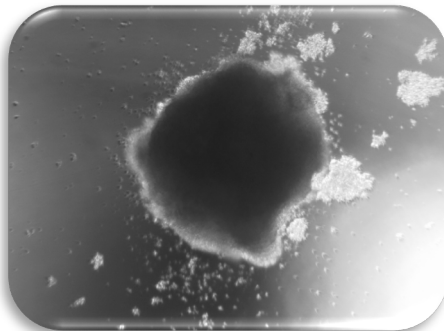
JELLAGEN



GELATIN



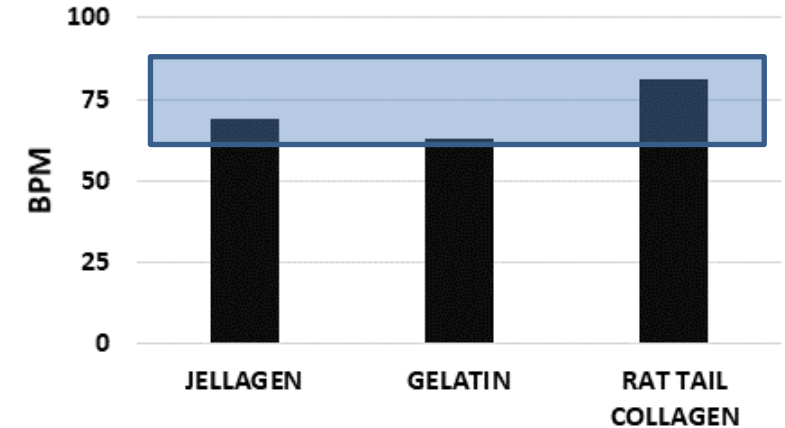
RAT TAIL COLLAGEN



x40

Beats Per Minute (BPM)

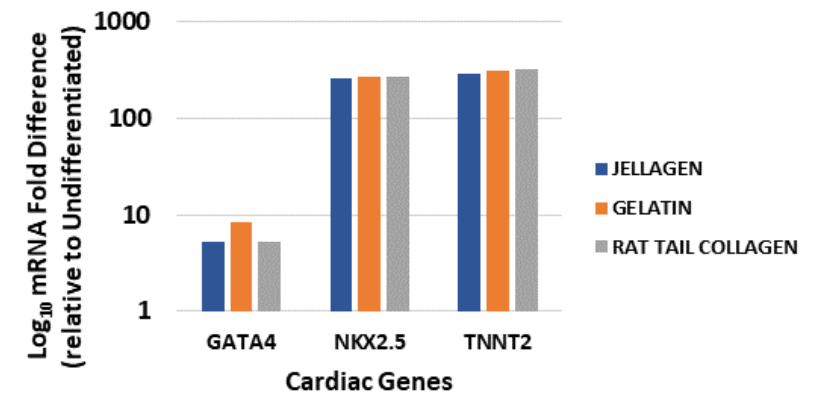
Day 19 of Cardiomyocyte Differentiation



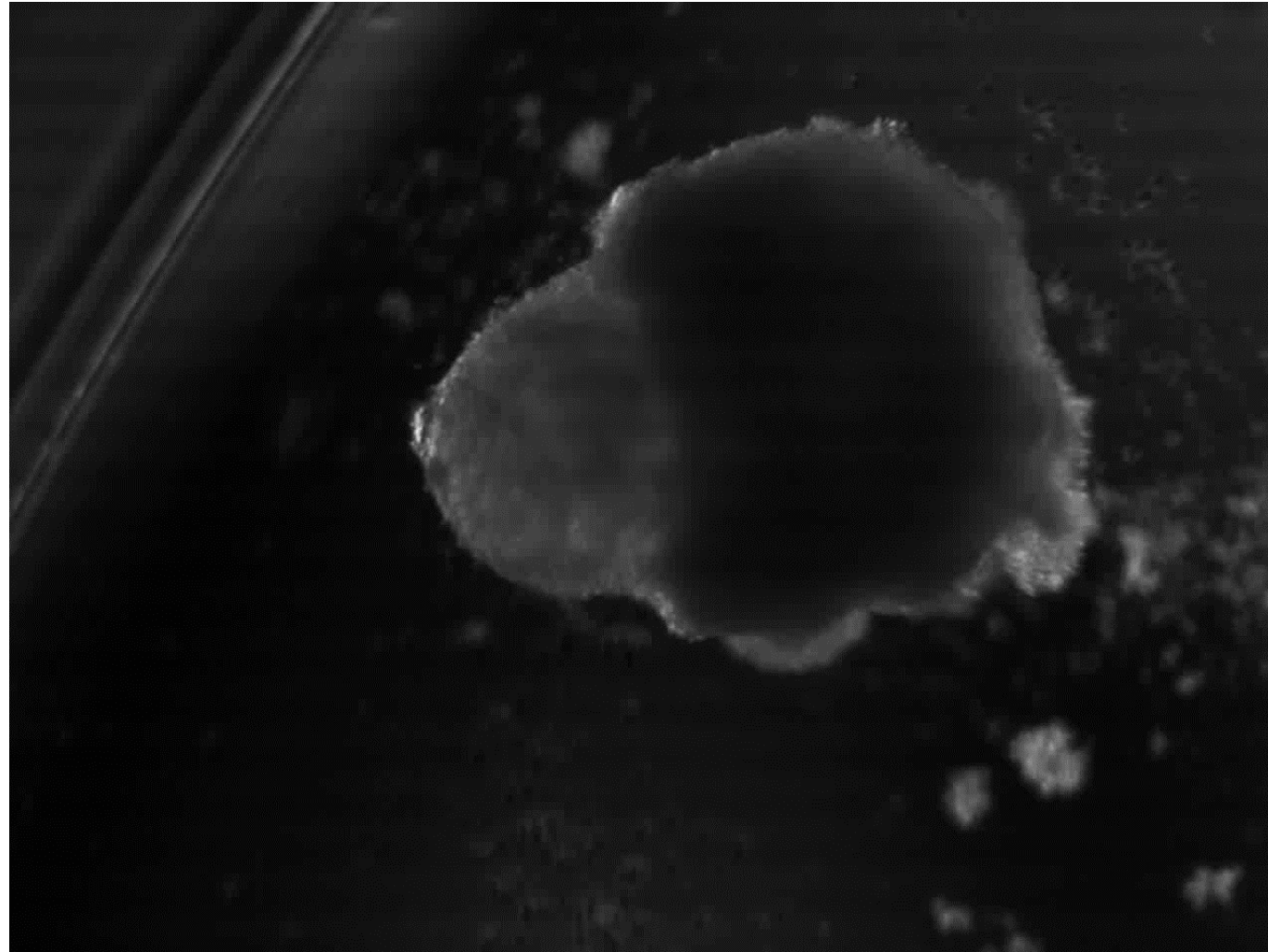
Matrices

Quantitative-PCR

Day 19 of Cardiomyocyte Differentiation



Cardiomyocyte – Phase Beating



Product Range – for Cell Culture



Biomaterial
Solution & Dried



Collagen
2D Pre-Coated Plates



Jellagen® 3D Scaffolds



JellaGel®- Collagen
Hydrogels

What does Jellagen Offer?

- Less risk of disease transfer - Prion & disease-vector free material [BSE]
- Less 'off target' effects - significantly cleaner at the miRNA level.
- More accuracy and reproducibility – inert & non pro-inflammatory material.
- Good biocompatibility - low immunogenicity profile, non-cytotoxic and offers in vitro to in vivo potential.
- Fewer repeats - Consistent from one batch to another because of the simplistic physiology of jellyfish.
- Ethically sourced material
- Compatible with all existing cell culture methodologies (self coating, imaging, etc).
- Compatible with a wide range of cell lines.

Jellagen[®]: a next generation collagen, is a collagen evolution not a revolution.



www.jellagen.co.uk