

## Alternatives to scarce Matrigel and why they are needed.

### Introduction

Matrigel, first developed over 35 years ago has been used in 2D and 3D cell culture however due to supply limitations, inconsistency of biochemical and mechanical properties and potential for antigenicity researchers are now looking to other biomaterials for structural support of their cultures. This ProColl white paper examines the reasons for Matrigel's limitations and why advances in biotechnology now mean that cell scientists and engineers understandably are demanding more for meeting the needs of 21st century regenerative medicine.

### Biochemical Consistency of Culture Environment

Matrigel is a matrix of materials produced from murine (mouse) tumour cells. Its primary components are laminin, collagen IV, entactin and perlecan, a proteoglycan, but it also contains a myriad of growth factors, enzymes and cytokines (1). It is reported to contain more than 14,000 unique peptides and 2000 unique proteins and this number is increasing as more are discovered (2). This means that Matrigel is an undefined mixture of biochemicals that permit good cell and tissue growth but at the cost of uncertainty when interpreting cell data in terms of cause and effect. This problem is compounded by the biochemical inconsistencies that researchers have observed within a single batch and between batches of Matrigel (3, 4, 5, 6). This leads to the conclusion that Matrigel is an undefined and variable collection of chemicals that support and guide cell growth but leads to uncertainty and lack of reproducibility in cell-culture and tissue engineering experiments. For fundamental research, therapeutic-cell manufacturing and tissue engineering a defined growth matrix is required with controllable biochemical and biomechanical properties. This can be achieved through modern techniques that use purified collagens and scaffolding fabrication techniques such as electrospinning. However, the collagen *must* be consistent. ProColl manufacturing techniques ensure minimal batch to batch variation and high purity providing confidence in the definition of the cells biochemical environment

### Xeno-Free Culture

As with all materials derived from animal sources Matrigel is antigenically compromised with the presence of materials from animals. Many reports have identified weakness in the interpretation of data from cellular assays as a consequence of using Matrigel with its xenogenic contaminants (3, 7). If we consider the increased awareness and concern over the interspecies transfer of disease vectors then Matrigel is also compromised. Viral contamination (lactate dehydrogenase-elevating virus (LDHV), has been found in multiple batches of animal-derived products, including Matrigel (8,9). Thus, the presence of the xenogenic contaminants also limits the clinical potential of methods such as cell number expansion which have been developed using Matrigel. The demand for alternatives to Matrigel has led to new product development and the formation of start up companies within the life sciences sector (1) Modern methods now allow the production of synthetic animal-free systems that can be used to culture cells and tissue efficiently without the biochemical inconsistency and dependence on animal materials and negating ethical and interspecies concern. ProColl have now established a range of recombinant collagens that are animal free, with a high degree of purity and consistency that were developed to meet the needs of modern cell and tissue culture.

**If you are interested in joining our growing list of distribution and OEM partners, please use the contact form on our website ([www.procoll.co.uk](http://www.procoll.co.uk)) and one of the team will be in touch. ProColl's collagen is also available direct for bulk orders.**

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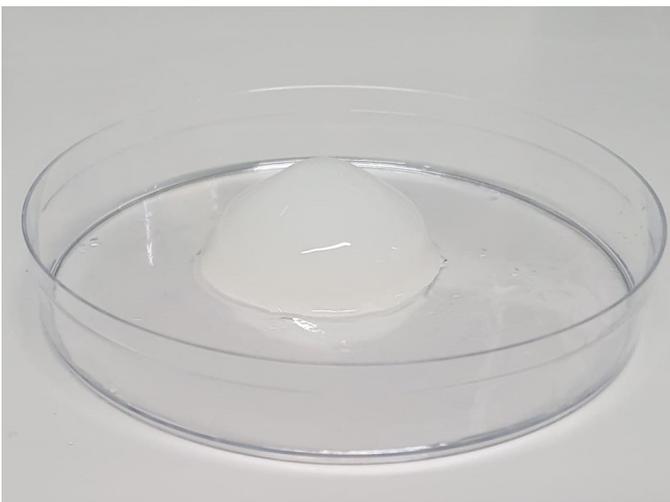
### References

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Figure: A hydrogel made from ProColl acid soluble collagen.

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