TOYO

AGM Reagent Kit for Animal Cells

PRODUCT BRIEF

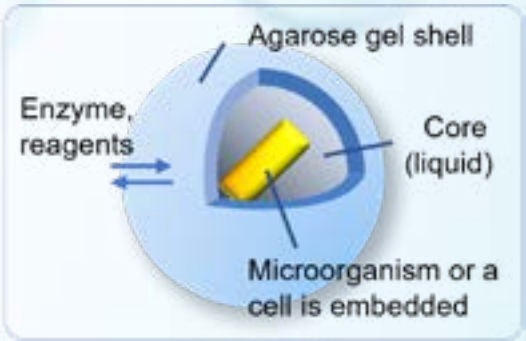
INTRODUCTION

To enhance cell viability and accuracy in single-cell whole genome analysis, TOYO has introduced the AGM (Agarose Gel Microcapsules) reagent kit for animal cells, building upon the success of the commercially available AGM reagent kit for microorganisms. This innovative kit optimizes reagent conditions, resulting in a marked improvement over traditional amplification kits. When used in conjunction with the AGM reagent kit for microorganisms, the newly launched AGM reagent kit for animal cells enables highly precise genomic analysis for both microorganisms and animal cells.

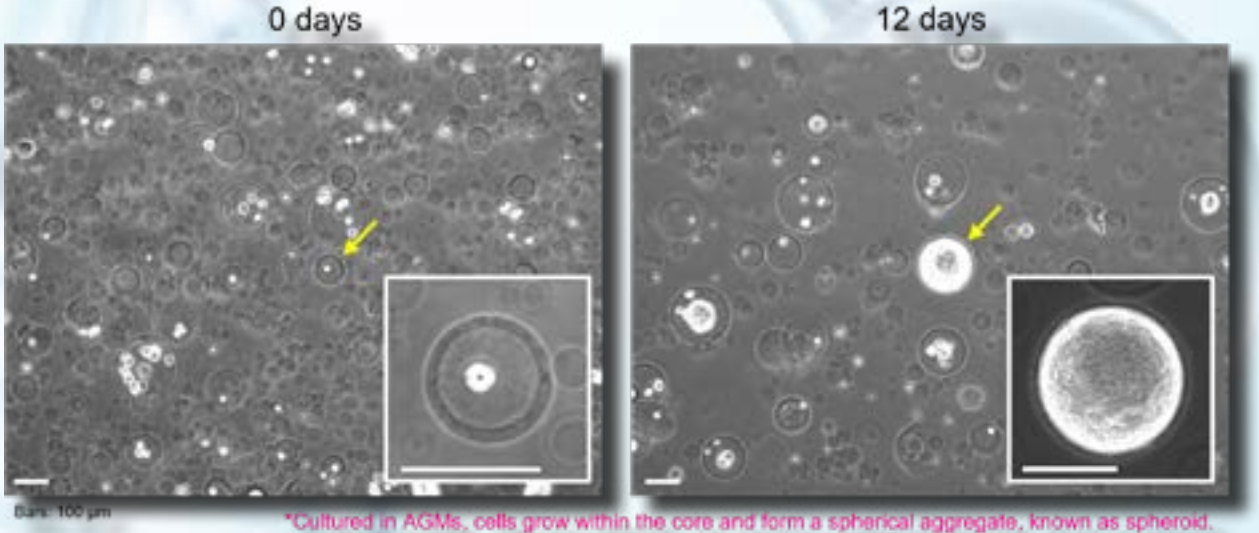
AGM Reagent Kit

MICROCAPSULE EMBEDDING A SINGLE CELL

In the past, cell cultivation has conventionally relied on dishes and gels. However, we embarked on a novel approach by cultivating cells within AGMs. AGM shells facilitated gas and medium exchange, allowing us to successfully observe cell cultivation within these capsules. Notably, the microcapsules imposed less stress on the cells compared to traditional gels, resulting in rapid cell growth and the formation of characteristic spheroids, as depicted in the figure below. Retrieving cultured cells from AGMs proved to be exceptionally straightforward, requiring no special treatment. Furthermore, our studies demonstrated that the shear force generated during culture medium exchange had a negligible adverse effect. This innovative culture method, enabled by the AGM reagent kit for animal cells, holds great promise for applications in anticancer drug screening and stem cell research.



Novel Core and Shell Structure



*Cultured in AGMs, cells grow within the core and form a spherical aggregate, known as spheroid.

APPLICATIONS

Single-cell genome analysis of single animal cell
Animal cell culture in a capsule
Spheroid formation in a capsule

KEYWORDS FOR APPLICATIONS

Cell culture/transplantation, cell therapy, genomic diagnosis, cancer cells, regenerative medicine, cancer diagnosis, anticancer drug screening, stem cell research

AGM

AGM (AGAROSE GEL MICROCAPSULE) TECHNOLOGY

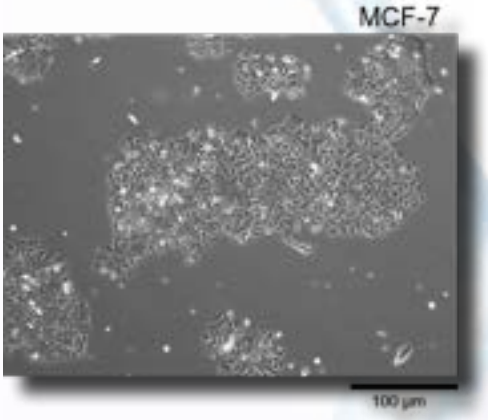
Recent advances in DNA amplification technologies, including multiple displacement amplification (MDA) and gene analysis technologies that incorporate next-generation DNA sequencers, have sparked interest in single-cell genomics for various applications such as circulating cancer cell (CTC) tests, reproductive medicine, and cancer biopsies. These technologies enable the diagnosis of diseases from a single cell, offering superior solutions for alleviating patient stress related to issues like sampling, specificity, and sensitivity. However, enzymatic amplification of trace amounts of DNA has been associated with amplification bias, making it challenging to obtain comprehensive genome information.

We have successfully mitigated amplification bias by reducing the volume of the reaction mixture to a pico-liter (10-12 liters) scale and have introduced the agarose gel microcapsule (AGM) reagent kit. This kit facilitates more accurate single-cell genome analysis of microorganisms. It allows the creation of hydrogel microcapsules with a liquid core containing microorganisms and an agarose gel shell surrounding them. Furthermore, this kit can be used with standard laboratory equipment to produce hundreds of thousands of capsules. While initially designed for microorganisms, we have also developed a kit for animal cells, including those from humans and mice.

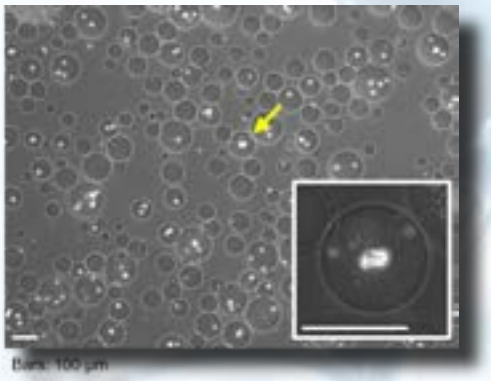
REPORT ON CULTURING OF ANIMAL CELLS IN AGMS

[Method] We developed an AGM reagent kit for animal cells by adjusting the compositions of the existing AGM preparation reagents. We then embedded the C3H10T1/2 mouse embryo-derived cell line and the MCF7 human breast cancer-derived cell line into the AGMs and attempted to culture them.

[Results and Discussion] When we used conventional AGM reagents designed for microorganisms, the survival rate of animal cells was nearly 0%. However, after optimizing the reagents specifically for animal cells, the survival rate increased to approximately 80%. When we cultured C3H10T1/2 and MCF7 cells within the sol-like AGM core, the C3H10T1/2 cells, which are susceptible to contact inhibition, did not proliferate. In contrast, the MCF7 cells, which are not susceptible to contact inhibition, grew and formed clumped spheroids using each other as scaffolds. Based on these findings, we have established conditions for stable cell embedding and culturing within AGMs. AGM reagents tailored for animal cells hold promising potential for applications in single-cell genomics and cell cultures in the future.



Another method
MCF-7 cells are embedded in gel beads.



When cells are cultured using conventional gel beads, the gel inhibits growth, and growth is slower in the beads than in AGMs.

If you continue to culture cells within AGMs, shells will break and the cells will leak out, making it easy to collect the cells.

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10/03/2023 (SCW)