# Enhancing Precision in Neurosphere Analysis

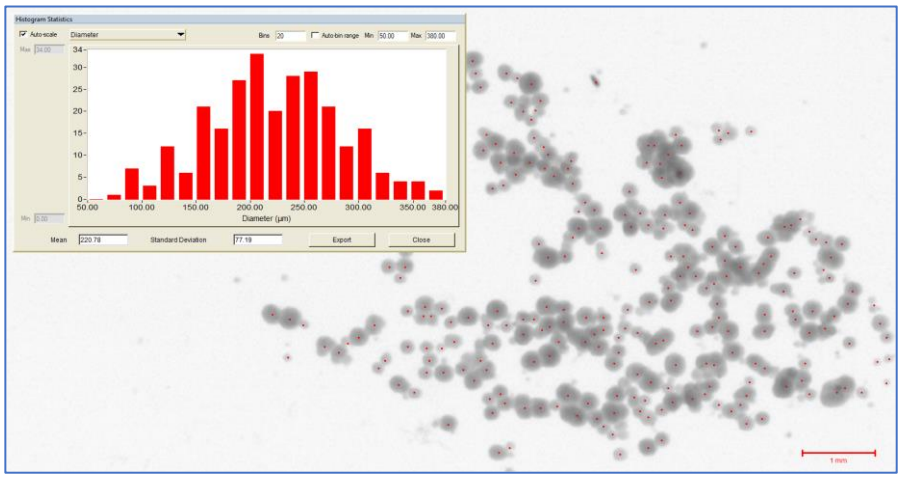
## by Justin Croft

### Introduction

In the dynamic field of brain biology research, the exploration of neurospheres, complex three-dimensional aggregates of neural stem cells and progenitors, has significantly contributed to our understanding of the intricacies of the brain. Ranging from low complexity structures to highly complex structures such as organoids that mirror both structure and function, neurospheres can provide key insights into brain development, disease modeling, and drug discovery. The accurate detection, enumeration and sizing of neurospheres is crucial for unraveling these insights. However, the manual approach to these tasks is onerous, time-consuming, subjective, and prone to errors.

Addressing these challenges, the GelCount system, developed by Oxford Optronix, emerges as the gold standard automated solution, optimizing efficiency and enhancing the reliability of 3D neurosphere and neuronal organoid analysis. In this article, we explore the advantages of the GelCount system and showcase its application in real-world scientific publications.

### Automated precision with GelCount




The GelCount revolutionizes neurosphere analysis by deploying advanced image analysis algorithms, eliminating the need for manual counting, and mitigating subjective interpretation. This automation not only saves considerable time but also eliminates the potential for human errors and biases.

### Efficiency and standardization

Manual counting of neurospheres is a labor-intensive task, often requiring enumeration of hundreds or thousands of neurospheres under a microscope. While alternative approaches like automated microscopy exist, they tend to be slow and lack scalability. The GelCount system accelerates the process, allowing swift

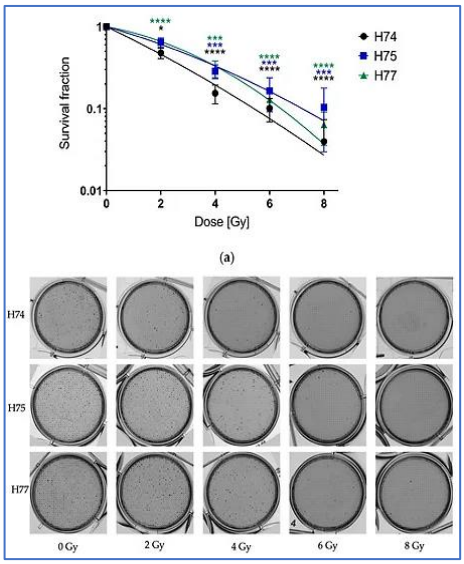
and accurate analysis of large numbers of spheres across multiple plates in a short space of time. Additionally, the platform ensures consistency by strictly applying consistent neurosphere detection and sizing parameter across an entire study.

**Objective results and advanced features**

Delivering consistent and objective results, the GelCount overcomes the variability associated with manual counting methods. It provides advanced features, including insights into neurosphere size distribution, crucial for understanding the heterogeneity of neurospheres under diverse experimental conditions and disease models.

**Published application examples**

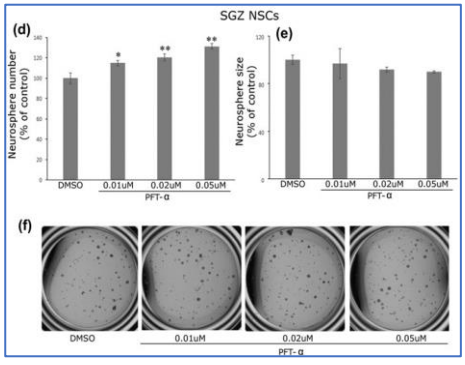
*Strand Z. et al. 2023 (Cancers)*
Establishment of a 3D model to characterize the radioresponse of patient-derived glioblastoma cells




The study describes the development of a three-dimensional (3D) model for patient-derived glioblastoma (GBM) cells to better understand their responses to radiotherapy. The authors successfully establish a novel 3D model for patient-derived GBM cell lines and provide an analysis of the volume and growth pattern of primary GBM cells.

The GelCount was used to provide a quantitative analysis of colony and spheroid growth, and volume measurements. It facilitated the establishment of the 3D model and enabled the scientists to accurately analyze the growth patterns and responses of GBM cells.

*Turcato F. et al. 2018 (Cell Transplantation)*
Sequential combined treatment of pifithrin-α and posiphen enhances neurogenesis and functional recovery after stroke




This article investigates the effects of a sequential combined treatment approach involving pifithrin-α and posiphen on neurogenesis and recovery after stroke. The main conclusion of the study shows that this treatment approach enhances self-renewal, proliferation rate, and neuronal differentiation of adult neural stem cells (NSCs) in culture. Additionally, the sequential treatment leads to improved functional recovery in stroke animals.

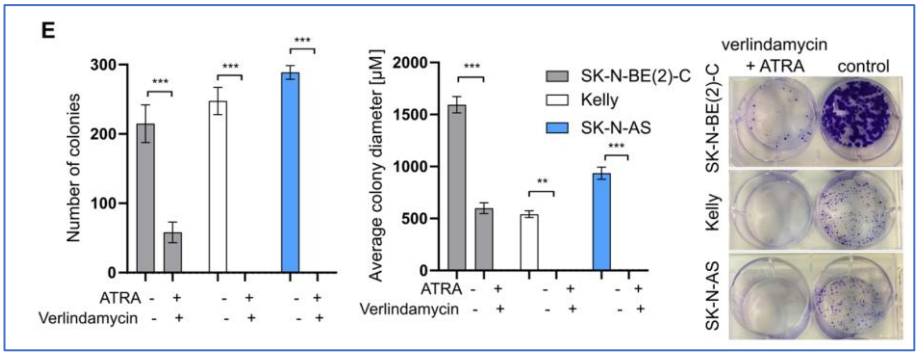
By providing a readout of neurosphere count and size, the GelCount was used to quantitatively evaluate the enhancement of endogenous neurogenesis in response to the treatment.

The study highlights the potential of the sequential combined treatment with Pifithrin-α and Posiphen as a promising therapeutic approach for stroke recovery.

*Urban-Wójciuk Z. et al. 2022 (Cancer Gene Therapy)*
The biguanide polyamine analog verlindamycin promotes differentiation in neuroblastoma via induction of antizyme

This publication investigates the effects of verlindamycin on neuroblastoma differentiation. The main findings were that verlindamycin acts as a potent inhibitor of neuroblastoma growth and enhances the

differentiation induced by ATRA (all-trans retinoic acid). This is significant because ATRA-induced differentiation therapy has been shown to extend relapse-free survival in high-risk neuroblastoma cases associated with the MYCN gene.




The GelCount was employed for quantifying and analyzing cellular growth and differentiation. It provided a reliable method for measuring the effects of verlindamycin on neuroblastoma cell proliferation and total growth. The study highlights the potential therapeutic applications of verlindamycin in neuroblastoma treatment, specifically for promoting differentiation and inhibiting tumor growth.

*Skaga E. et al. 2022 (Translational Oncology)*
Functional temozolomide sensitivity testing of patient-specific glioblastoma stem cell cultures is predictive of clinical outcome
GelCount is used to count tumorsphere forming assays (Supplementary Fig. S1 and S2)

*Lin W. et al. 2021 (Journal of Neuroinflammation):*
VMP1, a novel prognostic biomarker, contributes to glioma development by regulating autophagy
Used GelCount to count glioblastoma cells in clonogenic assay (Figs 4E, 4F)

**Conclusion**

As has been the case for the better part of 15 years, the GelCount system stands as a cornerstone in basic brain biology and cancer research, providing invaluable benefits for automating the counting and sizing of neurospheres and neuronal organoids. Its automated and objective approach enhances efficiency and reliability, contributing to the advancement of our understanding of brain biology and related fields. The real-world applications showcased in the large body of scientific publications citing the GelCount underscore the system's significance in unraveling the complexities of neurosphere analysis.