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Ricoh Biosciences, Inc.

Amyotrophic Lateral Sclerosis (ALS)

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Building Better ALS Models for Translational Discovery

ALS drug discovery has long been limited by models that fail to capture human disease biology. Our iPSC-derived ALS model recapitulates hallmark patient phenotypes such as TDP-43 mislocalization and motor neuron degeneration—without artificial overexpression. Partner with us to design, optimize, and execute custom cell-based assays that generate meaningful, translational data to drive your research forward.

TDP-43 Pathology: A Hallmark of ALS

A defining hallmark of ALS pathology is the mislocalization of TDP-43 protein from the nucleus to the cytoplasm, where it forms aggregates that disrupt RNA processing and drive motor neuron degeneration. Ricoh Biosciences' iPSC-derived ALS models reproduce this key disease feature, providing a human-relevant platform to investigate disease mechanisms and evaluate therapeutic strategies targeting TDP-43 pathology.

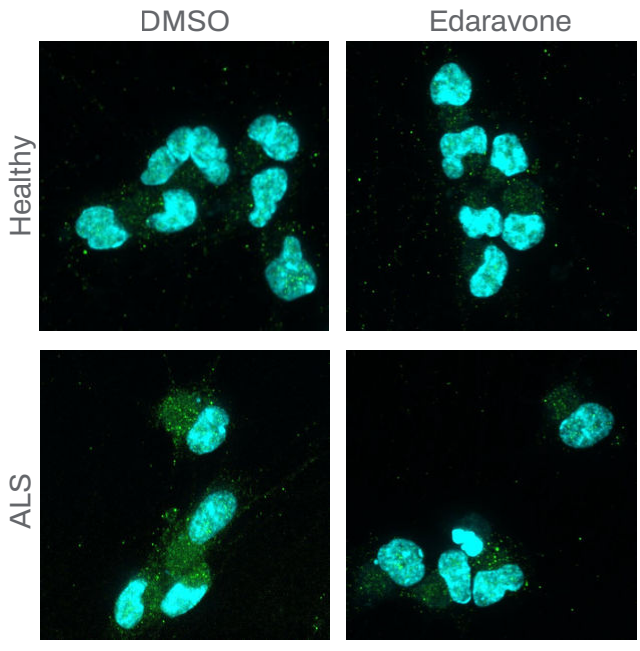

Figure 1: Representative immunofluorescence of iPSC-derived motor neurons from a sporadic ALS donor (bottom) and a healthy control (top). Nuclei (blue), and total TDP-43 (green).

Immunofluorescence imaging of iPSC-derived motor neurons (see Figure 4) reveals distinct TDP-43 localization patterns in ALS versus control cultures. In healthy neurons, TDP-43 remains confined to the nucleus; in ALS models, it accumulates in the cytoplasm — faithfully reproducing a defining pathological signature of ALS.

Quantifying TDP-43 in ALS Motor Neurons

Quantitative image analysis confirms a significant increase in cytoplasmic TDP-43 puncta in ALS cultures relative to healthy controls (****p < 0.0001). This robust phenotype provides a reproducible assay for evaluating therapeutic compounds that modulate TDP-43 aggregation or localization dynamics in a human-relevant system.

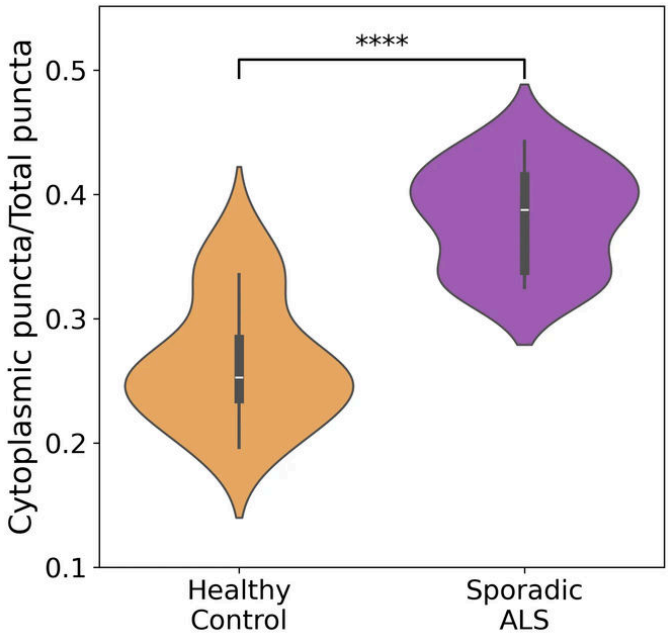

Figure 2: Quantification of TDP-43 localization in Quick-Neuron™ motor neurons. Violin plots show the ratio of cytoplasmic to total TDP-43 puncta in cultures derived from a sporadic ALS patient and a healthy control. Significance was quantified by T-test. Stars denote statistical significance: (**** = p <0.0001).

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Custom assay services and human, iPSC-derived ALS disease models for drug discovery.

Compound Testing in iPSC-Derived ALS Models.

To demonstrate the translational utility of our iPSC-derived ALS motor neuron models, we tested compounds targeting key disease mechanisms. Edaravone, CK1 inhibitors, and Sephin1—representing antioxidant, TDP-43 regulatory, and stress-response pathways—each produced measurable rescue of TDP-43 mislocalization in ALS motor neurons. These findings highlight the model's sensitivity to diverse therapeutic mechanisms and its value as a platform for screening candidate ALS treatments.

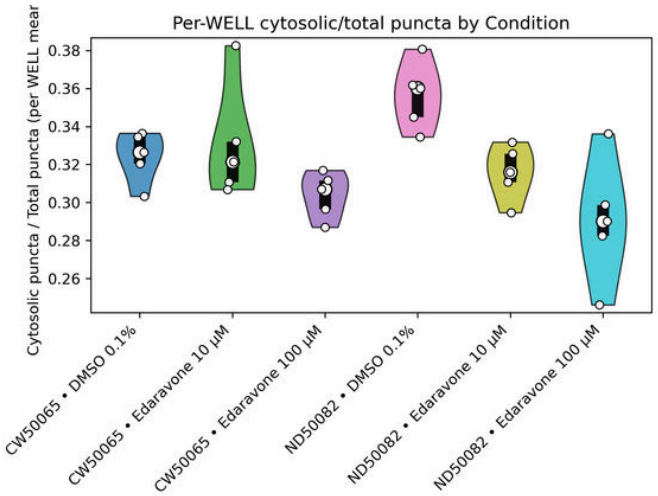

Figure 3: Violin plots show the distribution of per-well mean cytosolic puncta/total puncta ratios for healthy control and ALS cultures treated with vehicle (0.1% DMSO) or edaravone (10 or 100 µM). ALS motor neurons treated with DMSO show elevated cytoplasmic TDP-43, consistent with ALS pathology. 24-hour treatments with Edaravone at both 10 µM and 100 µM concentrations significantly rescues this mislocalization, reducing cytosolic TDP-43 levels.

Physiologically Relevant

Recapitulates disease hallmarks such as TDP-43 mislocalization.

Consistent & Reproducible

Reliable performance and batch-to-batch consistency.

Sporadic & Familial ALS Models

Patient-derived lines for sporadic and familial ALS.

Naturally Evolving Pathology

Progressive, spontaneous disease phenotypes.

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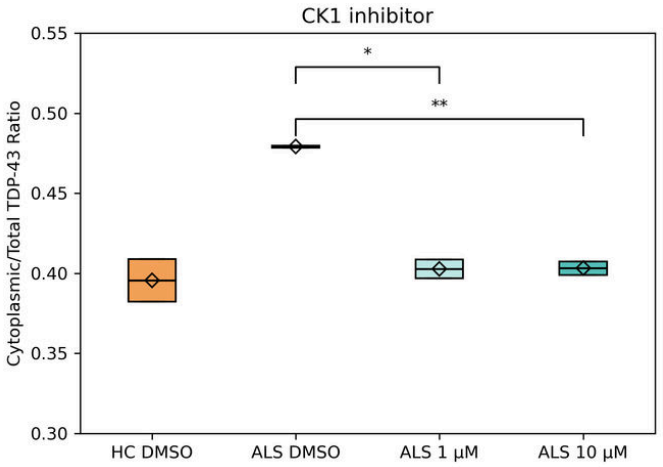

Figure 4. Quantification of the cytoplasmic-to-total TDP-43 ratio in Quick-Neuron™ motor neuron cultures derived from a sporadic ALS patient and a healthy control. All cultures were treated with DMSO, and ALS cultures were additionally treated with a CK1 inhibitor (1 µM or 10 µM).

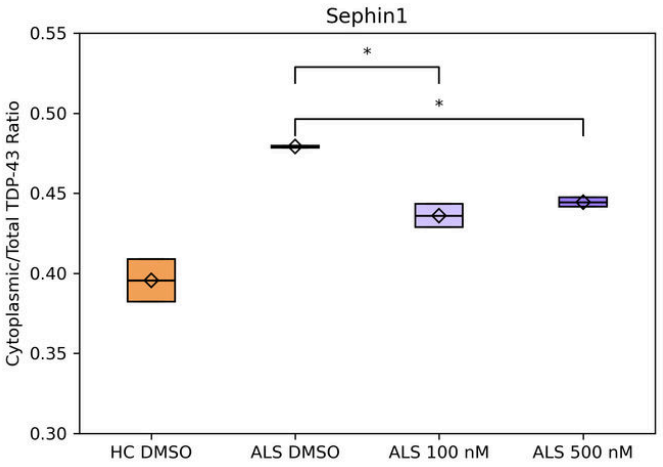

Figure 5. Quantification of the cytoplasmic-to-total TDP-43 ratio in Quick-Neuron™ motor neurons derived from a sporadic ALS patient and a healthy control. All cultures were treated with DMSO, and ALS cultures additionally received Sephin1 (100 nM or 500 nM).

Our ALS Disease Modeling Services.

Assay Services

Reliable testing with iPSC-derived cells for drug discovery and safety evaluation.

Assay Development

Custom assay design tailored to your research goals, including disease models and endpoints.

Differentiation Services

Rapid, high-quality differentiation of iPSCs into virtually any human cell type.

Let's Connect

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