Dorsal root ganglion neurons maintained in a 3D culture model exhibit similar electrophysiological properties to fresh explants.

E. East, K. P. S. J. Murphy & J. B. Phillips

*Department of Life Sciences, The Open University, Milton Keynes, UK*

**INTRODUCTION:** Tissue engineered culture models provide a powerful tool for neuroscience research. They overcome limitations associated with monolayer cultures of neurons and glia by maintaining cells in a more realistic 3D spatial arrangement, and permit continuous monitoring and control of variables that cannot be achieved in animal models. Here we report the development of a system for recording electrophysiological behaviour in neurons in 3D culture.

**METHODS:** Dorsal root ganglia (DRGs) were harvested from adult rats, dissociated using collagenase, then seeded within 2 mg/ml Type I collagen gels and maintained in culture for 20 hours. Preparations were transferred to an interface recording chamber at 29°C, perfused with culture medium at 150 µl/min and exposed to warmed and humidified oxygen (95%) and carbon dioxide (5%). Recordings were made using glass micropipettes filled with 3M KCl (electrode series resistance 60-80 MOhms) attached to an Axoclamp 2B amplifier and stored on a Macintosh computer. Neurons in 3D culture were compared to those in acutely hemi-sectioned DRG explants.

**RESULTS:** Resting membrane potential and input resistance were recorded from neurons in both 3D cultures and acutely hemi-sectioned control tissue. Characteristic membrane voltage responses to hyperpolarising current were obtained and injection of depolarising current elicited action potentials (Fig 1).

**DISCUSSION & CONCLUSIONS:** Adult rat DRG neurons maintained in 3D culture exhibit electrophysiological responses comparable to their counterparts in fresh tissue explants. This system provides a functional model in which neuronal responses can monitored. The reproducibility and control make this approach suitable for further development as a model for toxicity testing.

**REFERENCES:**