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Immunocytochemical characterization of highly passaged primary astrocyte cultures from autopsied aged human brain

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Abstract

Astrocytes have a wide variety of functions, unlike oligodendrocytes or ependymal cells that have a single highly specialized function. Most of our understanding of astrocyte functions is derived from studies in vitro utilizing astrocyte cultures established from neonatal and adult rodent brain and from fetal human brain. However, to study the pathological roles of astrocytes in age-related neurological diseases in human, it is crucial to establish in vitro systems derived from the adult human brain, predominantly from cases of neurological disorders. In the past, methods have been developed to isolate viable glial cells from adult human brain tissue. We believe that human cells in the appropriate developmental, aging and disease state, and from afflicted brain regions, would provide a more suitable in vitro model system for such studies. However, there have been discrepancies in the literature as to the predominant type of cell in primary astrocyte cultures established from adult human brain, particularly with multiple passages. Some reports say that the predominant cell type is fibroblasts or fibroblast-like cells, and not cells of glial origin. Others contend that astrocytes predominate. In the latter case, however, two different changes in GFAP expression in astrocytes were demonstrated: stable and decreased expression with successive passages. Therefore, to examine whether primary astrocytes are replaced with leptomeningeal fibroblasts and whether the GFAP immunoreactivity changes during successive passages, we have conducted an immunocytochemical characterization of primary astrocyte cultures established from aged human autopsied brain. As a result, more than 90% of the cultured cells were thought to be astrocytes. Less than 10% were other types of cells, including fibroblasts, endothelial cells, microglia, neurons and oligodendrocytes. Successive passages and even multiple cycles of freezing and thawing did not alter the antigenic properties of the cultured astrocytes. This indicates that primary cultures of glial cells can be frozen for reposition in cell banks, distributed to laboratories around the world, and used as a reliable source for glial cell research. *Tottori J. Clin.Res.* 2(1), 121-141, 2009

Key words: astrocytes, primary cultures, autopsy, glial acidic fibrillary protein (GFAP), cell bank

Introduction

There are two major classes of cells in the brain: neurons and glia. In the central nervous system (CNS), glial cells are represented by three t-