

Risk Assessment – retinal pigmented epithelium cells

Background

The pigmented layer of retina or retinal pigment epithelium (RPE) is the pigmented cell layer just outside the neurosensory retina that nourishes retinal visual cells, and is firmly attached to the underlying choroid and overlying retinal visual cells. The RPE was known in the 18th and 19th centuries as the pigmentum nigrum, referring to the observation that the RPE is dark (black in many animals, brown in humans); and as the tapetum nigrum, referring to the observation that in animals with a tapetum lucidum, in the region of the tapetum lucidum the RPE is not pigmented.

The RPE is composed of a single layer of hexagonal cells that are densely packed with pigment granules. At the ora serrata, the RPE continues as a membrane passing over the ciliary body and continuing as the back surface of the iris. This generates the fibers of the dilator. Directly beneath this epithelium is the neuroepithelium (i.e., rods and cones) passes jointly with the RPE. Both, combined, are understood to be the ciliary epithelium of the embryo. The front end continuation of the retina is the posterior iris epithelium, which takes on pigment when it enters the iris. When viewed from the outer surface, these cells are smooth and hexagonal in shape. When seen in section, each cell consists of an outer non-pigmented part containing a large oval nucleus and an inner pigmented portion which extends as a series of straight thread-like processes between the rods, this being especially the case when the eye is exposed to light.

Risk Considerations

(1) RPE cell is not generally considered capable of infecting vertebrate cells. As a result the risk of accidental human infection is considered negligible.

(2) RPE cell is highly sensitive to the activity of human complement so a rapid death of the cell would be expected to occur in any accidental exposure of laboratory workers. In addition, the cell is incapable of replication in human cells as the environment is non-permissive for RPE cell replication.

Exposure risk

There is negligible risk of exposure and infection by RPE cells to workers in the lab as these organisms cannot generally infect vertebrate cells. The RPE cells used in the lab are not very stable or robust in the environment as it is more susceptible to UV and desiccation damage. Good standard laboratory practices of appropriate lab protective equipment, containment and appropriate disinfection/disposal will prevent any accidental exposure of the human skin to the RPE cells.

Decontamination/Disposal Procedures

General Level 1 good laboratory practices of decontamination of all work surfaces daily and appropriate chemical disinfection (eg. 1% hypochlorite) of all liquid cultures and laboratory glassware will successfully kill any RPE cells used in the lab.

Summary

The amount of RPE cells produced at any given time will be less than 0.1 liter of unconcentrated cells. These volumes are considered to be a low and therefore low risk. There is negligible infection risk to humans.

Tentative Assessment: BIOSAFETY LEVEL 1