



## MIO-M1 cells

### Category

Biological Materials/Cell lines

### Spontaneously immortalized human Müller glia cell line

Cells grow indefinitely under adherent conditions in the presence or absence of extracellular matrix proteins. Optimal medium for cell growth: DMEM medium containing high glucose and stable glutamine, supplemented with 10% foetal bovine serum.

Under normal culture conditions, MIO-M1 express markers of mature Müller cells, including cellular retinaldehyde binding protein [CRALBP], glutamine synthetase, vimentin and epidermal growth factor receptor-[EGF-R].

The cells are **NOT** intended for ***Stem cell Research***.

**Size: Cells are shipped growing in 25cm<sup>2</sup> flasks.**

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### Acknowledgement

**Full acknowledgement of the source of the MIO-M1 cells must be given in all relevant publications and presentations of research results.**

The following statement must be included in all publications and the accompanying reference must be cited:

**'The human Müller cell line Moorfields/Institute of Ophthalmology- Müller 1 (MIO-M1) was obtained from the UCL Institute of Ophthalmology, London, UK.'**

The reference is:

**'Limb GA, Salt TE, Munro PMG, Moss SE and Khaw PT. (2002) [In vitro characterization of a spontaneously immortalized human Müller cell line \(MIO-M1\)](#). *Investigative Ophthalmology and Visual Science*, 43: 864-869'**

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## References

1. KHAW, MOSS, MUNRO, SALT, LIMB(2002) , In vitro characterization of a spontaneously immortalized human Muller cell line (MIO-M1), Invest Ophthalmol.Vis.Sci. , 43(3), 864-869
2. LIMB, KHAW, LUTHERT, REH, KEEGAN, BRATIA, SINGHAI, LAWRENCE , MIO-M1 cells and similar muller glial cell lines derived from adult human retina exhibit neural stem cell characteristics, Stem Cells , 25(8), 2033-2043
3. CURTIS, STITT, UCHIDA, LIMB, MEDINA, ZONG, SYONG(2010) , Evidence supporting a role for N-(3-formyl-3,4-dehydropiperidino)lysine accumulation in Muller glia dysfunction and death in diabetic retinopathy, Mol Vis,, 16, 2524-38
4. STITT, CURTIS, LIMB, YONG, MADDEN, WARD, ZONG(2010) , Hyperglycaemia-induced pro-inflammatory responses by retinal Muller glia are regulated by the receptor for advanced glycation end-products (RAGE), Diabetologia,, 53, 2656-66.
5. MARTIN, LIMB, BULL(2008) , Human Muller stem cell (MIO-M1) transplantation in a rat model of glaucoma: survival, differentiation, and integration, Invest Ophthalmol Vis Sci,, 49, 3449-56
6. BRINGMANN, WIEDEMANN, KOHEN, LIMB, JAHN, HOLLBORN(2004a) , Characterization of the basic fibroblast growth factor-evoked proliferation of the human Muller cell line, MIO-M1, Graefes Arch Clin Exp Ophthalmol,, 242, 414-22
7. BRINGMANN, WIEDEMANN, WOLF, KOHEN, REICHENBACH, LIMB, SCHNURRBUSCH, BIGL, TENCKHOFF, YAFAI, IANDIEV, KRAUSSE, HOLLBORN(2004b) , Glial cell expression of hepatocyte growth factor in vitreoretinal proliferative disease, Lab Invest,, 84, 963-72.
8. BRINGMANN, KOHEN, WIEDEMANN, WOLF, REICHENBACH, LIMB, SCHNURRBUSCH, BIEDERMANN, IANDIEV, JAHN, TENCKHOFF, HOLLBORN(2005) , Changes in retinal gene expression in proliferative vitreoretinopathy: glial cell expression of HB-EGF, Mol Vis,, 11, 397-413
9. KOHEN, BRINGMANN, LIMB, WIEDEMANN, REICHENBACH, WAGNER, WURM, DUKIC-STEFANOVIC, RILLICH, ULBRICHT, HOLLBORN(2011) , The human Muller cell line MIO-M1 expresses opsins, Mol Vis,, 17, 2738-50
10. ZHANG, SONG, ZHOU, SUN, YANG, PENG, XIE, LIMB, HU, XIONG, YE, LIU(2014) , IL-1beta Upregulates IL-8 Production in Human Muller Cells Through Activation of the p38 MAPK and ERK1/2 Signaling Pathways, Inflammation, ,
11. KENNEY, KUPPERMANN, LIMB, LUCZY-BACHMAN, GUPTA, MANSOOR(2010) , Protective effects of memantine and epicatechin on catechol-induced toxicity on Muller cells in vitro, Toxicology,, 271, 107-14
12. KENNEY, KUPPERMANN, LIMB, CHWA, FRANCO, PHAM, RAMIREZ(2013) , Hydroquinone induces oxidative and mitochondrial damage to human retinal Muller cells (MIO-M1), Neurotoxicology,, 39, 102-8