

UNIVERSITI TEKNOLOGI MARA

**ANALYSIS OF THE EFFECTIVE METHODS IN
DETERMINING THE CYTOTOXICITY OF
CIRCLE CONTACT LENSES USING NEUTRAL
RED TEST**

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TABLE OF CONTENT

AUTHOR'S DECLARATION	i
ACKNOWLEDGEMENT	iii
TABLE OF CONTENT	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	ix
ABSTRAK	x
CHAPTER 1- INTRODUCTION	1
1.1 Circle Contact Lenses	1
1.2 Background of study	2
1.3 Problem statement	3
1.4 Study objectives	4
1.5 Significance of study	4
CHAPTER 2- LITERATURE REVIEW	5
2.1 Prevalence and habits of cosmetic contact lenses wear	5
2.2 Ocular complication after the use of cosmetic contact lenses	5
2.3 Toxicity test	6
2.3.1 Draize eye testing	6
2.3.2 Alternative <i>in vivo</i> testing	7
2.3.3 <i>Ex vivo</i> tests	7
2.3.4 <i>In vitro</i> tests	8
2.4 Neutral red test	9
2.5 Pigment on cosmetic contact lens	10

CHAPTER 3- METHODOLOGY	12
3.1 Study selection criteria	12
3.2 Inclusion criteria	12
3.3 Exclusion criteria	12
3.4 Electronic searches	12
3.5 Key words used	13
3.6 Procedure	13
CHAPTER 4- RESULTS	14
4.1 Data synthesis	14
4.1.1 Cell line used	14
4.1.2 Duration of the cells exposed with the test material	15
4.1.3 Volume of the neutral red used	15
4.2 Result from data synthesis	16
4.2.1 Pharmaceutical drugs	16
4.2.2 Contact lens care regimens	24
4.2.3 Cosmetic colourants	26
4.2.4 Others	27
CHAPTER 5- DISCUSSION	29
CHAPTER 6- CONCLUSION	33
REFERENCES	34

ABSTRACT

Potentially hazardous substances can affect the physiological structure of ocular surface on a daily basis. Damages to cornea from different materials and chemical variability from irritation and inflammation can cause mild discomfort due to tissue damage resulting in blindness. Therefore, the ocular toxicity test is required to make sure that the products are safe for the consumer. The aim of this study was to systematically synthesize evidence from previous studies on the methods used in neutral red (NR) test in determining the cytotoxicity and also to analyze the effectiveness of NR test in determining the toxicity of the pigments on circle contact lenses in reducing the number of cases of ocular irritancy due to the use of circle contact lenses. Variety studies of randomized clinical control trials (RCTs) that uses NR test in determining the cytotoxicity was selected and systematically assessed. The information obtained from the RCTs include type of cell line used, duration of the cells exposed or incubated with the test material and the volume of neutral red used in the studies. From all the 19 studies that met all the inclusion criteria, 14 studies assessed the cytotoxicity potential using Wong-Kilbourne derivative (WKD) Chang conjunctival cell line. 15 minutes was the most frequent of duration of the cells exposed/incubated with the test material used in assessing the cytotoxicity while four studies stated that they used 10, 30 and 60 minutes of incubation duration with the test material. The majority used 200 µl of neutral red in the cytotoxicity test. Therefore, the effective method in determining the toxicity of the pigments on circle contact lenses using NR test is by using Wong Kilbourne derivative of Chang conjunctival cell line, 15 minutes of exposure time with the test material and 200 µl of NR solution in reducing the number of cases of ocular irritancy due to the use of circle contact lenses.

Keywords: cytotoxicity assay, phototoxicity, neutral red test, eye irritation, ocular toxicity, contact lens, colourants, dyes, surfactants.

CHAPTER 1

INTRODUCTION

1.1 Circle Contact Lenses

Circle lenses, which are also known as ‘big eye’ lenses have become a trend nowadays. It was first introduced in South Korea and has become a famous fashion accessory among younger generation and adolescence since it was first launched. Circle lenses are just like contact lenses. It enhances the eye colour and makes it look bigger and brighter. The colour pigment is enlarged to the edge of the lens to attract attention to the iris and gives a doll-like eye look.

These kinds of lenses can be widely purchased on the internet and stores as well as in flea markets. These decorative contact lenses are also part of product line which includes a range of corrective power ranging from Plano to -10.00D. These kinds of lenses are regulated medical devices which means that any unauthorized firm that are selling these types of lenses without a proper prescription and fitting by an eye care professional are breaking the law (Meadows, 2003).

However, despite the evolution of CL materials and designs, fitting success has been jeopardized by the occurrence of ocular complication. Multi-sponsor Surveys International LLC has conducted a study of the International Market for Contact Lenses in 2010. The result showed that among all contact lens wearer in Taiwan and Singapore, the use of cosmetically tinted lenses were high in Singapore (39%) compared to Taiwan (24%) (Rah et al., 2013).