

## Retinal Toxicity from Intense Pulsed Light Therapy: A Case Report

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### Abstract

The use of Intense Pulsed Light (IPL) in various disciplines is becoming more prevalent with time. This article aims to increase awareness of possible ocular side effects, specifically that of the retina, that may occur during procedures which utilise IPL technology. Although there have been scientific reports on the deleterious effects of IPL on the peri-ocular skin tissues and the cornea and iris, there have been no prior scientific reports documenting IPL related retinal injury. This report explores a case of retinal toxicity caused by long-term exposure to IPL light. In this case, a 44 year old woman working as an IPL therapist presented with blur vision and other visual disturbances with no clear triggers. Upon further examination, she was found to suffer from serious macular thinning in both eyes as well as visual field abnormalities in her right eye. She was then diagnosed with retinal toxicity. This case provides evidence that the retina is also vulnerable to IPL light, and it is critical that providers of this service are aware. If the providers do not take proper and strict precautions while administering IPL treatments, patients undergoing the therapy may then experience detrimental ocular side effects. Therefore, it is imperative that they are educated on this issue and provide the appropriate ocular protection.

**Keywords:** Intense Pulsed Light; Retinal Toxicity; Eye Protection; Ocular Complications; Retina

### Introduction

IPL therapy is a technique largely used in the field of cosmetology and dermatology to treat several skin conditions focusing on face and body rejuvenation. The popularity of IPL therapy has been increasing in recent times. Patients who seek cosmetic treatments turn to this technology due to its non-invasive and non-ablative nature. Recently, its use has expanded to the field of ophthalmology where it has been successfully applied to treat ocular rosacea, blepharitis and dry eyes associated with Meibomian gland disease. It has been reported that IPL has beneficial effects on patients suffering from Dry Eye disease, showing improvements in both lid margin and Meibomian gland features [1].

IPL consists of a broad but controlled spectrum of about 500 to 1,200 nm wavelength light. Without proper eye protection, ocular complications may occur. Several published case reports have documented IPL causing damage to the periocular area due to absorption of heat energy by pigmented tissues. As it is known that the skin around the eyes is thinner than the rest of the face, this area is more susceptible to injuries caused by the IPL. There have also been reports documenting damage to the pigmented structures at the anterior segment of the eye. In one such case, a 31 year old woman presented with anterior chamber and iris complications after IPL and was subsequently diagnosed with iridocyclitis. It was noted that the patient's ocular protection was removed mid procedure as it was causing discomfort in her eyes [2].

Light-induced damage to the retina has long been a cause for concern and is vastly studied. The cornea absorbs ultraviolet radiation below 295 nm and the lens absorbs most UVB light (300 - 315 nm) and all UVA light. This leaves remaining radiation ranging 400 to

1400nm to reach the retina, also known as the retinal hazard region [3]. With this in mind, the possibility of IPL related retinal damage has been postulated since the IPL light emits wavelengths within the retinal hazard zone and can traverse through the transparent eye structures to hit on the retina where the energy can be absorbed by the retina pigments and haemoglobin. However, there has been no documented case as far as we know of an actual documented occurrence.

### Case Report and Discussion

In this case, a 44 year old woman came to our clinic and complained of blur vision in her right eye with a “black line” obstructing her vision, as well as tearing. She started having these symptoms one month prior and it was found that she is an IPL therapist who has been practicing for over ten years. While she will always provide her customers with eye shields, she does not use any form of eye goggles protection for herself when administering the treatments.

Upon examination, her best corrected visual acuity after subjective refraction was 6/9 in the right eye and 6/6 in the left eye. She suffers from mild myopia of R: -1.00/-0.75 x 175 L: -0.75/-0.50 x 150. Ophthalmoscopy found normal looking retina fundus with only a dull foveal reflex. Retinal optical coherence tomography was done and showed significant central macular and paramacular retinal thinning in the right eye whilst the left eye showed significant macular thinning and mild to moderate thinning of the paramacular zones. Visual field studies showed a superior scotoma pattern in the right eye (Figure 1-4).

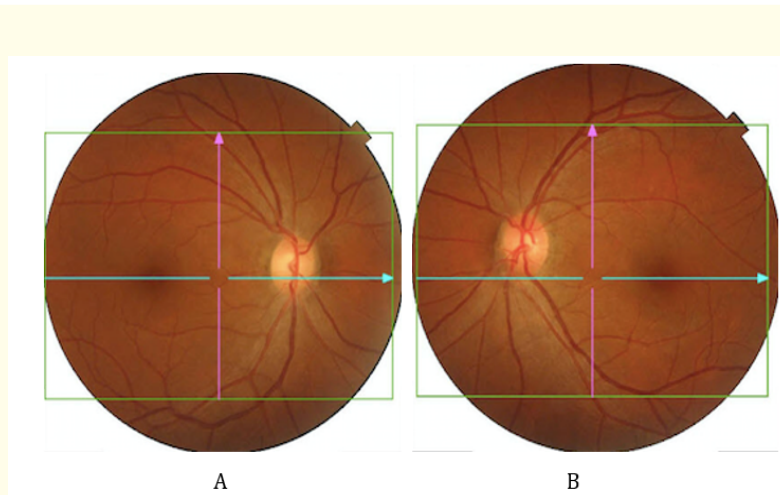


Figure 1: Retinal fundus photographs of the right eye (A) and the left eye (B).

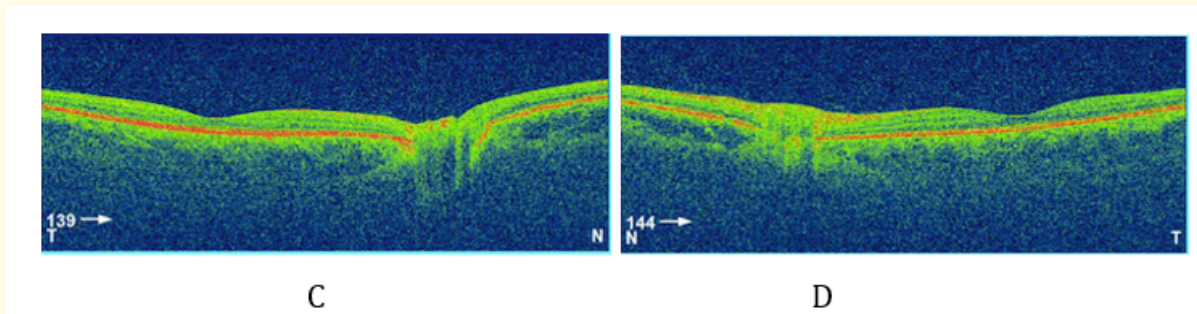


Figure 2: Retinal OCT scans of the right eye (C) and the left eye (D).

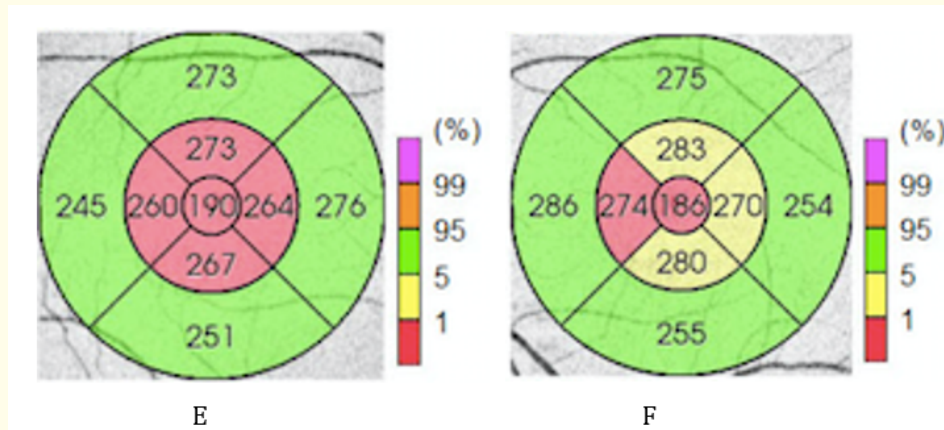


Figure 3: Retina Thickness Map of the right eye (E) and the left eye (F).

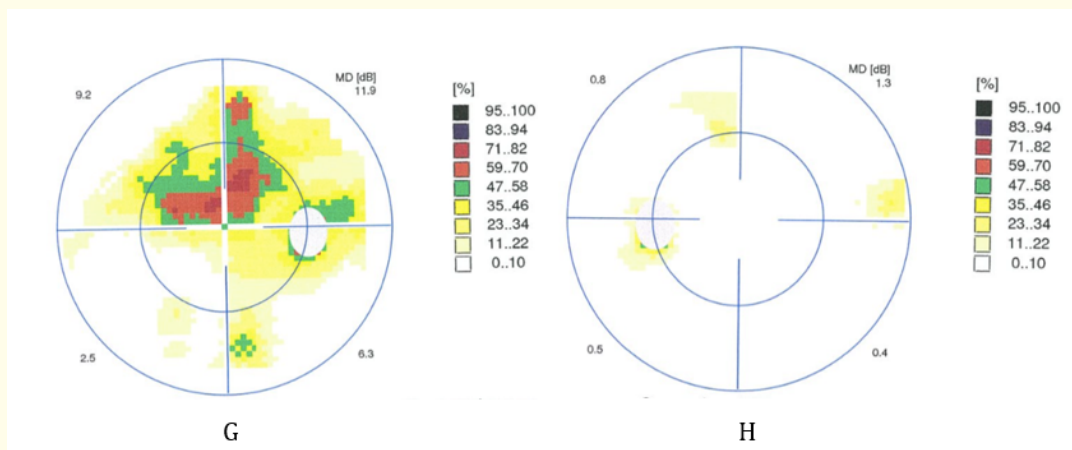


Figure 4: Grayscale representations from visual field study of the right eye (G) and the left eye (H).

One of the biggest risks to developing retinal toxicity is the use of common systemic drugs, especially hydroxychloroquine (HCQ). Other medications with the potential to induce retinal toxicity include thioridazine and deferoxamine [4]. There have been several studies done showing a high prevalence of retinopathy with long-term use of HCQ. In one study, a high percentage of 30.5% of the test subjects developed retinal toxicity due to long-term usage of HCQ [5].

This patient is a healthy patient with no prior significant ocular or general health conditions. Apart from that, she is also not on any medications. Therefore, we can conclude that the patient's retinal damage was not drug-induced, and it is highly unlikely that it was caused by any existing underlying conditions. Results from relevant history taking revealed that other than her current job as an IPL therapist, the patient does not undertake any other work. This eliminates any other occupational predispositions and significant environmental factors that may lead to developing retinal issues. The OCT scans of the retinal periphery were normal. These findings all suggest that the macular and paramacular retinal thinning and associated scotoma of the right eye is caused by her chronic exposure to IPL therapy given her history that she does not wear protective goggles when administering IPL treatments.

Following these results, the patient was diagnosed with IPL related retinal toxicity and counselled to wear appropriate eye protection to prevent further damage to her retinas. This case provides evidence that long-term exposure to intense pulsed light even indirectly as in this case can have deleterious effects on the retina.

### Conclusion

There have been little literature describing the retina specifically being affected by IPL. Furthermore, most of the patients in the articles demonstrating the IPL related peri-ocular and anterior segment side effects were exposed to the light directly. In this case, not only was the patient's retina damaged, she was also exposed indirectly as the therapist. As previously mentioned, the use and popularity of IPL have been steadily increasing in recent times. Not only is it widely used for aesthetic purposes, it is also used by many medical disciplines, especially in optometry and ophthalmology. Therefore, with this case presenting the relevant evidence, it is of utmost importance that users of the IPL treatment are aware of the possible ocular side effects, including that of the retina. Dermatologists, medical practitioners and others who use IPL in their practice will then be more vigilant in providing eye protection to their patients undergoing the procedures, thereby preventing further unintentional but adverse events.

### Informed Consent

Informed consent was obtained from the patient in this case report.

### Conflicts of Interest

The authors report no conflicts of interest in this work.

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