



Cancer clusters of ocular melanoma

The risk of developing cancer depends on many factors such as age, genetics and the environment. Although a high proportion of cancers are accounted for by avoidable lifestyle factors such as alcohol, smoking and diet, for many of them, the causes remain largely unknown. Nonetheless, the prevalence of risk factors and the incidence of cancer are diverse, differing both by region and country across the globe. Sporadically, a large number of cancer cases may occur in a particular group of people in a defined area over a short period of time. These outbreaks are often referred to as cancer clusters and include those of the leukaemia outbreak near Sellafield, Cumbria (1968-1995), the testicular cancer outbreak that occurred in Fulton County, New York (1982-1984) and the more recent outbreak of blood cancers that occurred in Clyde, Ohio (1996-2013). Cancer clusters are statistical events that do not always have a cause and often occur without any obvious carcinogenic source. Consequently, when a cancer cluster is suspected there is an obvious need to determine if the outbreak is authentic or purely a coincidental event. One such incident that is currently causing significant concern is the ocular cancer (uveal melanoma) outbreak in two separate locations in North America - Auburn, Alabama and Huntersville, North Carolina (Figure 1).



Figure 1. Map showing the locations of the two outbreaks of uveal melanoma

Ocular or uveal melanoma (UM) is a rare malignancy of the eye that generally occurs in about five or six individuals in every million, representing less than 5% of all melanomas. The cancer arises from melanocytes in the uvea which consists of the iris, ciliary body and choroid (Figure 2). Whilst melanoma of the skin is one of the most common cancers diagnosed among adolescent and young adults, the median age for diagnosis of UM is around 65 years. Frequently occurring in people with fair skin and light eye colour, there is no known precise cause. Patients with UM often have no symptoms and are usually diagnosed during routine eye tests. Although the primary melanoma is effectively treated with radiotherapy, it often returns and spreads to other sites in around 50% of the patients.

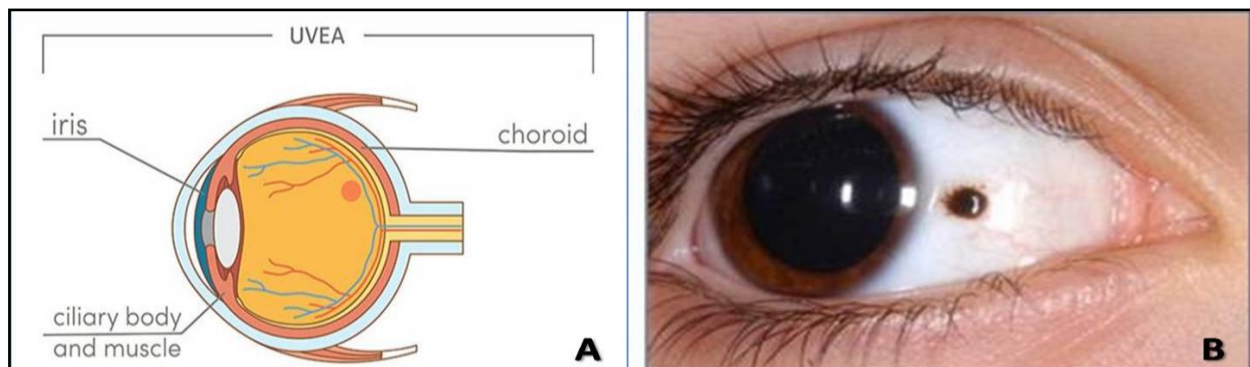


Figure 2. Anatomy of the eye (A) showing an ocular (uveal) melanoma (B)

The current outbreak of UM began in 1999 when a young woman who had attended the university in Auburn, Alabama became the first reported case. She later had her eye removed and in 2001 another young woman suffered the same fate as a result of the disease. By coincidence, the second patient had also graduated from the same university some 11 years earlier. Following the discovery that her two friends were afflicted with the same rare eye cancer that she too had been diagnosed with, a third patient set up a Facebook page in order to highlight the condition. In reality, what she discovered was that many other patients affected by the disease had also attended the university in Auburn between the years of 1983 and 2001. When the rare cancer had been identified in almost 50 patients between the two locations of Auburn, Alabama and Huntersville, North Carolina, medical experts remained baffled.

Although many of the patients were treated at a cancer centre in Philadelphia, it was not until 2015 that an oncologist at the clinic first reported the link between the two outbreaks. When the

coincidence first aroused the suspicions of the medical fraternity in North Carolina, they focused their investigation on four young women who had lived in the vicinity of or had attended Hopewell High School in Huntersville. In April 2017, the state health department initiated further studies and began looking for patterns and trends among the patients. The survey which included a regional geospatial analysis of the air, soil and water showed that although there were some toxic materials present in the environment, the analysis provided little information on any specific association with the outbreak.

In the summer of 2018, it was reported that 18 cases of UM had been confirmed in Huntersville and 27 cases in Auburn. In response, the public health department in Alabama together with the university at Auburn began their own investigation among former students and employees. Both units are currently working together with the North Carolina state department and researchers at the Thomas Jefferson University in Philadelphia where many of the patients were treated. However, in October 2018, it was reported that the study conducted by the Alabama Department of Public Health did not find rates of cancer any higher than the number of cases that would have been expected. Investigation and surveillance of the cancer and potential clusters in other regions are continuing in order to identify relationships between patients and environmental issues that might help the cause. Research is also continuing on identifying and understanding the genetic basis of UM and recent work has focussed on the effect of FR900359 (a natural plant compound of the primrose family) on the overactive protein G alpha q which is commonly found in these tumours. The prognosis for those affected by ocular melanoma is not promising and survivors of the disease have affirmed that they would much rather have a cure for the cancer than a conclusion that clarified any regional correlation between the two distinct outbreaks.

Further reading

1. Auburn ocular melanoma Facebook page
<https://m.facebook.com/Auburn-Ocular-Melanoma-Page-405444223229609/>
2. Uveal melanoma: epidemiology, etiology, and treatment of primary disease. Krantz BA et al; Clin Ophthalmol. 2017; 11: 279–289
<https://doi.org/10.2147/OPTH.S89591>
3. Uveal clusters in Auburn, AL and Huntersville, NC . Barnett CR; July 2018
<https://www.curemelanoma.org/blog/article/uveal-clusters-in-auburn-al-and-huntersville-nc>

4. Geospatial investigation into the occurrence of uveal melanoma cases in and around Huntersville, North Carolina. Cassels J; March 2018
<https://www.arcgis.com/home/item.html?id=fce26673bdce48b0857c2fa5376720f0>
5. Auburn commits to funding first leg of ocular melanoma research as number of confirmed cases reaches 27. Brownlee C; August 2018; The Auburn Plainsman
<http://www.theplainsman.com/article/2018/08/auburn-commits-to-funding-first-leg-of-ocular-melanoma-research-as-number-of-confirmed-cases-reaches-27>
6. Plant compound may shut down eye cancer. Strait-Wustl JE; September 2018
<https://www.futurity.org/eye-cancer-plant-compound-1860312/>

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