



## Pathology Biology Section – 2006

### G103 Perimacular Circular Folds in the Eyes of Injured Children

M.G.F. Gilliland, MD\*, Brody SOM at East Carolina University, Department of Pathology & Laboratory Medicine, Brody 7 South 10, Greenville, NC 27834

After attending this presentation, attendees will gain an understanding of how to recognize perimacular folds, will know when to look for them, and know in what kinds of cases perimacular circular folds have been reported to be present.

This presentation will impact the forensic community and/or humanity by demonstrating an increasing ability of forensic pathologists to recognize perimacular circular folds and stimulate interest in looking for such folds in a wider variety of death investigations, although most perimacular circular folds have been seen in abusive head injury deaths.

Hypothesis: Examination of the retinas of a group of children would allow the identification of perimacular circular folds if present. Review of the clinical history, investigative information, and autopsy findings would help establish the significance of such circular folds.

Circular folds have been identified in the eyes of injured children. The initial reports described these findings in children described as battered babies and in children with head injuries attributed to shaking. Cases were selected to report the presence of circular folds. Another report described them in three of ten consecutive cases of child abuse. In all of these reports vitreous traction was the proposed mechanism in the development of circular folds. In the consecutive series report it was proposed that direct head trauma was sufficient to produce the acceleration deceleration traction. More recently, a report described circular folds in a child with crush head injuries occurring when a television fell from a stand, which was an accidental event.

Ocular examinations were a part of a prospective study of child deaths investigated at the Southwestern Institute of Forensic Sciences. Adequate material was available for a retrospective evaluation of 33 of the children's retinas for the presence of circular folds. This group consisted of 25 children with abusive injuries, 5 children with accidental head injuries, and one each of lethal trunk injuries, brain tumor and drowning. Perimacular circular folds were identified in 11 cases. Review of the clinical histories, investigations, and autopsy findings revealed that the circular folds were only found in children with abusive head injuries.

The mechanism of the head injury has previously been reported for a subgroup of head injured children from the entire series from the Southwestern Institute of Forensic Sciences. The mechanism of injury for the 30 head injured children in this group was established independent of information about the presence or absence of perimacular circular folds. Circular folds were seen in 3 of 15 deaths attributed to blunt force mechanisms, 7 of 12 deaths with combined shake and blunt force mechanisms, and 1 of 3 with the mechanism of injury attributed to shaking.

Conclusion: These observations confirm the association of perimacular circular folds with abusive head injuries in a larger group of child deaths than previously reported. The cases were not selected on the basis of circular folds or abusive head injury. The number of accidental head injuries and other causes is too small to clarify whether the perimacular circular folds could be found in other conditions. The mechanism of injury in 8 of the 11 children with circular folds included shaking which supports the proposed vitreous traction mechanism for the formation of perimacular circular folds. However, the presence of circular folds in 3 abusive head injury deaths attributed to blunt force injuries suggests more observations are needed to clarify this issue.

**Perimacular Circular Folds, Abusive Head Injury, Vitreous Traction**