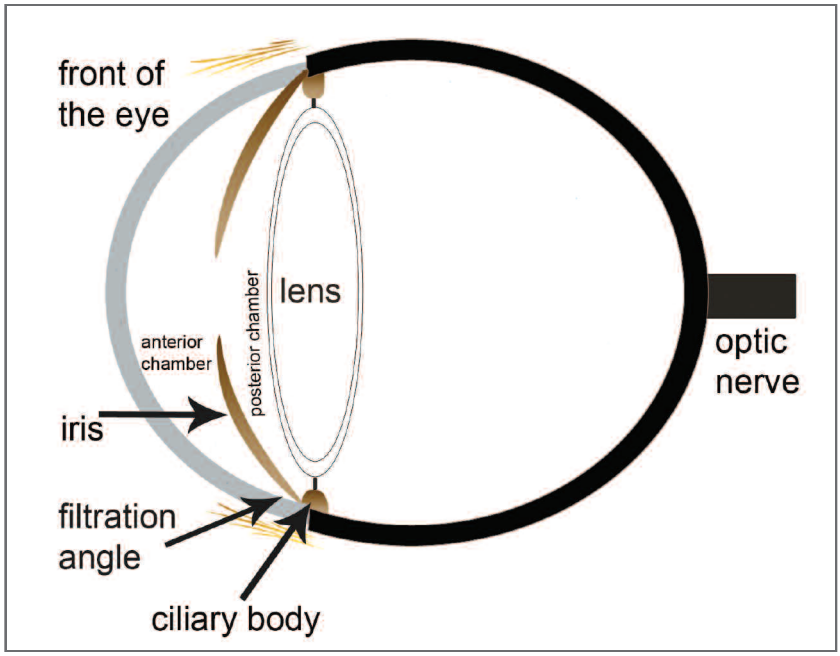
There has been a great deal of discussion regarding pigmentary uveitis since it was first described as a disease of Golden Retrievers (Sapienza et al, 2000). The Health and Genetics Committee recommends yearly eye exams and online recording of eye exams for a lifetime in Golden Retrievers who have been bred. It is hoped that these recommendations will allow breeders to identify dogs who have had healthy eyes for a full lifetime. In addition, for the sake of early detection and more effective treatment, many ophthalmologists recommend annual eye exams for all Golden Retrievers beginning in early adulthood and continuing to an advanced age. The accompanying article was developed to provide members with expert opinions. The figure below is provided to help with some of the terms used in the article.



A simplified diagram of the canine eye drawn by Dr. Hubbs for the Health and Genetics Committee to help owners understand what happens in pigmentary uveitis. The clear part of the eye is the cornea and light enters the eye and is focused on the back of the eye by the lens. The lens is just behind the colored part of the eye which is known as the iris. Fluid is produced in the ciliary body in the posterior chamber and drains from the eye in the anterior chamber where the iris meets the cornea (the filtration angle). If more fluid is produced in the ciliary body than can be drained at the filtration angle, pressure builds up in the eye and the Golden Retriever develops glaucoma.

Expert Ophthalmologists Answer GRCA Member Questions about Pigmentary Uveitis

Pigmentary uveitis, also known as Golden Retriever uveitis or pigmentary and cystic glaucoma, is an eye disease of Golden Retrievers that is believed to be inherited. However, the average age of diagnosis is reported to be 8.6 years old, which means that many dogs develop the disease after they have produced offspring. Pigmentary uveitis often progresses to glaucoma, and pain associated with the disease can necessitate removing the eye(s) or placing a cosmetic intrascleral prosthesis, making it a significant quality of life issue in the breed. Since some of the most challenging problems presented by this disease have not yet been answered by the published science, we have asked three ophthalmologists with high levels of expertise and experience specifically in investigating, diagnosing, and treating pigmentary uveitis to help us respond to your questions. As is to be expected in areas of veterinary medicine that are the subject of ongoing investigation, these experts may differ on some of the details of pigmentary uveitis development and treatment; but overall there is broad general agreement on most of the major questions posed by GRCA members.

John Sapienza, DVM is a veterinary ophthalmologist in private practice in Long Island, NY, and is the lead author of a pivotal scientific paper published in 2000 that characterized pigmentary uveitis.

Wendy Townsend, DVM, MS is a veterinary ophthalmologist on the faculty of Purdue University in IN, and has had research grants investigating pigmentary uveitis for several years.

Tom Sullivan, DVM is a veterinary ophthalmologist and Golden owner in private practice in Seattle, WA, where he has demonstrated a special commitment to early diagnosis and treatment of pigmentary uveitis.

1. Iris/ciliary body cysts sometimes appear before pigmentary uveitis can be definitively diagnosed, but not all Goldens with iris/ciliary body cysts will eventually get pigmentary uveitis. Is there a way to tell the difference between incidental cysts and those that may be associated with pigmentary uveitis, and if so, what are the differences?

Sapienza: Incidental cysts tend to be free floating in the anterior chamber and often solitary. The cysts that are generally associated with the Golden Retriever (GR) uveitis are often iridociliary cysts (cysts located in the posterior chamber: the area between the back of the iris and the front of the lens). These iridociliary cysts are often multiple in nature, but can begin as one or two cysts. The pupil must be dilated to adequately see these iridociliary cysts.

Townsend: I would agree with the comments shared by both Drs. Sapienza and Sullivan. I believe iridociliary cysts are a relatively common finding in Golden retrievers. In CERF clinics I have performed, 30% of the Golden Retrievers examined have had iridociliary cysts. Complete dilation of the pupil is critical because the iridociliary cysts are located behind the iris and without dilation are hidden from view.

Sullivan: A: Iris/ciliary body cysts, as you've stated, can be seen as part of the uveitis syndrome, or as an unrelated entity. In the population of dogs that we see in our area, I would divide these into three groups:

1. Dogs with free-floating cysts – singly or in low numbers. These likely arise on the back of the iris, but break free and float into the space between the iris and the inner surface of the cornea. These are often seen at 6 o'clock inside the eye because they sink with gravity. If the dog lies on his/her side for an extended period, they will roll to the new "down" side until the head is lifted. These usually continue to enlarge. Because that space – the anterior chamber – is dome shaped, continued growth results in these cysts becoming lodged between the iris and cornea, eventually moving into the pupillary space as that is where there is the most room. These free floating cysts, in my opinion, are not usually a result of uveitis.

2. Dogs with one or two cysts attached to the ciliary body behind the iris way out at the periphery of the lens. These will sometimes grow to the point where they put pressure on the lens periphery, resulting in small equatorial cortical cataracts. These, too are usually not part of this syndrome, but could be the earliest stage of # 3 below.

3. Dogs with multiple cysts growing on the back side of the iris such that when the pupil is dilated they can be seen emerging through the edge of the pupil. These in my area and opinion, are much more likely to be a part of the uveitis complex. Dr. Sapienza reported on blood filled ciliary body cysts in his paper. We rarely (if ever) see those, and in fact the cystic form of PU is the minority of our cases. (See photos below.)

a. Are these differences reliable enough for breeders to feel "safe" breeding dogs whose cysts appear to be incidental?

Sapienza: Yes and no. I have examined several GR dogs with solitary cysts in the anterior chamber that went on to develop severe GR uveitis. If the cysts are iridociliary in nature or there is radial pigment on the anterior capsule of the lens, then I would certainly say that there is the initial stage of GR uveitis.

Townsend: The least concerning cyst would be the single, free floating cyst inside the anterior chamber. However that does not guarantee that they will not develop PU.

Multiple cysts growing on the back side of the iris such that when the pupil is dilated they can be seen emerging through the edge of the pupil. (Sullivan, Q1, Group # 3)

Cysts attached to the ciliary body behind the iris way out at the periphery of the lens. (Sullivan, Q1, Group # 2)

Sullivan: If there is a single cyst free floating inside the anterior chamber and no other evidence of PU, I wouldn't be concerned that that cyst is a sign of PU. That does not mean that that dog will not develop PU independent of the cyst, so breeding is fine, but ongoing CERF exams are always warranted.

b. Is there agreement among ophthalmologists regarding characteristics of incidental versus suspicious iris/ciliary body cysts so that if they were examining the same dog, they would reach the same conclusion?

Sapienza: I believe so.

Townsend: I think most are in agreement regarding the free floating cysts. Beyond that I'm not sure that there is a consensus.

Sullivan: Good question – I have no idea – there is much more subjectivity to CERF evaluations and clinical impressions of what constitutes what disease than is ideal – especially in a disease, such as PU, that developed after the majority of the current ophthalmologists were trained. Different opinions and answers from different ophthalmologists are probably not uncommon.

c. Is there medical/surgical treatment for the iris/ciliary body cysts that are associated with pigmentary uveitis?

Sapienza: Often topical anti-inflammatory medications (namely, prednisolone actetate or dexamethasone) are started. There is no medication to make the cysts disappear.

Townsend: There are no medications that will make the cysts disappear. There are surgical therapies to remove the cysts, but those are usually only used in patients with solitary free floating cysts that are large enough to obstruct vision.

Sullivan: No medical treatment. The cysts can sometimes be treated via laser if they are heavily pigmented (the laser is absorbed by pigment – if cysts are relatively clear, doesn't work), but more will likely occur. They can sometimes be aspirated under general anesthesia with a very small needle, but this can be tricky as you don't want to puncture the lens, and the attached cysts are difficult to reach with a needle while avoiding the lens. Although it has been reported that these cysts are responsible for glaucoma development, they are not the only reason for the glaucoma (and in our "cystless" cases, obviously not even a contributing factor), so addressing the cysts medically or surgically may not be of any help in avoiding blindness.

d. Is there a place on the CERF form where the examining ophthalmologist can provide his/her professional opinion as to whether iris/ciliary body cysts are either incidental or suspicious?

Sapienza: Yes.

Townsend: Not in the section where the cysts are marked. The ophthalmologist would have to write comments in the lower right hand corner of the form. However comments written there do not show up when an animal receives its CERF number. Therefore if a Golden retriever receives a CERF number and has category D1 marked, someone else viewing that CERF information cannot tell whether the cysts were thought to be incidental or suspicious.

Sullivan: There are separate spots to mark PU and Iris/CB cysts. If there are other signs of PU, then "PU" would be marked. If there are cysts, but no other signs of PU then most ophthalmologists would likely just mark cysts. If you were suspicious that the cysts are part of early PU, then you can write that suspicion in the "comments" box in the lower right hand corner of the form.

2. *What percentage of dogs with pigmentary uveitis develops glaucoma?*

Sapienza: Difficult to say. Based on my article on GR uveitis, 46% of GR dogs went on to develop glaucoma. If fibrin-like debris is present in the anterior chamber, glaucoma is a common secondary complication. Thirty-seven percent developed different stages of cataract formation (incipient to hypermature stages).

Townsend: I believe this depends how early in the course of the disease treatment is started. In the patients that I see, 49% have developed glaucoma and most of those have had glaucoma at the very first visit. In fact the discomfort associated with the glaucoma was the reason they saw an ophthalmologist and the pigmentary uveitis was diagnosed. For patients participating in the pigmentary uveitis study the rate of glaucoma is lower at 30% as more of these patients are being diagnosed earlier at their annual CERF examinations.

Sullivan: Depends upon how young the onset of disease and how early treatment is started. If treatment started very early, it is very rare for them to develop glaucoma in our cases (again, we don't see the number of cysts that other areas apparently see). If not treated, glaucoma and cataracts are very likely if the patient lives long enough. In other words, if a 5 year old has significant changes from PU, chances are very high that he/she will get glaucoma by 8-9. If a dog has very early signs and treatment started, glaucoma less likely, but may develop vision-threatening cataracts several years later (we've done cataract surgery on a few of these dogs). If a dog develops early signs at 12 years of age, glaucoma is less likely just because they may not live long enough to develop secondary problems a few years down the road.

3. What is your treatment protocol for dogs with very early pigmentary uveitis?

Sapienza: Prednisolone acetate eye drops 1-3 times daily depending on the level of inflammation.

Townsend: Either topical steroids or topical NSAIDs depending on the severity of the changes already present and monitor every couple of months

Sullivan: In our cases, the inflammation does not respond well to steroids. Topical nonsteroidal anti-inflammatory drops (NSAIDs) work best. We use diclofenac, generally once daily.

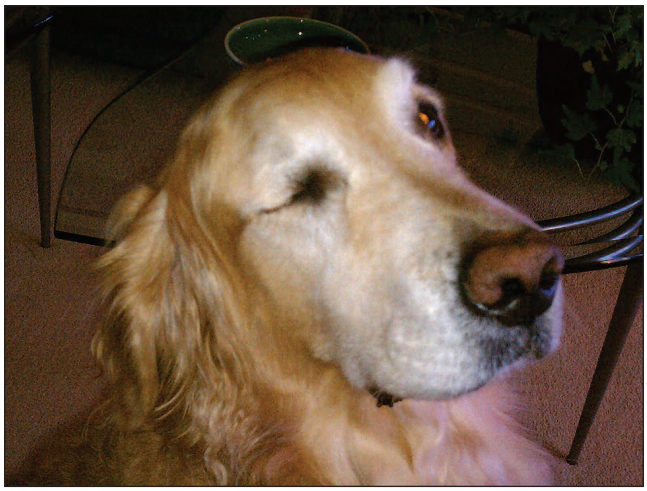


Photo of a Golden Retriever that has recovered from surgery to remove an eye with glaucoma due to pigmentary uveitis.

The key issue to keep in mind is that inflammation inside the eye does two things: 1) it causes scar tissue development within the drain (fluid is always being produced inside the eye – it flows through the pupil into the front of the eye, then exits through the drain into the bloodstream), and 2) it reduces fluid production by interfering with the function of the fluid producing structure. An inflamed eye is a soft eye (this is why early on, PU eyes have very low pressures. As scar tissue builds up in the drain and contracts, it blocks drainage and increased pressure results). If we have an eye with moderate loss of drainage due to scar tissue (and we can't see that on exam, you can surmise if the other signs of PU are moderate) then quelling the inflammation will turn fluid production back up to normal, and the damaged drain might no longer be able to cope with this normal fluid rate, leading to increased pressure inside the eye. This is how treating the inflammation with NSAIDs can lead to glaucoma. In dogs with early PU, these drops will usually halt the inflammation, preventing further damage. Because scar tissue contracts over time, glaucoma can still develop down the line even if ongoing inflammation is controlled. This is not usually the case in "early" cases, but is a concern in cases deemed moderate (moderate in our terminology means that inflammation has been smoldering for a moderate amount of time, so there is damage/scarring within the globe. Early would mean that the inflammation hasn't been active for very long – it isn't that some eyes are more inflamed than others as much as some have been inflamed for a longer period of time prior to diagnosis).

a. In your experience, if pigmentary uveitis is diagnosed and treated in its very early stages, what percentage of dogs will remain clinically free of symptoms, versus those that progress to significant symptoms?

Sapienza: My clinical suspicion is that 1/5 dogs go on to develop severe disease, but this truly depends on the level of anterior chamber inflammation (flare), the presence of fibrin-like debris in the anterior chamber, the number of iridociliary cysts, and the formation of cataracts.

Townsend: This is hard to say for sure as we don't know how long the dogs that are diagnosed with more advanced disease were affected before they developed glaucoma, etc. However, patients seem to do better if it's detected early so that we can prevent the scar tissue build up. We also don't know how many older Goldens are affected with pigmentary uveitis, but never diagnosed because they are free of symptoms. I have been performing eye exams on senior Goldens in an effort to determine how prevalent pigmentary uveitis truly is in the senior population. On average I diagnose 1-2 cases of pigmentary uveitis for every 25-30 older Goldens examined. In each case the owners thought their older Golden had normal eyes as they had no symptoms.

Sullivan: The vast majority will remain visual and comfortable lifelong if caught early and treated with diclofenac. Some – a very low percentage – will develop cataracts several years down the road from damage done to the lens back when the inflammation was active.

4. At what age would you recommend beginning screening examinations for pet dogs that will not be bred, to give them the best chance for effective treatment if diagnosed?

Sapienza: At three years of age.

Townsend: I think two years of age is a good time to start to get a baseline and catch some of the rare cases that start at three to four years of age.

Sullivan: We start screening at four years of age. I have seen two dogs with significant signs of active uveitis as early as two years of age, but that is very rare. Most start to develop definitive changes in the five- to seven-year range in our population.

a. How frequently should pet Golden Retrievers be examined for pigmentary uveitis?

Sapienza: If not clinical, once a year.

Townsend: Yearly.

Sullivan: We screen annually.

b. Can general practice veterinarians detect early pigmentary uveitis if the owner specifically asks him/her to check for this?

Sapienza: I do not believe so. A slit-lamp examination is imperative after the pupil has been dilated.

Townsend: Better to see an ophthalmologist as our instruments allow us to detect very subtle changes that occur early in the disease process.

Sullivan: Not reliably. It has taken *many* cases and several years of repeat examination for me to feel that I can see early PU. Many GP's aren't able to detect moderate or late PU – not because they are poor clinicians, just because they aren't as familiar with ocular structures and the differences between normal and diseased tissues within an eye.

5. What is your best estimate of the number of Goldens with pigmentary uveitis that you have diagnosed and/or treated?

Sapienza: Several hundred.

Townsend: There are more than 200 dogs participating in my study with more that I know of.

Sullivan: 400–500 (best guesstimate)

a. Have you observed a trend in the number of affected dogs in recent years?

Sapienza: Less so over the years, but still quite frequently seen.

Townsend: They are being diagnosed at a younger age and earlier in the course of their disease

Sullivan: Depends on definition of recent. When we perform screening clinics, the trend in new dogs without known ocular disease greater than or equal to four years of age is that 25% – 33% have been affected. This has been stable over the past four years.

6. Do other breeds get pigmentary uveitis?

Sapienza: I had two Labrador cross-bred dogs with similar signs of "GR" uveitis.

Townsend: No.

Sullivan: Not that we've seen. Nor have I seen any Golden crosses, i.e. "doodles" with it, although it is a new enough phenomenon that the 8-9 year old "typical presentation" hasn't been reached for many.

7. When diagnosing a Golden with pigmentary uveitis, how can you be sure that it's not the form of uveitis that other dogs can get?

Sapienza: The classical signs of GR uveitis are the pigment on the anterior lens capsule (often in a radial fashion), the presence of iridociliary cysts, posterior synechiae, fibrin-like debris in the anterior chamber, and then secondary complications like glaucoma and cataracts. In the GR breed, there is typically not a lot of anterior chamber inflammation (so called aqueous flare) as in the other types of uveitis seen in other breeds.

Townsend: The classic appearance – pigment deposited on the anterior lens capsule in a radial fashion.

Sullivan: Most cases of uveitis are sudden onset and aggressively inflamed. The Golden Retriever variety is very low grade inflammation (this is why owners don't notice until secondary changes like glaucoma have developed) over prolonged periods of time. This leads to different symptoms/changes.

8. What is the youngest age at which you've diagnosed pigmentary uveitis? What is the oldest? Is there an age at which a Golden can be determined to have no risk of getting the disease, or should eye exams continue for the dog's lifetime?

Sapienza: Youngest dog was 4.5 years old, oldest was 14.5 years old at the time of examination.

Townsend: Personally six years, but there are dogs that are 3-4 years old in the study. I have also had a dog diagnosed at 13.5 years of age, so there's no safety zone.

Sullivan: Youngest, 2.5 years of age. Oldest new onset 13 years of age. These are both very uncommon. I think in most cases it is fine to stop checking in the 11-year-old range as development later than this is unlikely, and a dog that develops it later would be unlikely to live long enough to have significant problems.

9. Do you have any advice or recommendations about how breeders should evaluate the breeding prospects for Golden Retrievers that have a close relative such as a parent, aunt, uncle, grandparent, and/or sibling with pigmentary uveitis?

Sapienza: My advice is to breed as far away from the affected animal as possible.

Townsend: That is a hard question as we don't know the inheritance of the condition.

Sullivan: I would have an ophthalmologist familiar with the disease screen annually starting at four years of age. I would insist that pet owners do the same with any offspring. In our cases, at least, this appears to be a very treatable condition as long as it is caught and treatment started early enough. This is a much better health issue in terms of being able to manage as compared to severe allergic disease, heart disease, orthopedic disease, or cancer. This needs to be eliminated from the breed, but a genetic test is the best hope for that. Until that time, at least in our populations, it might be difficult to find lines free of this disease. Eliminating all related dogs from breeding might very well lead to unintentionally selecting for something else...

Thank you very much for answering these questions from members of the Golden Retriever Club of America. Is there a final message that you would like to convey to our members regarding pigmentary uveitis in Golden Retrievers?

Sapienza: This disorder has been around for years, but progress is being made in minimizing the frequency that we are seeing this syndrome. Judicious breeding and ethical decisions need to be continued to be implemented in order to eliminate this disorder in the GR breed.

Townsend: I would like to thank everyone who has participated in my studies on pigmentary uveitis and the efforts that have been made to increase awareness of this condition. I think more dogs are being diagnosed earlier because of this increased awareness, which gives us a much better chance with therapy. ❖