HED session
Gonioscopy

Marianne Richter
ECVO Congress, Estoril 2017
HED committee:

A Proposal of a new grading system for gonioscopy (draft by M.Richter), presented in Budapest 2016 (M.Richter, F.Stades)

A Collection of comments/ suggestions of all national panels: A, D, CH, I, F, B, S, N, DK, NL, FIN, GB (M.Richter)
HED committee:

Establishment of a **gonioscopy sub-committee**:

B. Ekesten, P. Bedford, C. Bundgaard, G. Chaudieu, A. Guandalini, M. Richter

Slides are kindly provided by B. Spiess
At Present: *pectinate ligament abnormality (PLA)* is classified as *unaffected/undetermined/affected* using the terms *fibrae latae (FL)/laminae (LA)/occlusio (OC)* if affected by PLA, findings are judged as *mild/moderate/severe*, whereas *LA and OC* are to be judged as *moderate or severe*. 

M. Richter, Estoril 2017
1. **Fibrae latae (FL)**: in which the normal part of the pectinate ligament fibre is too short and the abnormal part is broadened; also described as broad bands;

2. **Laminae (LA)**: plates or sheets of continuous tissue, with very short remaining fibres in the angle;

3. **Occlusio (OC)**: pectinate ligament completely closed, with flow holes, and narrowed angle and/or shallow anterior chamber;
Å The severity of laminae (LA) or occlusio (OC) can never be less than moderate or severe. If occlusio is present > 25 % of the angle it is evaluated as: ‘severe’.
**Fibrae latae (FL):** in which the normal part of the pectinate ligament fibre is too short and the abnormal part is broadened; also described as broad bands;

**Laminae (LA):** plates or sheets of continuous tissue, with very short remaining fibres in the angle;

**Occlusio (OC):** pectinate ligament completely closed, with flow holes, and narrowed angle and/or shallow anterior chamber;

Affected: moderate?

Affected: severe?

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M. Richter, Estoril 2017
Motivation to change evaluation of the iridocorneal angle (ICA):

The present ECVO certificate does not differentiate extent (circumference) of PLA (focal vs extensive for LA and OC) and width of ICA.

From clinical observations the extent of PLA related to 360 angular degree of the ICA and the width of the ICA seem to be important concerning the likelihood to develop glaucoma.
Motivation to change evaluation of the iridocorneal angle (ICA):

- Breeders need advice about clinical significance (to develop glaucoma) and which dogs can be used for breeding

- Currently, dogs are selected for breeding by the terms affected FL/LA/OC but not by the clinically important aspect of the extent of involvement of the ICA (360 degrees)
**Aim of gonioscopy:**

- *Detection & Grading* of abnormalities of the iridocorneal angle (ICA) by evaluation of pectinate ligament (PL) *and* iridocorneal angle width (ICAW)

- *Identification/Selection of dogs* with abnormalities of the ICA *potentially leading to blindness* *(severely affected dogs should be excluded from breeding)*
Grading of the ICA (PL and ICAwidth):

Åpectinate ligament (PL):
  normal – fibrae latae – laminae/occlusio

Åiridocorneal angle width (ICAwidth):
  open – narrow – closed
Grading of pectinate ligament (PL):

<table>
<thead>
<tr>
<th>Present</th>
<th>NEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>FL &lt; 25% = unaffected</td>
<td>0 – 50% FL = unaffected</td>
</tr>
<tr>
<td>FL 25-50% = undetermined</td>
<td>undetermined</td>
</tr>
<tr>
<td>FL &gt; 50% = affected (mild)</td>
<td>&gt;50-100% FL and/or &lt; 25% LA/OC = affected (mild)</td>
</tr>
<tr>
<td>LA = affected</td>
<td>25-50% LA/OC = affected (moderate)</td>
</tr>
<tr>
<td>(moderate/severe)</td>
<td></td>
</tr>
<tr>
<td>OC ≤ 25% = affected (moderate)</td>
<td></td>
</tr>
<tr>
<td>OC &gt; 25% = affected (severe)</td>
<td>&gt; 50% LA/OC = affected (severe)</td>
</tr>
</tbody>
</table>

M. Richter, Estoril 2017
## Grading of pectinate ligament (PL):

<table>
<thead>
<tr>
<th>Present</th>
<th>NEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>FL &lt; 25% = unaffected</td>
<td>0 – 50% FL = unaffected</td>
</tr>
<tr>
<td>FL 25-50% = undetermined</td>
<td>&gt;50-100% FL and/or &lt; 25% LA = affected (mild)</td>
</tr>
<tr>
<td>FL &gt; 50% = affected (mild)</td>
<td>25-50% LA = affected (moderate)</td>
</tr>
<tr>
<td>LA = affected (moderate/severe)</td>
<td>&gt; 50% LA = affected (severe)</td>
</tr>
<tr>
<td>OC ≤ 25% = affected (moderate)</td>
<td></td>
</tr>
<tr>
<td>OC &gt; 25% = affected (severe)</td>
<td></td>
</tr>
</tbody>
</table>

M. Richter, Estoril 2017
Grading of iridocorneal angle width (ICAwidth):

Â Open = normal
Â Narrow = affected (moderate)
Â Closed = affected (severe)

Terminology:
Ratio A/B:  closed  narrow  open
PL not visible  A < 1/3 of B  A ≥ 1/3 of B

Comparison between 2 distances:
A = length of PL
B = distance from the origin of the PL to the anterior surface of the cornea at the transection area
C = Pupil
D = Iris
E = PL
F = inner/deep pigment band
G = outer/superficial pigment band
H = corneal transection

Terminology:
Ratio A/B:
- closed: PL not visible
- narrow: A < 1/3 of B
- open: A ≥ 1/3 of B

M. Richter, Estoril 2017
Definitions:

٠ Normal PL:
  thin/filamentous fibres from iris base to its insertion at the cornea

٠ FL (fibrae latae): fibres with a confluent (broad) base and shortened thin insertions at the cornea or thick fibres (<5 fibres)
Definitions:

Å LA (laminae): plates or sheets of continuous tissue (>5 fibres), with or without flow holes
NEW

Definitions:

Å iridocorneal angle width (ICAwidth): open – narrow – closed

M. Richter, Estoril 2017
Terminology:
Ratio A/B:  closed  narrow  open
PL not visible  A < 1/3 of B  A ≥ 1/3 of B

M. Richter, Estoril 2017
**present:**

<table>
<thead>
<tr>
<th>Eye disease no.</th>
<th>mild</th>
<th>moderate</th>
<th>severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNAFFECTED</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UNDETERMINED</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AFFECTED</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Lig. Pectinate abnormality (only after gonioscopy)

**NEW:**

<table>
<thead>
<tr>
<th>Eye disease no.</th>
<th>mild</th>
<th>severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNAFFECTED</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UNDETERMINED</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AFFECTED</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Iridocorneal angle abnormality (ICAA): (only after gonioscopy)

**Advantage:** the examiner clearly indicates the severity of ICA abnormality in its entirety and its clinical impact; comprehensible to the breeder

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You can still use the present Certificate:

<table>
<thead>
<tr>
<th>Eye disease no.</th>
<th>mild</th>
<th>moderate</th>
<th>severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td></td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

8. Lig. Pectinate abnormality (only after gonioscopy)

NEW Certificate:

<table>
<thead>
<tr>
<th>Eye disease no.</th>
<th>mild</th>
<th>severe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Iridocorneal angle abnormality (ICAA): (only after gonioscopy)

In the area above for descriptive comments, the examiner specifies the type of ICA abnormality: PLA (pectinate ligament abnormality and/or ICA (iridocorneal angle) width
Fig 81

**Normal PL:** thin fibres from iris base to its insertion at the cornea

**FL:** fibres with a confluent (broad) base and shortened thin insertions at the cornea or thick fibres (< 5 fibres)

**LA:** plates or sheets of continuous tissue, with or without flow holes

**ICAW:** open-narrow-closed

**PLA:** 0-50% FL around 360° = unaffected

M.Richter, Estoril 2017
A = length of PL  
B = distance from the origin of the PL to the anterior surface of the cornea

**PLA**: 0-50% FL around 360° = **unaffected**  
**ICAW**: open

Terminology:  
Ratio A/B:  
- closed: PL not visible  
- narrow: A < 1/3 of B  
- open: A ≥ 1/3 of B

M. Richter, Estoril 2017
You can still use the present Certificate

Eye disease no. ..........................  mild  moderate  severe

8. Lig. Pectinate abnormality (only after gonioscopy)

NEW:

Eye disease no. ..........................  mild  severe

8. ICAA: PLA

8. ICAA: PLA

M. Richter, Estoril 2017
Normal PL: thin fibres from iris base to its insertion at the cornea

FL: fibres with a confluent (broad) base and shortened thin insertions at the cornea or thick fibres (< 5 fibres)

LA: plates or sheets of continuous tissue, with or without flow holes

ICAW: open-narrow-closed

PLA: 0-50% FL around 360° = unaffected
A = length of PL
B = distance from the origin of the PL to the anterior surface of the cornea

**PLA:** 0-50% FL around 360° = unaffected

**ICAW:** open

---

**Terminology:**

<table>
<thead>
<tr>
<th>Ratio A/B:</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL not visible</td>
<td>A &lt; 1/3 of B</td>
</tr>
<tr>
<td>A ≥ 1/3 of B</td>
<td>open</td>
</tr>
</tbody>
</table>

M. Richter, Estoril 2017
**You can still use the present Certificate:**

Eye disease no. .......................... □ mild □ moderate □ severe

8. Lig. Pectinate abnormality (only after gonioscopy)

NEW:

Eye disease no. .......................... □ mild □ severe

8. ICAA: PLA

NEW:

8. Iridocorneal angle abnormality (ICAA): (only after gonioscopy)
Fig 3

**Normal PL:** thin fibres from iris base to its insertion at the cornea

**FL:** fibres with a confluent (broad) base and shortened thin insertions at the cornea or thick fibres (< 5 fibres)

**LA:** plates or sheets of continuous tissue, with or without flow holes

**ICAW:** open-narrow-closed

**PLA:** 0-50% FL around 360° = **unaffected**

M. Richter, Estoril 2017
A = length of PL
B = distance from the origin of the PL to the anterior surface of the cornea

PLA: 0-50% FL around 360° = unaffected
ICAW: open

Terminology:
Ratio A/B: closed
PL not visible
narrow
A < 1/3 of B
open
A ≥ 1/3 of B
NEW:

Eye disease no. .......................... mild  moderate  severe

**  UNAFFECTED  UNDETERMINED  AFFECTED

8. Lig. Pectinate abnormality (only after gonioscopy)

8. ICAA: PLA

ICA (width)
mild moderate severe
narrow (= moderate)
closed (= severe)

***

8. Iridocorneal angle abnormality (ICAA): (only after gonioscopy)

mild moderate severe

You can still use the present Certificate:

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**Fig 56**

**Normal PL:** thin fibres from iris base to its insertion at the cornea

**FL:** fibres with a confluent (broad) base and shortened thin insertions at the cornea or thick fibres (< 5 fibres)

**LA:** plates or sheets of continuous tissue, with or without flow holes

**ICAW:** open-narrow-closed

**PLA:** 0-50% FL around 360° = unaffected
A = length of PL
B = distance from the origin of the PL to the anterior surface of the cornea

**PLA**: 0-50% FL around 360° = **unaffected**

**ICAW**: open

**Fig 56**

<table>
<thead>
<tr>
<th>Terminology: closed</th>
<th>Ratio A/B: PL not visible</th>
</tr>
</thead>
<tbody>
<tr>
<td>narrow</td>
<td>A &lt; 1/3 of B</td>
</tr>
<tr>
<td>open</td>
<td>A ≥ 1/3 of B</td>
</tr>
</tbody>
</table>

M. Richter, Estoril 2017
### You can still use the present Certificate:

<table>
<thead>
<tr>
<th>Eye disease no.</th>
<th>mild</th>
<th>moderate</th>
<th>severe</th>
</tr>
</thead>
</table>

### NEW:

**8. Lig. Pectinate abnormality (only after gonioscopy)**

- **UNAFFECTED**
- **UNDETERMINED**
- **AFFECTED**

### NEW:

**8. Iridocorneal angle abnormality (ICAA):**

- **UNAFFECTED**
- **UNDETERMINED**
- **AFFECTED**

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M. Richter, Estoril 2017
**Fig 20**

**Normal PL:** thin fibres from iris base to its insertion at the cornea

**FL:** fibres with a confluent (broad) base and shortened thin insertions at the cornea or thick fibres (< 5 fibres)

**LA:** plates or sheets of continuous tissue, with or without flow holes

**ICAW:** open-narrow-closed

**PLA:** >50-100% FL and/or <25% LA = affected – mild

M.Richter, Estoril 2017
A = length of PL
B = distance from the origin of the PL to the anterior surface of the cornea

**PLA:** >50-100% FL *and/or* <25% LA
= affected – mild
**ICAW:** open

Terminology:
Ratio A/B:
- closed: PL not visible
- narrow: A < 1/3 of B
- open: A ≥ 1/3 of B
### You can still use the present Certificate:

Eye disease no. .................8...............  □ mild  □ moderate  □ severe

<table>
<thead>
<tr>
<th></th>
<th>UNAFFECTED</th>
<th>UNDETERMINED</th>
<th>AFFECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lig. Pectinate abnormality (only after gonioscopy)</td>
<td></td>
<td></td>
<td>fibrae latae lacrimae occlusio</td>
</tr>
</tbody>
</table>

#### NEW:

Eye disease no. ........................................  □ mild  □ severe

<table>
<thead>
<tr>
<th></th>
<th>UNAFFECTED</th>
<th>UNDETERMINED</th>
<th>AFFECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. ICAA: PLA</td>
<td></td>
<td></td>
<td>mild moderate severe</td>
</tr>
<tr>
<td>8. ICAA: ICA (width)</td>
<td></td>
<td>narrow (= moderate) closed (= severe)</td>
<td></td>
</tr>
</tbody>
</table>

8. Iridocorneal angle abnormality (ICAA): (only after gonioscopy)
Fig 57

**Normal PL:** thin fibres from iris base to its insertion at the cornea

**FL:** fibres with a confluent (broad) base and shortened thin insertions at the cornea or thick fibres (< 5 fibres)

**LA:** plates or sheets of continuous tissue, with or without flow holes

**ICA:** open-narrow-closed

**PLA:** 0-50% FL around 360° = **unaffected**
A = length of PL
B = distance from the origin of the PL to the anterior surface of the cornea

**PLA:** 0-50% FL around 360° = **unaffected**

**ICAW:** open

**Fig 57**

Terminology:

<table>
<thead>
<tr>
<th>Ratio A/B:</th>
<th>Terminology</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &lt; 1/3 of B</td>
<td>closed, PL not visible</td>
</tr>
<tr>
<td>A ≥ 1/3 of B</td>
<td>open</td>
</tr>
</tbody>
</table>

M. Richter, Estoril 2017
You can still use the present Certificate:

<table>
<thead>
<tr>
<th>Eye disease no.</th>
<th>mild</th>
<th>moderate</th>
<th>severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNAFFECTED</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>UNDETERMINED</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AFFECTED</strong></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Lig. Pectinate abnormality (only after gonioscopy)

NEW:

<table>
<thead>
<tr>
<th>Eye disease no.</th>
<th>mild</th>
<th>severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNAFFECTED</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UNDETERMINED</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AFFECTED</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. ICAA: PLA

- mild
- moderate
- severe

ICA (width)

- narrow (= moderate)
- closed (= severe)

M. Richter, Estoril 2017
**Fig 84**

**Normal PL:** thin fibres from iris base to its insertion at the cornea

**FL:** fibres with a confluent (broad) base and shortened thin insertions at the cornea or thick fibres (< 5 fibres)

**LA:** plates or sheets of continuous tissue, with or without flow holes

**ICAW:** open-narrow-closed

**Comment:** FL (< 5 fibers)

**PLA:** 0-50% FL around 360° = unaffected

M. Richter, Estoril 2017
A = length of PL
B = distance from the origin of the PL to the anterior surface of the cornea

**PLA:** 0-50% FL around 360° = unaffected
**ICAW:** open

**Fig 84**

Terminology:

<table>
<thead>
<tr>
<th>Ratio A/B:</th>
<th>closed</th>
<th>narrow</th>
<th>open</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL not visible</td>
<td>A &lt; 1/3 of B</td>
<td>A ≥ 1/3 of B</td>
<td></td>
</tr>
</tbody>
</table>

M. Richter, Estoril 2017
### You can still use the present Certificate:

<table>
<thead>
<tr>
<th>Eye disease no.</th>
<th>mild</th>
<th>moderate</th>
<th>severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNAFFECTED</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UNDETERMINED</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AFFECTED</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

8. Lig. Pectinate abnormality (only after gonioscopy)

**NEW:**

<table>
<thead>
<tr>
<th>Eye disease no.</th>
<th>mild</th>
<th>severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNAFFECTED</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UNDETERMINED</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AFFECTED</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. ICAA: PLA

- mild
- moderate
- severe
- narrow (= moderate)
- closed (= severe)

8. ICAA: PLA

- mild
- moderate
- severe
**Fig 41**

**Normal PL:** thin fibres from iris base to its insertion at the cornea

**FL:** fibres with a confluent (broad) base and shortened thin insertions at the cornea or thick fibres (< 5 fibres)

**LA:** plates or sheets of continuous tissue, with or without flow holes

**ICAW:** open-narrow-closed

**PLA:** 0-50% FL around 360° = unaffected

M. Richter, Estoril 2017
A = length of PL
B = distance from the origin of the PL to the anterior surface of the cornea

**PLA:** 0-50% FL around 360° = unaffected

**ICAW:** narrow = affected (moderate)?
or

**ICAW:** open = unaffected

Comment: check position of gonio lens, "borderline" cases!

Terminology:
- **Ratio A/B:**
  - closed: PL not visible
  - narrow: A < 1/3 of B
  - open: A ≥ 1/3 of B
**You can still use the present Certificate:**

Eye disease no. 8

<table>
<thead>
<tr>
<th>mild</th>
<th>moderate</th>
<th>severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNAFFECTED</td>
<td>UNDETERMINED</td>
<td>AFFECTED</td>
</tr>
</tbody>
</table>

8. Lig. Pectinate abnormality (only after gonioscopy)

NEW:

Eye disease no. 8

<table>
<thead>
<tr>
<th>mild</th>
<th>severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNAFFECTED</td>
<td>AFFECTED</td>
</tr>
</tbody>
</table>

8. Iridoconeal angle abnormality (ICAA): (only after gonioscopy)

Descriptive comments: ICAW = narrow

Comment: check position of gonio lens!
If ICA = open: tick “unaffected”
If ICA = narrow: tick “affected – ICAW narrow”
Fig 1

**Normal PL:** thin fibres from iris base to its insertion at the cornea

**FL:** fibres with a confluent (broad) base and shortened thin insertions at the cornea or thick fibres (< 5 fibres)

**LA:** plates or sheets of continuous tissue, with or without flow holes

**ICAW:** open-narrow-closed

**PLA:** 25-50% LA (around 360°) = affected – moderate

M. Richter, Estoril 2017
A = length of PL
B = distance from the origin of the PL to the anterior surface of the cornea

**PLA:** 25-50% LA (around 360°) = **affected – moderate**

**ICAW:** open

Comment: in areas of LA the ICAW may be narrow... however, we judge 360 degrees!...according to PLA the grading would be «affected-moderate» anyway!

**Terminology:**
- **Ratio A/B:**
  - **Closed:** PL not visible
  - **Narrow:** $A < \frac{1}{3}$ of $B$
  - **Open:** $A \geq \frac{1}{3}$ of $B$

M. Richter, Estoril 2017
**You can still use the present Certificate:**

### Eye disease

<table>
<thead>
<tr>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Unaffected" /></td>
<td><img src="image2" alt="Undetermined" /></td>
<td><img src="image3" alt="Affected" /></td>
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</tbody>
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8. **Lig. Pectinate abnormality** (only after gonioscopy)

### NEW:

<table>
<thead>
<tr>
<th>Mild</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4" alt="Unaffected" /></td>
<td><img src="image5" alt="Severe" /></td>
</tr>
</tbody>
</table>

8. **Iridocorneal angle abnormality (ICAA):** (only after gonioscopy)

---

M. Richter, Estoril 2017
Fig 31

**Normal PL:** thin fibres from iris base to its insertion at the cornea

**FL:** fibres with a confluent (broad) base and shortened thin insertions at the cornea or thick fibres (< 5 fibres)

**LA:** plates or sheets of continuous tissue, with or without flow holes

**ICA W:** open-narrow-closed

**PLA:** 25-50% LA = affected – moderate

M. Richter, Estoril 2017
A = length of PL
B = distance from the origin of the PL to the anterior surface of the cornea

**PLA:** 25-50% LA (around 360°) = affected – moderate
**ICAW:** open

Fig 31

<table>
<thead>
<tr>
<th>Terminology:</th>
<th>closed</th>
<th>narrow</th>
<th>open</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio A/B:</td>
<td>PL not visible</td>
<td>A &lt; 1/3 of B</td>
<td>A ≥ 1/3 of B</td>
</tr>
</tbody>
</table>

M.Richter, Estoril 2017
You can still use the present Certificate:

Eye disease no. ........................ mild  moderate  severe

8. Lig. Pectinate abnormality (only after gonioscopy)

NEW:

Eye disease no. ................................ mild  severe

8. ICAA: PLA

8. ICAA: PLA

M.Richter, Estoril 2017
**Fig 58**

**Normal PL:** thin fibres from iris base to its insertion at the cornea

**FL:** fibres with a confluent (broad) base and shortened thin insertions at the cornea or thick fibres (< 5 fibres)

**LA:** plates or sheets of continuous tissue, with or without flow holes

**ICAW:** open-narrow-closed

**PLA:** >50% LA = *affected – severe*
A = length of PL
B = distance from the origin of the PL to the anterior surface of the cornea

PLA: >50% LA (around 360°) = affected
– severe
ICAW: open

Fig 58

Terminology: closed narrow open
Ratio A/B: PL not visible A < 1/3 of B A ≥ 1/3 of B

M. Richter, Estoril 2017
You can still use the present Certificate:

Eye disease no. .............8...........

<table>
<thead>
<tr>
<th></th>
<th>mild</th>
<th>moderate</th>
<th>severe</th>
</tr>
</thead>
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<tr>
<td>UNAFFECTED</td>
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<td></td>
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</tr>
<tr>
<td>UNDETERMINED</td>
<td></td>
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</tr>
<tr>
<td>AFFECTED</td>
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</tr>
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</table>

8. Lig. Pectinate abnormality (only after gonioscopy)

NEW:

Eye disease no. .......................... mild | severe

<table>
<thead>
<tr>
<th></th>
<th>mild</th>
<th>severe</th>
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<tbody>
<tr>
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<tr>
<td>AFFECTED</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

8. ICAA: PLA

ICA (width)

mild moderate severe
narrow (= moderate)
closed (= severe)

M. Richter, Estoril 2017
Fig 10

**Normal PL:** thin fibres from iris base to its insertion at the cornea

**FL:** fibres with a confluent (broad) base and shortened thin insertions at the cornea or thick fibres (< 5 fibres)

**LA:** plates or sheets of continuous tissue, with or without flow holes

**ICAW:** open-narrow-closed

**PLA:** >50% LA = **affected – severe**

M.Richter, Estoril 2017
Terminology:
- closed
- narrow
- open

Ratio A/B:
- PL not visible
- $A < \frac{1}{3}$ of $B$
- $A \geq \frac{1}{3}$ of $B$

**PLA:** $>$ 50% LA (around 360°) = 
**affected – severe**

**ICAW:** open

Comment: ICAW = open but occluded by LA (note the difference between the terms “closed” and “occluded”);
If PLA or ICAW is graded “affected-severe” its meaning is comprehensible to the breeder

---

M. Richter, Estoril 2017
**You can still use the present Certificate:**

Eye disease no. ...........8.................. mild moderate severe

---

8. Lig. Pectinate abnormality (only after gonioscopy)

---

NEW:

Eye disease no. .................................. mild severe

---

8. ICAA: PLA

ICA (width)
mild moderate severe
narrow (= moderate)
closed (= severe)

---

M. Richter, Estoril 2017
A = length of PL
B = distance from the origin of the PL to the anterior surface of the cornea

**PLA:** > 50% LA (around 360°) = affected – severe

**ICAW:** closed? or open but occluded by extensive LA? (see next page)

---

Terminology:
Ratio A/B:  
- closed: PL not visible
- narrow: A < 1/3 of B
- open: A ≥ 1/3 of B

M. Richter, Estoril 2017
Terminology:
Ratio A/B:
closed PL not visible
narrow A < 1/3 of B
open A ≥ 1/3 of B

Fig 83

Fig 10

M. Richter, Estoril 2017
A = length of PL
B = distance from the origin of the PL to the anterior surface of the cornea

Authors interpretation: ICA occluded by a sheet of pigmented tissue spanning the angle from the base of the iris to the inner-pigmented band with one flow hole visible. >90% affected or grade 3.

“Progression of pectinate ligament dysplasia over time in two populations of Flat-Coated Retrievers” R.Pearl, D.Gould, B.Spiess
*Veterinary Ophthalmology*, Vol18, Issue 1, p 6-12, Sep 2013

M.Richter, Estoril 2017
**You can still use the present Certificate:**

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8. Lig. Pectinate abnormality (only after gonioscopy)

**NEW:**

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<td></td>
</tr>
<tr>
<td><strong>AFFECTED</strong></td>
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<td></td>
</tr>
</tbody>
</table>

8. ICAA: PLA

Comment: 2 opinions of 2 examiners but same result!
1. PLA «affected» «severe»
2. ICAW: «affected» «closed»; PL not visible – no judgement possible

M. Richter, Estoril 2017
A = length of PL
B = distance from the origin of the PL to the anterior surface of the cornea

Authors interpretation: ICA occluded by a sheet of pigmented tissue spanning the angle from the base of the iris to the inner-pigmented band with several flow holes visible. 70% affected or grade 2.

“Progression of pectinate ligament dysplasia over time in two populations of Flat-Coated Retrievers” R.Pearl, D.Gould, B.Spiess
Veterinary Ophthalmology, Vol18, Issue 1, p 6-12, Sep 2013

M.Richter, Estoril 2017
### You can still use the present Certificate:

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<tr>
<td>8. <strong>Lig. Pectinate abnormality</strong> <em>(only after gonioscopy)</em></td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
</tr>
</tbody>
</table>

### NEW:

<table>
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<th>severe</th>
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</thead>
<tbody>
<tr>
<td>8. <strong>Iridocorneal angle abnormality (ICAA):</strong> <em>(only after gonioscopy)</em></td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
</tr>
</tbody>
</table>
NEW (Chapter 8 Vet Advice):

- Gonioscopy every 3 years / at age 1, 4 & 7 (Chapter 7 Recommendations regarding age and frequency)

- Breeding advice (ICA = iridocorneal angle abnormality):
  - Mild-moderate: OPTIONAL (according to present scientific information available: if these dogs are used, it is recommended to breed these dogs to unaffected graded dogs)
  - Severe: NO BREEDING (+ risk to develop glaucoma)
Advantage of the new grading:

- Grading on the certificate is more comprehensible to the breeder (unaffected, affected mild/moderate/severe)
- Grading of abnormalities of PL and ICAwidth (in the descriptive comment area)
- Clinically relevant grading (360 degrees)
Many thanks

Å to the gonioscopy subcommittee members:
  Björn Ekesten, Peter Bedford, Claus Bundgaard, Gilles Chaudieu, Adolfo Guandalini

Å for the slides: Bernhard Spiess
• 0 – 50% FL = unaffected
• >50-100% FL and/or < 25% LA = affected (mild)
• 25-50% LA = affected (moderate)
• > 50% LA = affected (severe)