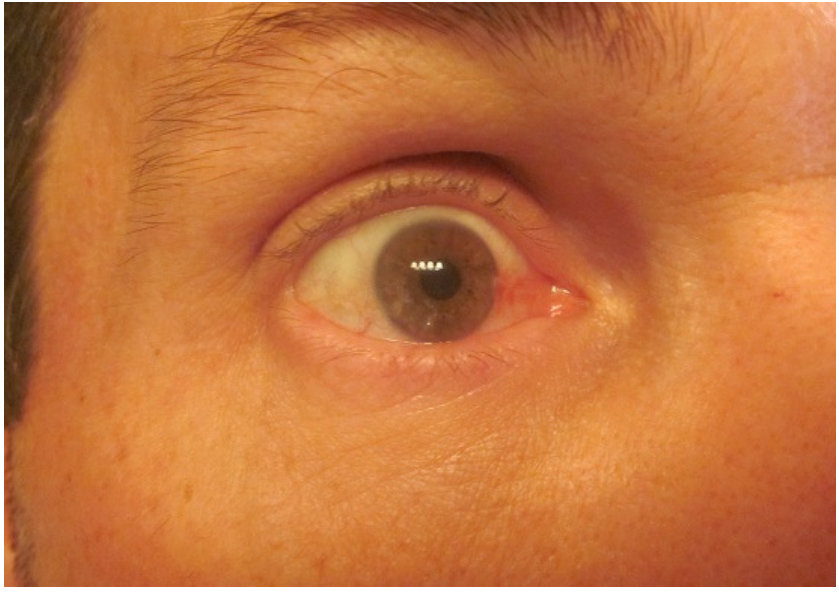
Preliminary Investigation of Ultramarathon-Associated Visual Impairment

Tracy B Høeg, MD[1,2], G. Kim Corrigan, OD[3], Martin D. Hoffman, MD, FACSM[4]

[1]Faculty of Health and Medical Sciences, University of Copenhagen, Denmark

[2]University of California-Irvine [3]El Dorado Hills Optometric Center, El Dorado Hills, CA

[4]Northern California Health Care System and University of California-Davis Medical Center, Sacramento, CA.



Background

Vermont and Western States 100 mile Runs: 500 runners

Table 5 Comparison of problems that impacted race performance between finishers and nonfinishers reported as percentages within each group

Problem	Finishers	Nonfinishers	*P*-value
Blisters or "hot spots" on feet	40.1	17.3	<0.0001
Nausea and/or vomiting	36.8	39.6	0.60
Muscle pain	36.5	20.1	0.0005
Exhaustion	23.1	13.7	0.024
Inadequately heat acclimatized	21.0	28.1	0.12
Inadequately trained	13.5	15.1	0.66
Muscle cramping	11.4	15.8	0.22
Injury during the race	9.0	10.1	0.73
Ongoing injury	7.5	15.8	0.010
Illness before the race	6.0	5.0	0.83
Started out too fast	5.1	6.5	0.52
Vision problems	2.1	3.6	0.35
Difficulty making cutoff times	1.8	27.3	<0.0001
Other, not categorized	11.7	26.6	0.0001

Hoffman MD, Fogard K. Factors related to successful completion of a 161-km ultramarathon. *Int J Sports Physiol Perform*. 2011;6:25–37.

Anecdotal

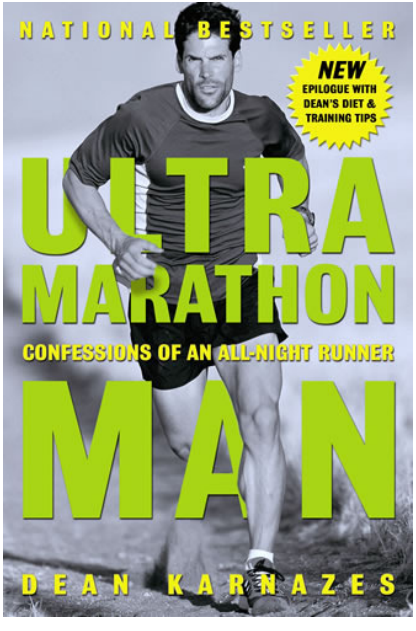
- *“A friend running Pinhoti this past Saturday (24+ hour finish), went blind or had a large vision loss during the race, and had to be helped in by another runner. I understand that he ran in the last few miles with a hand on her shoulder (no joke). I am still a little short on the facts.*

  Can't find too much on this on Google.

  Does anyone have any info?” – Ultrarun listserve

Hellgate 100k

Runner's eye at the Hellgate 100km race. Photo credit: George Wortley, MD.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NEW
EPILOGUE WITH DEAN'S DIET & TRAINING TIPS
ULTRA MARATHON MAN
CONFESSIONS OF AN ALL-NIGHT RUNNER
DEAN KARNAZES

But what is ”ultra eye”?

- Low blood sugar?
- Dehydration?
- Fatigue?

But what is ”ultra eye”?

- Is it dangerous?
- Does everyone get their vision back?
- After how long?
- Can it be prevented?
- Why do only some people get it?

Pubmed Search for previous studies

Pubmed Search for previous studies

Nothing

- Internet-based survey from March to June of 2013
- 173 self-identified ultramarathon runners with prior visual impairment

Participant characteristics

Characteristic	Mean* or Percent	Median*	Interquartile Range
Age at survey completion (years)	46.2		39.2-53.9
Women (%)	38.7		
Episodes of vision impairment (number)		2	1-5

Participant characteristics

Medical history			
Cardiac arrythmias (%)	4.1		
High blood pressure (%)	3.5		
Ischemic heart disease (%)**	1.2		
Diabetes (%)	0.6		

Participant characteristics

Eye history	
Contact wear (%)***	24.9
Refractive surgery (%)	23.7
Contact wear** and/or refractive surgery (%)	46.2
Dry eye (%)	8.1
Cataract (%)	4.6
Amblyopia (%)	3.5
Glaucoma (%)	2.3
Retinal disorder (%)	1.2

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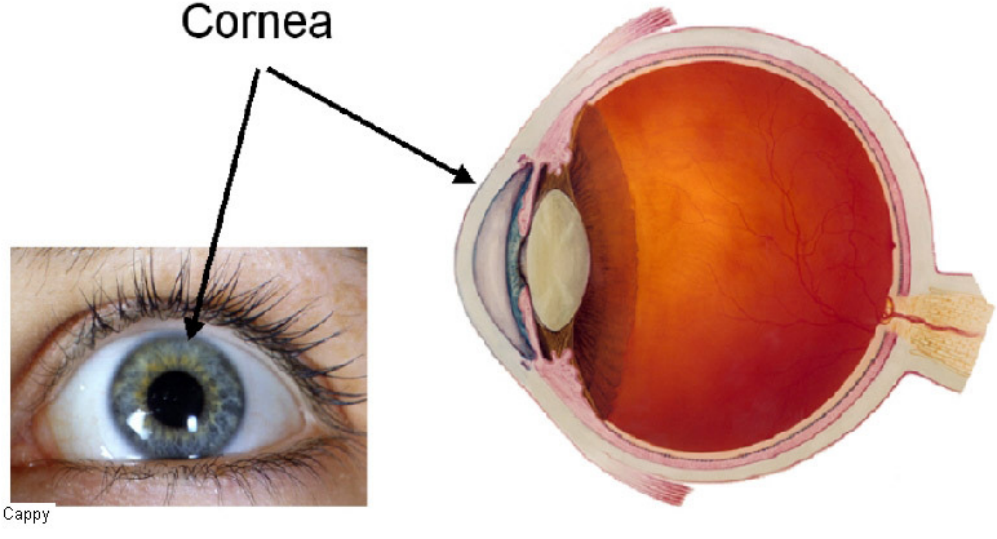
Comparison Group

- 412 Western States Endurance Run participants

Results

Characteristic	Respondents with visual impairment	Comparison group	P or t value
Race age (years)	42.0	41.9	0.84
Women (%)	38.7	20.1	<0.001
Contact wear (%)*	24.9	25.4	0.88
Refractive surgery (%)	23.7	12.1	<0.001

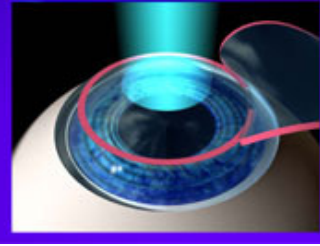
The Cornea



Refractive Surgery

LASIK (Laser in-situ Keratomileusis)

- A small corneal "lid" or "flap" is created
- Laser treatment under the flap
- Flap is laid back
- Discomfort is minimal to none
- Rapid visual recovery
- Most can drive and work the next day



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Results

- *“I did however, shortly after LASIK, climb a 14000 ft … I was fatigued from a week worth of backpacking in the area before starting the climb. On the summit I noticed my right eye was blurry. That was my first instance of blurred vision. I saw the LASIK dr and he thought it was swelling due to surgery and it wouldn't happen again.*

  Thinking it through for me, ***lasik appears to be the trigger.”***

Results

- Those with a history of refractive surgery experienced **almost twice as many episodes of vision loss**
  - a mean (±SD) of 7.0 ± 8.6 episodes (range 1-38), which was greater (p=0.0042) than among those without a history of refractive surgery who experienced 4.0 ± 4.6 episodes (range 1-30)

Results

Eye history	
Contact wear (%)***	24.9
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Results

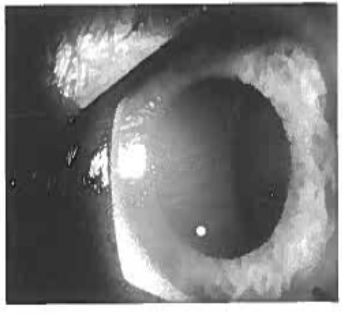
- Most Common Symptoms (from dropdown menu)
  - "cloudy or foggy vision" (69.1%)
  - "blurry vision" (61.3%)
  - "eye dryness" (23.5%)
  - "halos" (21.2%)
  - "eye pain" (6.0%)
  - "tunnel vision" (1.8%).

Results

- Diagnoses while symptoms persisted
  - Eight participants diagnosed with corneal edema.
  - Two participants with corneal damage from contact lenses.

Corneal Edema

- Endurance cyclist



Recurrent corneal edema of the right eye when cycling for more than 4 hours, especially in windy and cold conditions. Researchers able to induce corneal edema by placing him in a room set at 4 C and with a fan blowing on his eyes

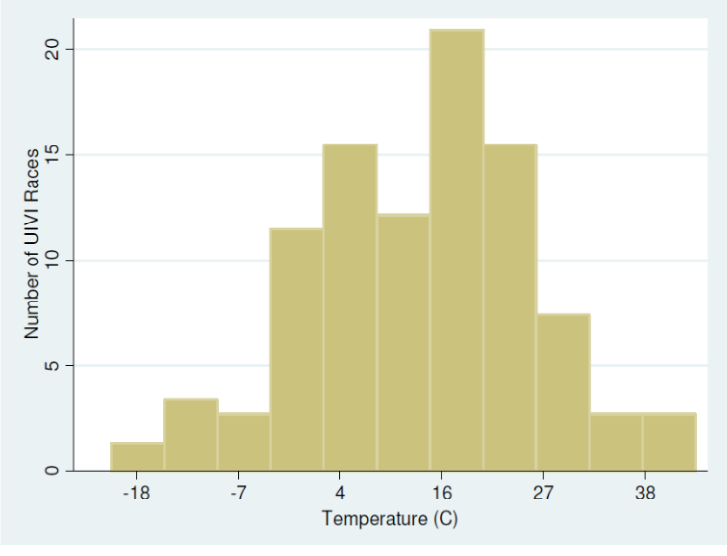
Ettl AR, Felber SR, Rainer J. Corneal edema induced by cold. *Ophthalmologica* 1992;204:113-114.

Results

- Race and environmental characteristics
  - In 32.4% of the episodes, symptoms began after the subject had been at an altitude of 2000 m or higher.
  - Participants selected “significant wind” as being present before the onset of their symptoms in 22.7% of episodes.
  - The mean temperature prior to vision impairment was reported to be 12.9°C (range -21 to 49°C) and
    - There was no apparent distribution pattern suggesting a causative effect related to temperature

Results

- Temperature distribution

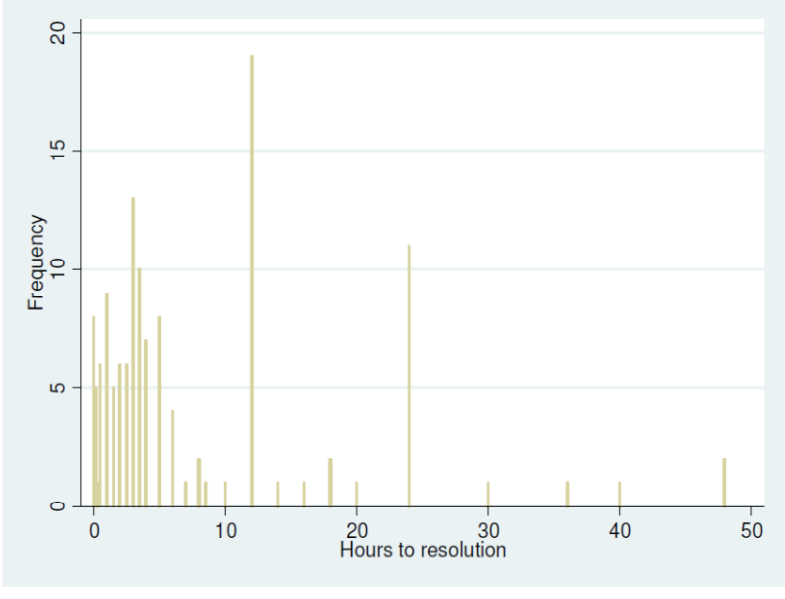


Results

- Duration of Visual Impairment
  - Normal vision was regained before the end of the race in 13.5% of episodes
  - Of the 86.5% with persistent visual impairment after the race, resolution of symptoms was reported within a median of 3.5 hours (interquartile range = 1.5-12 hours)
  - All had resolution of symptoms within 48 hours and 95.5% within 24 hours, apart from one outlier (who reported symptoms lasting 6-8 months and did not seek medical care)

Results

- Duration of Visual Impairment



Results

Race Distance	N (%)
Timed Event*	6 (2.8)
>161 km	5 (2.3)
161 km	102 (46.8)
>42.2 - <161 km	101 (46.3)
≤42.2 km	4 (1.8)

Results

- Symptom Relief/Partial Improvement of Vision
  - hydrating eye drops/washing eyes with water (16.8%)
  - oral hydration (9.2%)
  - resting and/or stopping (8.1%)
  - use of protective eyewear (2.3%)
  - the morning sun or warmer temperatures (2.3%)

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Conclusions

- ✓ Ultramarathon-associated visual impairment generally consists of painless clouding or blurring of vision that resolves spontaneously within 24 to 48 hours after cessation of running.

Conclusions

- ✓ Refractive surgery stood out as a risk factor for development of visual impairment and for recurrent episodes during ultramarathons.

Conclusions

- ✓ Ultramarathon-associated vision impairment can occur across a wide range of ambient temperatures.

Conclusions

- ✓ Strategies potentially effective for the prevention of the above mechanism of corneal edema, include eye drops, protective eyewear and proper energy intake. Decreased exertion/rest and closing of the eyes appear to be the most effective treatments.

Limitations

- Unable to establish cause or pathophysiology behind this condition
- Everyone is different
- Anecdotal reports of different causes of vision loss during ultras and longer lasting symptoms

Thank you!


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by Mark Parisi
AFTER THE LASER EYE SURGERY, I DIDN'T NEED 'EM ANYMORE...
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