A two phase approach to treating myopia

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1. Current definition of myopia
   1. Does “refractive error” equal disease?
      1. It is NOT a disease
         1. Does anything change in our thinking?
      2. It IS a disease
         1. Does anything change in our thinking?

A disorder of structure or function in a human, animal, or plant, especially one that produces specific signs or symptoms or that affects a specific location and is not simply a direct result of physical injury.

* 1. Optical anatomy of a myopic eye
     1. *Why* is the eye too long?
     2. Emmetropization
        1. What part of the retina is responsible?
        2. Earl Smith, OD, PhD Monkey studies
           1. Macula
           2. Periphery
     3. How do you know it’s too big?
     4. What’s normal axial length growth
        1. Two techniques to measure
           1. Contact
           2. Non-contact – optical biometry

Plusses of each technique

Minuses of each technique

* 1. Nature vs. nurture debate
     1. How much of myopia is caused by nature vs nature?
     2. Nature
        1. Genetics overview
     3. Nurture/environment
        1. Outdoor time
           1. Onset
           2. Progression

Why the difference between onset and progression

Kazuo Tsubota, MD research

* + - 1. Near work
         1. Digital device use vs. conventional near work
         2. Effect of body posture
         3. Effect of text/background color

Increase in choroidal thickness

* + - * 1. Indoor dioptric stimulation
  1. When does myopia start?
     1. Zadnik, CLEERE, +0.75 study
     2. Is decreasing low hyperopia the start of myopia?

1. Demographics of the US myopia problem
   1. 42 % of the total US population
   2. 25% of children
   3. 10 million children
   4. Much bigger problem outside the US
2. Consequences of myopia
   1. “There is no safe level of myopia.”
      1. Ian Flitcroft, MD study review
   2. “Pathological myopia” vs. “physiological myopia”
   3. Relative risk definitions
      1. myopia risks related to risks of diseases from smoking
      2. myopia rates related to rate of diabetes
   4. retinal detachments
      1. relative risk as a function of Rx
   5. myopic maculopathy
      1. relative risk as a function of Rx
   6. glaucoma
      1. relative risk as a function of Rx
   7. cataract
      1. relative risk as a function of Rx
   8. social stigma for kids study data
   9. functional and emotional challenges of high myopia for children
      1. sports
      2. self esteem
3. Phase 1
   1. Optical considerations
      1. Kids need to see so, eyeglasses required 100% of the time
         1. Low Rx’s needed full time?
      2. Glasses, in their currently available form, do not slow down the progression of myopia
         1. Under-correction doesn’t work
         2. Some bifocal designs give some relief when kids also present with esophoria and significant accommodative lag
      3. Eyeglasses that are on the horizon to help
         1. Hoya – MyoSmart – Dims – 60% reduction in progression
         2. Essilor – Myopilux
         3. Zeiss – Myovision
            1. What’s taking so long?

Fabrication challenges

Optics

Cosmetics

FDA

Efficacy studies

Time

Double blind, double masked, cross over and controlled – difficult to configure study

* + 1. Contact lenses
       1. On-K RGPs don’t help
       2. Most “off the rack” lenses, even those for “myopia management” help somewhat, but aren’t as good as what could be done in phase two

1. Phase 2
   1. Myopia management alternatives – currently two categories available
      1. Optical
      2. Pharmaceutical
      3. Combination therapy
   2. Pharmaceutical
      1. Atropine
         1. Concentration
         2. Dosing
            1. Sunday – Thursday night
            2. Manual punctal occlusion
         3. Atom 1 and 2 studies
         4. Rebound effect
         5. Atom 3
      2. Side effects
         1. Ocular
         2. Systemic
      3. Prescribing/compounding
      4. Follow up schedule
   3. Optical
      1. Soft multifocal contact lenses
         1. Center near design
         2. Center distance design
         3. How much add is necessary
         4. Fitting visit and follow up schedule
      2. Overnight corneal reshaping lenses
         1. Why not use off the shelf CRT?
      3. Importance of initial corneal topography
      4. Importance of peripheral add
         1. Reverse curve optics
         2. Centration
         3. Pupil size
      5. Fitting visit and follow up schedule
         1. What if less than perfect correction initially?
      6. Difference between “orthokeratology” and “myopia control”
   4. Combination therapies
      1. OSU
      2. Hong Kong Polytechnic
   5. Off label use considerations
      1. Discussions with parents
2. What’s next? – “Phase 3?”
   1. Atom 3
      1. Can we prevent myopia?
      2. Treating low hyperopes?
   2. Atropine delivery
      1. Nevakar
      2. EyeNovia
   3. Hysteresis – does it matter?
      1. Most changes are probably epithelial
   4. Meibomian gland measurements
   5. Peripheral refraction
   6. Home monitoring
      1. Telemedicine
         1. VA
         2. Refraction
            1. Opternative/Visibly – gone but not forgotten
            2. EyeQue