

The correction of ametropia in older patients

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The correction of ametropia in older patients

- Two main topics:
- The correction of presbyopia.
- The link between spectacle correction and falls in frail, elderly people.

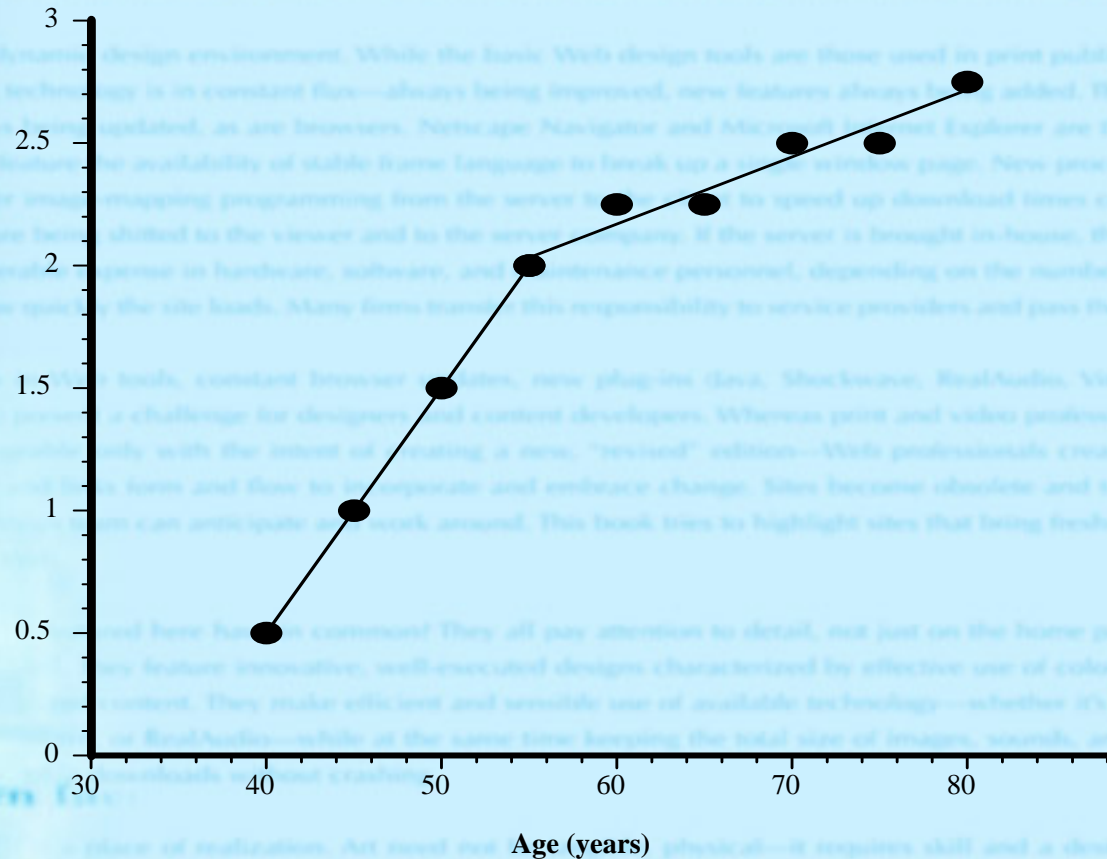
Tentative add test comparison

(Hanlon *et al.*, *J Am Optom Assoc*, 1987).

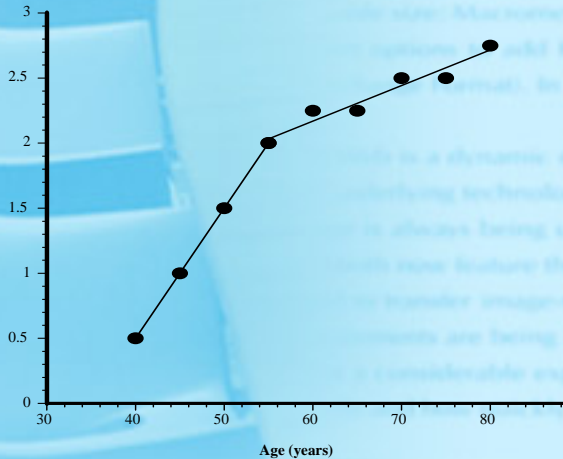
- 37 subjects unhappy with near Rx.
- Errors identified if tests indicated same add or lower as original add deemed too low etc.
- Binocular cross-cylinder: 61%.
- NRA/PRA: 46%.
- W.D. - $1/2$ amplitude: 30%.
- Age: 14%.

Add vs. age

(Pointer, *Ophthal Physiol Opt*, 1995;
Blystone, *J Am Optom Assoc*, 1999)



Reading addition changes



- The increase in add after the age of 55-60 is due to:
- Smaller working distances with increasing age (Millodot & Millodot, *Ophthal Physiol Opt*, 1989).
- Linked to need for increased magnification of small print due to decreased visual acuity (McMillan *et al.*, *Optom Vision Sci*, 2001).

Suggested tentative adds

Patient age (years)	Tentative add (D)
45	+1.00
50	+1.50
55	+2.00
60 +	Working distance (-0.25D)

Taken from the data of:

Hanlon *et al.*, 1987; Pointer, 1995; Blystone, 1999, McMillan *et al.*, 2001

*****The other alternative is to predict the add based on the patient's symptoms with their current near refractive correction.***

Falls in the elderly



- Older adults are more susceptible to serious injuries from falls, including broken hips and head injuries.
- More likely to be admitted to hospital or long stay institutions after a fall.
- Falls account for 84% of accidental deaths in the elderly.
- Even 'minor falls' can lead to fear of falling, deterring excursions from the home.

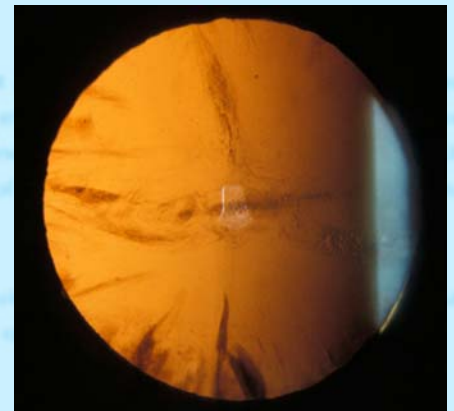
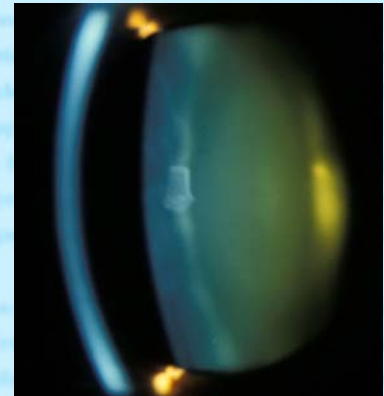
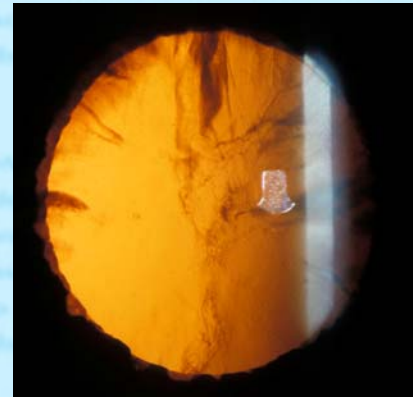


Poor vision and falls / hip fractures

- Falls are clearly multi-factorial.
- Poor VA is a major risk factor for falls (2.8x; Rubenstein, 2006; *Age & Ageing*) and hip fractures (2.0x; Dargent-Molina *et al.*, 1996; *Lancet*).
- Stereoacuity may be even more important (~ 6.0x; Ivers *et al.*, 2000; *Am J Epidemiol*).

Ametropia & cataract

- Visual impairment (VI) in the elderly is common.
- ~75% is due to uncorrected ametropia & cataract (e.g. Evans & Rowlands, *Ophthal Physiol Opt*, 2004).
- Nuclear cataract \ large myopic shifts; cortical cataract \ significant astigmatic shifts (Pesudovs & Elliott, *Br J Ophthalmol*, 2003).

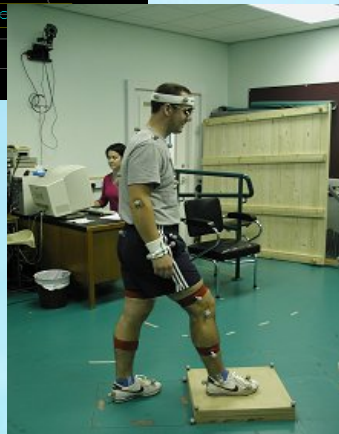
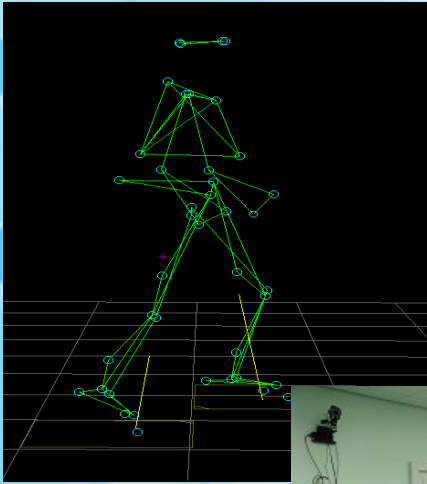


Clinic study

- UK geriatric clinic, acute admissions (N=200).
- 51% had visual impairment (VI), 76% of fallers had VI.
- 79% of this VI was correctable: 40% refractive error, 39% cataract.
- 60% had not had an eye exam in the last 3 years.

Jack *et al.*, 1995; *Gerontology*

Lab. based studies



- Refractive blur increases standing postural instability.
- Cataractous blur slows stepping, with a greater time supported on one leg.
- This increases dynamic instability, particularly in the M-L direction.
- Sideways falls are common and a common cause of hip fracture.

Anand *et al.*, 2003; *Invest Ophth Vis Sci.*

Heasley *et al.*, 2004; *Invest Ophth Vis Sci.*

Buckley *et al.*, 2005; *Gait & Posture.*

Intervention trials

- Surprisingly limited improvements.
- One study showed improvement only when combined with exercise; two cataract surgery studies show good improvement in falls rate, but two others show no improvement.
- Why?

Day *et al.*, 2002; *Br Med J*

Brannan *et al.*, 2003; *Br J Ophthalmol*

Harwood *et al.*, 2005; *Br J Ophthalmol*

McGwin *et al.*, 2006; *JAGS*

Foss *et al.*, 2006; *Age & Aging*

Cumming *et al.* (2007) JAGS

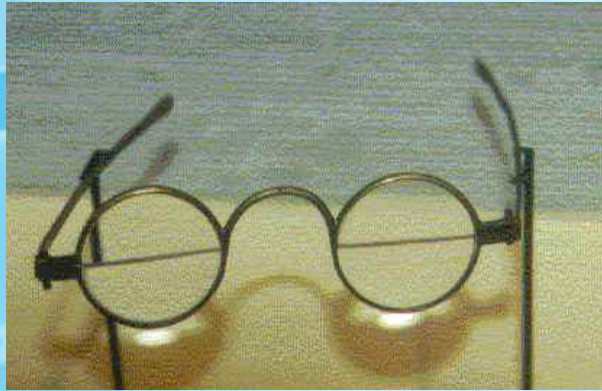
- Optometric intervention study (N=616).
- Found *increased* falls rate in intervention group!
- Likely due to adaptation problems.
- Full prescription given in all cases.
- The study also gave no thought to multifocals (the control group had more single vision lens wearers than intervention group).

Multifocal wearers: Accident study evidence

- UK study of accidents at work (N=1,504) and home/leisure (N=1,326).
- Bifocal/PAL wearers were involved in significantly more underfoot accidents.
- They were particularly involved in more “missed edge-of-step” accidents

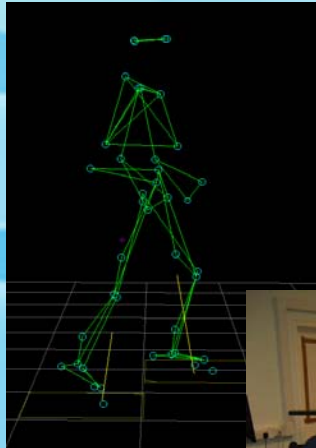
■ *Davies et al., 2001; Safety Science.*

Multifocal wearers: epidemiological evidence



- One year prospective cohort study (N=156).
- Multifocal wearers were 2.29 more likely to fall as non-multifocal lens wearers.
- More likely to fall because of a trip (OR 2.79) and outside the home (OR 2.55).
- Lord *et al.*, 2002; *JAGS*

Multifocals: Lab. evidence



- 20 elderly, fully adapted (mean 13 years) bifocal or PAL wearers.
- Distance single vision lenses improved the precision of foot placement and toe clearance and decreased the number of step hits.
- There was no difference between bifocal & PAL.
- There was no difference in head flexion with lens type.

Johnson *et al.*, 2007; *Invest Ophthalmol Vis Sci.*
Johnson *et al.*, 2007; *JAGS.*

Prescribing PALs and bifocals



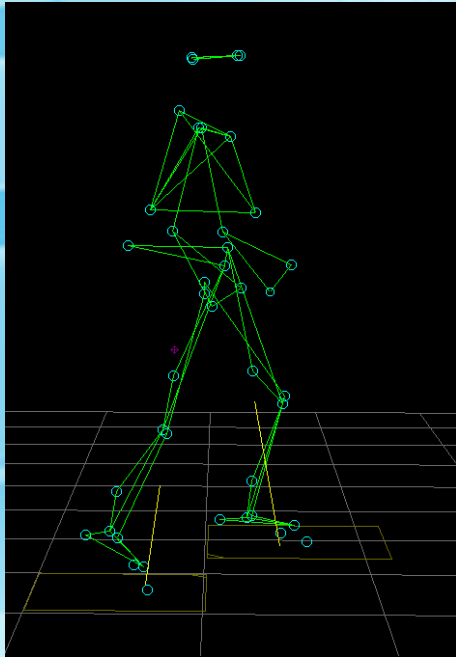
- Bifocals or PALs should NOT be prescribed to elderly single vision lens wearers at risk of falls.
- Adapted multifocal wearers who become a high risk for falls: Try 'softer' PAL designs?
- Single vision lenses should be advised for walking, particularly outside, in high risk patients.



Managing ametropia & cataract

- Uncorrected ametropia and cataract likely increases fall risk.
- This suggests reducing intervals between eye exams & earlier cataract referral for patients at high risk of falling.
- A partial correction of changes seems sensible in elderly patients. 0.75D max?
- Any partial correction should consider effects on stereoacuity.

Acknowledgements



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