Summary table 211 — excessive reading and myopia

Paper no.	Reference	Type of study	Population/ study information	Risk factor	Comparator	*N*	Level (quality)	Results	Other notes
1787	Saw et al 2006	Prospective cohort	Singaporean (Chinese, Malay, Indian) schoolchildren age 7–9 years with no myopia studied over 3 years	Reading books (no. per week)	Few books read	1478	IV	The relative risk for myopia was 1.55 (95%CI 1.18 to 2.04) for two versus no myopic parents and 1.1 (95%CI 0.97 to 1.05) for every unit increase in books read per week. Reading was not causally linked to myopia.	
2178	Saw et al 2001	Cross-sectional	Singapore military conscripts	Excessive reading	NA	429	IV	The odds ratio (OR) of myopia was 3.8 (95%CI 2.0 to 7.3) in conscripts who had gone through the gifted educational stream. University-educated conscripts had an OR for myopia of 4.1 (95%CI 1.4 to 4.9). Increased close work (reading, etc) did not correlate with increased myopia.	
1872	Khader et al 2006	Cross-sectional	Students aged 12–17 in Amman, Jordan	Screens (television/computer)	NA	1777	IV	Myopia was associated with computer use (OR 1.16; 95%CI 1.06 to 1.26; $P < 0.0001$) as well as reading and writing outside of school hours (OR 1.24; 95%CI 1.14 to 1.35; $P < 0.001$). There was no association with hours spent watching television but time spent playing sports was inversely associated with myopia (OR 0.89; 95%CI 0.89 to 0.93; $P < 0.0001$).	
1873	Kinge et al 2000	Prospective cohort study	University students in Norway	Reading	NA	192	II	No relationship was found between refractive change and time spent working with video display terminals or watching television. Time spent reading scientific papers, on practical near work, or in lectures was all statistically significantly associated with refractive change towards myopia. This work agreed with previous studies on the relation between development of myopia and computer or television use.	

Summary	Group
There are conflicting results about the relationship between reading and other near work and development of myopia.	*Group 1* — Clear association/causality *Group 2* — Possible association/causality (more research needed) *Group 3* — Lack of association/causality *Group 4* — Possible lack of association/causality (more research needed) *Group 5* — Conflicting results *Group 6* — Possible protection *Group 7* — No studies

Summary table 215 — TV/computer and myopia

Paper no.	Reference	Type of study	Population/ study information	Risk factor	Comparator	*N*	Level (quality)	Results	Other notes
1872	Khader et al 2006	Cross-sectional	Students aged 12–17 in Amman, Jordan	Screens (TV/computer)		1777	IV	Myopia was associated with computer use (OR 1.16; 95%CI 1.06 to 1.26; $P < 0.0001$) as well as reading and writing outside of school hours (OR 1.24; 95%CI 1.14 to 1.35; $P < 0.001$). There was no association with hours spent watching television but time spent playing sports was inversely associated with myopia (OR 0.89; 95%CI 0.89 to 0.93; $P < 0.0001$).	
1873	Kinge et al 2000	Prospective cohort study	University students in Norway	TV/computer		192	II	No relationship was found between refractive change and time spent working with video display terminals or watching television. Time spent reading scientific papers, on practical near work, or in lectures was all statistically significantly associated with refractive change towards myopia. This work agreed with previous studies on the relation between development of myopia and computer or television use	

Summary	Group
There appears to be no relationship between computer and television use and myopia, although further prospective studies would be useful to confirm this result. However, 'near work' such as reading and writing or practical near work is associated with a refractive change towards myopia (see summary table 211). (In one study, sport was protective for myopia development.)	*Group 1* — Clear association/causality *Group 2* — Possible association/causality (more research needed) *Group 3* — Lack of association/causality *Group 4* — Possible lack of association/causality (more research needed) (computer/TV screens) *Group 5* — Conflicting results *Group 6* — Possible protection *Group 7* — No studies

Summary table 216 —TV/computer and hyperopia

Paper no.	Reference	Type of study	Population/ study information	Risk factor	Comparator	*N*	Level (quality)	Results	Other notes
2194	Grignolo et al 1998	Prospective cohort	Visual display unit operators	TV/computer		6000	II	Changes in the refractive state seemed to be mainly age-related. There was a slight tendency toward hyperopia, but no effect on ocular motility.	Extracted from abstract

Summary	Group
In one study of visual display unit operators, extended use of visual display units caused a slight tendency toward hyperopia, but there is not other research data to support or refute this finding.	*Group 1* — Clear association/causality *Group 2* — Possible association/causality (more research needed) *Group 3* — Lack of association/causality *Group 4* — Possible lack of association/causality (more research needed) *Group 5* — Conflicting results *Group 6* — Possible protection *Group 7* — No studies

Summary table 220 — do eye tests reduce the incidence of eye disease in the general population?

Paper no.	Reference	Type of study	Population/ study information	Intervention	Comparator	*N*	Level (quality)	Results	Other notes
3400	Smeeth and Iliffe 2006	Systematic review (Cochrane) — 5 RCTs	Community-based studies of people aged 65 years or over	Mass screening	No screening	3494	I (Good)	Community-based screening of asymptomatic older people did not result in improvements in vision. The results in all five trials were very similar. The pooled RR for people in the intervention and control groups having self-reported visual problems when outcome assessments were performed was 1.03 (95%CI 0.92 to 1.15); the pooled odds ratio was 1.04 (95%CI 0.89 to 1.22). Three to five years after screening, the RR for visual acuity less than 6/18 in either eye comparing universal with targeted screening, was 1.07 (95%CI 0.84 to 1.36, *P* = 0.58). The mean composite score of the NEI VFQ-25 was 85.6 in the targeted screening group and 86.0 in the universal group, difference 0.4 (95%CI –1.7 to 2.5, *P* = 0.69).	
3399	Hatt et al 2006	Systematic review (Cochrane) — no RCTs found	Any population except for people already diagnosed with OAG, under the care of an eye specialist or with known visual impairment.	Any type of screening for OAG	No screening	NA	NA (Good review but no studies)	The search found no RCTs of population-based screening for OAG. High-quality RCTs are needed.	
3401	Powell et al 2005	Systematic review (Cochrane) — no RCTs	School children	Formal visual acuity testing	No screening	NA	NA (good review but no	The search found no RCTs of the impact of screening programs on amblyopia in school age children. High-quality RCTs are needed.	

Paper no.	Reference	Type of study	Population/ study information	Intervention	Comparator	*N*	Level (quality)	Results	Other notes
		found					studies)		
3048	Taylor et al 2004	Prospective cohort	People with normal vision and no eye disease ≥ 40 years (Melbourne Vision Impairment Project) followed over 5 years	Testing change in vision /eye disease over 5 years Eye tests (baseline and 5 years)	NA	1590	II	38 people had reduced vision at 5 years. Only 8–14 of these people (up to 0.88% to whole cohort) had not noticed a change in vision (asymptomatic vision loss) over the 5-year period. This showed how small the target group is for frequent eye screening examinations. Of the 38 with reduced vision, 10 had a family history of cataract, 1 of glaucoma and 1 of AMD. One of the 38 had developed glaucoma but it is not stated whether this person noticed a vision loss or was the person with a family history of glaucoma. Authors concluded that 'frequent routine eye examinations of those with normal examination results will have a low yield and may not be cost-effective'. Also, it may be more effective (in terms of outcomes and costs) to target people who notice a change in vision or who have a family history of eye disease than to screen people with normal vision regularly. American Academy of Ophthalmology (AAO) and American Optometry Academy have consensus-based recommendations for *biannual* eye exams for people 46–60 years and *annual* exams for > 60 years[a]; however, these are based as much on tradition/opinion as on evidence.	Did not come to a conclusion about frequency; only made recommendations about effectiveness of testing people with normal vision.

a American Academy of Ophthalmology (2006). Policy statement

Summary	Evidence
Community-based screening of asymptomatic older people did not result in improvements in vision.	Cochrane review (Level 1)
A cohort study in Melbourne found that regular eye examinations in people with normal vision only identified very few people (maximum of 0.88%) with vision loss that could not have been identified by symptoms and/or family history. Further research is needed.	Prospective cohort (Level III-2)
There are no RCTs to show the effectiveness or otherwise of population-based screening for glaucoma, or for amblyopia in childhood. No studies were found that properly addressed the issue of frequency of eye testing.	2 Cochrane reviews (more research needed)

Summary table 221 — do eye tests improve outcomes for diabetic retinopathy?

Paper no.	Reference	Type of study	Population/ study information	Intervention	Comparator	*N*	Level (quality)	Results	Other notes
3049	Bachmann 1998	Systematic review (numerous papers for different questions)	General practice-based diabetic population in the UK	Screening test of diabetic retinopathy (DR)	Various	NA	NA (Adequate)	Sensitivity of screening tests in detecting diabetic retinopathy (DR) requiring treatment was 50–88% in the study population. Of those screened, about 4% would be correctly detected as requiring treatment during an initial screening round, but this yield could decrease to about 1% in subsequent annual rounds. Of those treated, about 6% would be prevented from going blind within a year of treatment and 34% within 10 years of treatment. Concluded that it is effective to screen and treat early DR; however, there is only a small portion of screened patients who would benefit. Recommend increasing efficiency of screening programs by making sure high-risk patients are screened more often, and making sure low-risk patients/patients with negative test results are screened less often — eg by increasing the interval between screenings. However, this may mean that treatable cases are missed and different intervals may be confusing for patients and difficult for health care professionals to administrate.	
3047	Puent et al 2005	Prospective cohort	Diabetic population in Ohio, selected from 82 optometric practices. Charts reviewed over 10 years	Adherence to guidelines	NA	1497	NA	Examines how well optometrists adhere to guidelines for eye examinations in diabetic patients, rather than tests the optimal frequency of eye tests. Age not taken into account. Mentions that US Dept of Health and Human Services' 'Healthy Vision 2010' initiative has a goal of increasing the % of diabetic patients receiving *annual* dilated eye examinations. Also, American Optometric Association (AAO) recommends *annual* dilated eye examinations for diabetic patients to prevent vision loss (based on expert clinical opinion and available research data).[a]	Off topic

Paper no.	Reference	Type of study	Population/ study information	Intervention	Comparator	*N*	Level (quality)	Results	Other notes
3054	Stefansson 2000	Review (not systematic; background paper)	Reviews background information on public health approach to DR, and the organisation and methods of screening programs	Type and organisation of screening program	None (review of information on different programs)	NA	NA (Back-ground)	States that blindness incidence and prevalence is lower in populations that have established screening programs for diabetic eye disease than in populations without established screening. Screening for diabetic eye disease is one of the most cost-effective health procedures available. Various recommendations for screening intervals: Children: DR is generally not seen before puberty, therefore there is no regular screening of young children who are diabetic. American Academy of Ophthalmology (AAO) recommends regular screening from 10 years. American Diabetic Association (ADA) recommends starting screening from 12 years in people with diabetes for > 5years. European Retinopathy Working Party (RWP) recommends regular screening only at puberty. In Iceland, regular screening not started until 12 years (easier to use an age limit rather than the more variable onset of puberty). Type 1 diabetes: American College of Physicians, ADA and AAO recommend all people with type I are examined annually (and type II examined at diagnosis, 4 years later if no DR is detected, and annually after that). This may fail to detect onset of DR because the 4-year interval is too long. RWP has more appropriate guidelines: examine at diagnosis then at least biannually/annually if DR appears (DR usually takes 2 years to progress from nonsight-threatening to sight-threatening). Paper also gives some intervals for photographic screening programs.	

Summary	Evidence
Regular eye tests appear to be effective for decreasing the incidence of diabetic retinopathy in high-risk patients (although it is not clear how frequent such tests should be), but there appears to be less benefit to frequent screening of low-risk patients or those with negative test results.	Large review from general practitioner-based diabetic population in UK (Level 1)

Summary table 222 — nutritional supplements and cataract

Paper no.	Reference	Type of study	Population/ study information	Intervention	Comparator	*N*	Level (quality)	Results	Other notes
2781	West et al 2006	Systematic review of nutrient supplement use for eye diseases (6 RCTs and many large observational studies included for cataract)	Studies included: Age-Related Eye Disease Study (RCT) Womens Health Study (RCT) Linxian Study (RCT) Blue Mountains Study (cross-sectional) Beaver Dam Study Physicians Health Study Nurses Health Study and Health Professionals Follow-up Study + Others	Multivitamin /antioxidant (diet or supplements	Less vitamin/ antioxidants, or no supplements	NA	I (Good)	Consumption of multivitamins; vitamins E, C and β-carotene; vitamin E alone; vitamin C alone; carotenoids) was not shown to reduce the risk of cataracts. Supplements with riboflavin and niacin were associated with decreased numbers of cataracts (see also review of Huang et al below).	This paper includes a very well set out and detailed summary table of all studies with different supplement combinations

Paper no.	Reference	Type of study	Population/ study information	Intervention	Comparator	*N*	Level (quality)	Results	Other notes
2757	Huang et al 2006	Systematic review of nutritional supplement use (total of 20 RCTs) included 4 RCTs that studied cataract	General community-based population with no special nutritional needs	Nutritional supplements (several multivitamin and mineral combinations)	Placebo	total of approx 4000 per group	I (Good)	The largest RCT (the Age-Related Eye Disease Study, with 2300 participants per group) showed no significant effect of any multivitamin supplements on any form of cataract development (nuclear, cortical, posterior subcapsular, cataract surgery, severe lens events, loss of visual acuity score). The second largest study (Linxian Physicians Health Study [China] with approximately 1600 people per group) showed no significant effect for any supplements on cortical cataracts, but riboflavin + niacin showed a decrease in nuclear cataracts (but only in 65–74-year-olds), and an increase in posterior subcapsular cataracts (although the latter were very rare events and the increase not statistically significant). The other two, smaller studies showed some conflicting results. Skin yellowing was reported more frequently in the groups taking antioxidants than in the placebo groups.	

Paper no.	Reference	Type of study	Population/ study information	Intervention	Comparator	*N*	Level (quality)	Results	Other notes
1515	Seddon 2007	Review (6 randomised controlled trials, 8 prospective cohorts, 3 case–control)	General population	Nutritional supplements	Placebo or no supplements	NA	II (RCTs)	As noted above, the largest RCT of eye disease (the Age-Related Eye Disease Study), showed no statistically significant effect on prevalence of any types of cataract or cataract indicators from taking nutrient supplements containing vitamins C, E, and β-carotene, and zinc with cupric oxide. Other RCTs and observational studies showed mixed results; some cohort studies (including the Beaver Dam Study showed some benefit for taking vitamin C, E or multivitamins. especially for longer use (> 10 years).	Review was not systematic (poor quality). Level assigned on basis of individual studies.
2752	Chiu and Taylor 2007	Review (7 randomised controlled trials, 13 prospective cohorts)	General population	Nutritional supplements	Placebo or no supplements	NA	II (RCTs)	Includes AREDS and Linxian studies described above. Other studies showed inconsistent results for vitamin C and E and carotenoid intake. Some positive effects found in the observational studies. (Although this review does not present proper systematic review methods, it is does provide a very detailed analysis of the studies included with outcomes analysed for a wide range of vitamin combinations.)	Review was not systematic (poor quality). Level assigned on basis of individual studies

Paper no.	Reference	Type of study	Population/ study information	Intervention	Comparator	*N*	Level (quality)	Results	Other notes
2749	Bartlett and Eperjesi 2004	Systematic review (RCTs + observational studies)	General population	Nutritional supplements	Placebo or no supplements	NA	I (Adequate)	The effects of vitamin A and C supplementation showed mixed results, with vitamin C shown by many studies to give a decreased risk of nuclear cataract, but a higher risk of cortical cataract, with some studies showing no link at all. Vitamin E supplementation results were also mixed, with positive effects only being shown when high (potentially toxic) doses were given.	
2767	Meyer 2005	Systematic review (no details given of the studies used)	General population	Nutritional supplements	No/less supplements	NA	NA (Poor)	Studies looking at the effect of retinol, zinc or vitamin C supplementation on cataract formation showed mixed results, with some reporting lower cataract, others reporting higher risks and some reporting no significant effect either way.	
1518	Trumbo and Ellwood 2006	Systematic review (12 RCTs, 23 prospective cohort)	General population	Nutritional supplements	Placebo or no/less supplements	NA	NA (Poor)	None of the studies found any link between lutein or zeaxanthin intake and cataract risk.	
2773	Williams 2006	Systematic review (not detailed clearly — mix of epidemiological studies and animal studies)	General population	Nutritional supplements	No/less supplements	NA	NA (Poor)	Mixed results were found for the effects of vitamin E, vitamin C and carotenoid supplements in animal models and human studies.	

Summary	Group
Major studies show no association between vitamins E, C and β-carotene; vitamin E alone; vitamin C alone; or carotenoid supplements and the risk of any type of cataract development. One RCT from China and a number of observational studies have shown a reduction in all types of cataracts after multivitamin use or supplements with riboflavin and niacin. NB: Adverse effects of supplements need to be taken into account (eg β-carotene has been shown to increase risk of lung cancer in smokers; vitamin E has increased heart disease in people with vascular disease or diabetes.	*Group 1* — Clear association/causality *Group 2* — Possible association/causality (more research needed) *Group 3* — Lack of association/causality *Group 4* — Possible lack of association/causality (more research needed) (**vitamins C, E, carotenoids**) *Group 5* — Conflicting results *Group 6* — Possible protection (**multivitamins, riboflavin + niacin**) *Group 7* — No studies

Summary table 224 — nutritional supplements and glaucoma

Paper no.	Reference	Type of study	Population/ study information	Intervention	Comparator	*N*	Level (quality)	Results	Other notes
2781	West et al 2006	Systematic review of nutrient supplement use for eye diseases (many included studies but only 1 prospective cohort with glaucoma outcomes)	Nurses Health Study and Health Professionals Follow-up Study (US)	Antioxidant consumption t (diet /supplement)	Fewer antioxidants	NA	Good quality review II (LPS)	Increased consumption of antioxidants, whether through diet or supplement, was not shown to reduce the risk of glaucoma.	
2749	Bartlett and Eperjesi 2004	Systematic review (RCTs and observational studies)	General population	Nutritional supplements	No supplements	NA	I (Adequate)		

Summary	Group
Supplements (in the form of antioxidants) do not significantly reduce the risk of glaucoma.	*Group 1* — Clear association/causality *Group 2* — Possible association/causality (more research needed) *Group 3* — Lack of association/causality *Group 4* — Possible lack of association/causality (more research needed) *Group 5* — Conflicting results *Group 6* — Possible protection *Group 7* — No studies

Summary table 226 — nutritional supplements and macular degeneration

Paper no.	Reference	Type of study	Population/ study information	Intervention	Comparator	*N*	Level (quality)	Results	Other notes
2796	Evans 2006	Systematic review (Cochrane review) (8 RCTs)	Includes Age-Related Eye Disease Study (AREDS) and others	Nutritional supplements	Placebo/no supplements	NA	I (Good)	Supplementation with antioxidants and zinc may give a small but significant benefit to patients with AMD (OR 0.77; 99%CI 0.58 to 1.03). There was an increased risk of genitourinary problems in patients taking the supplements. Authors also note that other adverse effects of supplements should be taken into account (eg β-carotene has been shown to increase risk of lung cancer in smokers; vitamin E has increased the risk of heart disease in people with vascular disease or diabetes.	
2781	West et al 2006	Systematic review of nutrient supplement use for eye diseases (2 RCTs and several large cohort studies included for cataract)	Age-Related Eye Disease Study (AREDS) (RCT) Blue Mountains Study (cross-sectional) and others	Multivitamin/antioxidant (diet or supplements)	Fewer vitamins/ antioxidants	NA	I (Adequate)	Some positive endpoints were reports for AMD with consumption of vitamins E + C + β-carotene, the results were not adequate to draw a firm conclusion (see also review of Huang et al below).	This paper includes a very well set out and detailed summary table of all studies with different supplement combinations

Paper no.	Reference	Type of study	Population/ study information	Intervention	Comparator	*N*	Level (quality)	Results	Other notes
2752	Chiu and Taylor 2001	Systematic review (7 RCTs, 13 prospective cohort)	General population	Nutritional supplements	NA	NA	I (Adequate)	Studies investigating the effect of vitamins A, C, B and E on AMD gave mixed results, with some finding a positive effect, some negative and some no significant effect.	
2757	Huang 2006	Systematic review of nutritional supplement use (included 1 RCT that studied AMD)	Age-Related Eye Disease Study (AREDS) [RCT]				NA	Not analysed further as only includes RCTs and Cochrane review is more recent.	
2788	Bartlett and Eperjesi 2003	Systematic review (7 RCTs)					NA	Not analysed further as only includes RCTs and Cochrane review is more recent.	
2806	Mares-Perlamn et al 2002	Systematic review					NA	Not analysed further as only includes RCTs and Cochrane review is more recent.	
3405	Evans and Henshaw 1999	Systematic review (3 RCTs)					NA	Not analysed further as only includes RCTs and Cochrane review is more recent.	
3407	Evans 1999	Systematic review (2 RCTs)	General population	Ginkgo	Placebo or lower dose	RCT1: 10/group RCT2: 50/group	I (Good)	Not analysed further (treatment).	Off topic (treatment study)

Summary	Group
It is not clear whether supplements (vitamins, antioxidants, lutein, zeaxanthin and zinc) have a positive, negative or no effect on macular degeneration. Other adverse effects of supplements should be taken into account (eg β-carotene has been shown to increase risk of lung cancer in smokers; vitamin E has increased heart disease in people with vascular disease or diabetes.	*Group 1* — Clear association/causality *Group 2* — Possible association/causality (more research needed) *Group 3* — Lack of association/causality *Group 4* — Possible lack of association/causality (more research needed) *Group 5* — Conflicting results *Group 6* — Possible protection *Group 7* — No studies

Summary table 227 — nutritional supplements and retinitis pigmentosa

Paper no.	Reference	Type of study	Population/ study information	Intervention	Comparator	*N*	Level (quality)	Results	Other notes
2741	Hoffman and Birch 1998	Systematic review (does not detail the studies used)		Nutritional supplements	NA	NA	NA (Poor)	Patients with retinitis pigmentosa (RP) had lower omega 3 levels than the control subjects.	
2738	Berson et al 2004	RCT	Patients aged 18–55 years were evaluated over a 4-year period. The trial was randomised, controlled and double-blind. All patients were given vitamin A supplements.	DHA (an omega 3 fatty acid)	Placebo	221	II	No significant differences in decline in ocular function were found between the DHA group and the control group.	
2737	Aleman et al 2001	Case–control	Patients diagnosed with RP or Usher syndrome were compared with normal subjects given lutein supplements.	RP or Usher patients + nutritional supplements	Normal subjects + nutritional supplements	47 RP, 11 Usher, 27 normal	III-2	Macular pigment (MP — thought to be a protective factor against RP), was similar across all patients. Only 50% of patients treated with lutein showed a significant increase in MP. Only a third of the normal subjects showed an increase in MP after lutein supplements. Foveal sensitivity did not change after supplementing.	
2740	Dagnelie et al 2000	Case series	Participants with RP or other retinal degradations. Visual acuity was measured by a self-run computer test and wall chart test.	26-week course of lutein supplements	NA	13 RP, 3 other retinal degradation	NA	Mean visual acuity began to improve 2 to 4 weeks after the treatment began and plateaued at 6–14 weeks. Blue-eyed participants showed the strongest gains in visual acuity.	

Paper no.	Reference	Type of study	Population/ study information	Intervention	Comparator	*N*	Level (quality)	Results	Other notes
2743	Sibulesky 1999	Prospective cohort	Adults age 18–55 years with RP were supplemented with a high dose of vitamin A for ≤12y and compared with a group given a trace amount of vitamin A	Nutritional supplements	Patients on trace dosage of vitamin A	146 high dose, 149 trace dose	NA (off topic)	Patients given the higher dose showed an 8% increase in mean serum retinol at 5 years and 18% at 12 years. No toxicity signs were visible.	Does not mention effect on visual acuity.

Summary	Group
It is not clear whether lutein supplements are beneficial in retinitis pigmentosa. DHA (omega 3) supplements do not appear to be beneficial.	*Group 1* — Clear association/causality *Group 2* — Possible association/causality (more research needed) *Group 3* — Lack of association/causality *Group 4* — Possible lack of association/causality (more research needed) *Group 5* — Conflicting results *Group 6* — Possible protection *Group 7* — No studies

Summary table 229 — use of contact lenses and incidence of eye infections in the general population

Paper no.	Reference	Type of study	Population/ study information	Risk factor	Comparator	*N*	Level (quality)	Results	Other notes
2931	Hammersmith 2006	General review (international papers since 1998)	People with *Acanthamoeba* infections/ contact lens (CL) wearers	CL wear	No CLs	NA	NA (general review)	Contact lenses are a major risk factor for *Acanthamoeba* infections (in one study, contact lens wear was reported in 80–86% of cases). Silicone hydrogel lenses may have the greatest risk because they are increasingly prescribed and may be more 'sticky' to *Acanthamoeba.* Lowest risk soft contact lenses are daily disposables because have least amount of handling (in cases where infection was reported for daily disposables, other risk factors may have contributed — eg noncompliance with disinfection, swimming). Incidence of *Acanthamoeba* keratitis in hard lenses is 9.5 times that of soft (increasing because of the use of hard lenses for orthokeratology). Additional risk factors for 40–91% of contact lens wearers include swimming with lenses, irregular/inadequate disinfection, cleaning lens cases with tap water, minor corneal trauma, and exposure to contaminated water. For noncontact lens wearers, the diagnosis of *Acanthamoeba* keratitis is longer and more difficult, and less expected; therefore, the delay produces worse visual outcomes. Lists a number of major reviews on contact lens-associated *Acanthamoeba* keratitis: Schaumberg et al 1998, Lindquist 1998, Illingworth and Cook 1998 (see paper #2391 for details).	Orthokeratology is wearing CLs overnight for the correction of myopia

Paper no.	Reference	Type of study	Population/ study information	Risk factor	Comparator	*N*	Level (quality)	Results	Other notes
2902	Butler 2005	Case series	6-year review of *Acanthamoeba* keratitis (AK) in New South Wales (1997–2002) (retrospective review of all cases of AK from Sydney Eye Hospital)	Levels of contact lens wear	None	20	NA	Of the cases, 80% (*n* = 16) wore contact lenses (CLs); of these, 81% (13) wore soft lenses. 40% (*n* = 8) had additional risk factors (contact of CL/case with tap water, corneal abrasion, continuous wear, inappropriate cleaning solutions). AK is rare, but CL wear is the most significant risk factor. Delay in diagnosis and non-CL wearers have an increased risk of recurrent infection. Study notes that there are few large clinical series of AK in the literature (and the ones that exist are from UK). In a prospective UK study, the incidence of AK was 17.53–21.14/million CL wearers (compared with 1.13–1.26/million adults). Summarises data showing how the series in this paper compares with 2 others from the UK (numbers of CL-wearer AK cases for all 3 studies were 80% [*n* = 16], 97% [*n* = 102], 89% [*n* = 64]). Need more education about importance of disinfection, especially CL cases.	

Summary	Group
Contact lens wear appears to be a significant risk factor for acanthomoebic keratitis.	*Group 1* — Clear association/causality *Group 2* — Possible association/causality (more research needed) *Group 3* — Lack of association/causality *Group 4* — Possible lack of association/causality (more research needed) *Group 5* — Conflicting results *Group 6* — Possible protection *Group 7* — No studies

Summary table 230 — effect of education on the use and misuse of contact lenses and the incidence of eye infections

Paper no.	Reference	Type of study	Population/ study information	Intervention	Comparator	*N*	Level (quality)	Results	Other notes
2817	Claydon 1997	Randomised controlled, double-blinded trial	Experienced contact lens (CL) wearers in UK (17–55 years both sexes); assessment period of 12 months	Received educational package on lens care	Not given educational package	80 (only 72 completed study)	II	Education strategy included video, booklets, posters, checklist and a health care contract. Strategy had little significant effect on compliance levels (Mann Whitney U tests). This might have been because the assessment of noncompliance was not sensitive enough to detect small changes, or because the groups were overall very compliant anyway.	Does not assess incidence of infection; only looks at education and compliance
2823	Foulks 2006	Review (background only; not systematic)	Literature review of Ovid MEDLINE from 1966–2005. Gives keywords used, but does not give details of studies included (47 references listed in ref list).	None (just summarises current levels of safety and efficacy of CL use)	None	NA	NA (Poor)	Patient and health care practitioner participation in managing CL use is crucial for safety (proper use and care) in extended-wear contact lenses. Describes the risks associated with CL wear (highlighting the two most important categories: extended wear and unsupervised wear). However, does not examine incidence of eye infections.	Background

Summary	Group
One RCT showed that education did not significantly increase compliance with correct contact lens use in lens users; however, no studies looked specifically at incidence of eye infections.	NA

Summary table 231 — do infection control measures reduce the incidence of eye disease?

Paper no.	Reference	Type of study	Population/ study information	Risk factor	Comparator	*N*	Level (quality)	Results	Other notes
3402	Rabiu et al 2005	Systematic review (Cochrane review) — 3 RCTs/quasi-RCTs	Villagers in Mali and Gambia	Antibiotics, health education & insecticide sprays for reduction of trachoma	No interventions	Approx 10 000	I (Good)	Two studies that assessed insecticide spray as a control measure found that trachoma is reduced by at least 55% to 61% with this measure compared to no intervention. One study found that another control measure, latrine provision, reduced trachoma by 29.5% compared with no intervention, but the reduction was not statistically significant. In another study, health education on personal and household hygiene reduced the incidence of trachoma such that the odds of reducing trachoma in the health education village were about twice that of the no intervention village. All the studies have some methodological concerns relating to concealment of allocation and nonconsideration of clustering effect in data analysis.	
3403	Ejere et al 2004	Systematic review (Cochrane review) — 2 RCTs/quasi-RCTs	Participants from Kongwa, Tanzania, and the Northern Territory, Australia	Face washing + topical antibiotic for reduction of trachoma	No face washing	2560 children with active trachoma	I (Good)	Overall face washing combined with tetracycline treatment reduced trachoma compared to topical tetracycline alone at 12 months follow-up in villages in Tanzania. This effect was statistically significant for reducing 'severe' trachoma (OR 0.62, CI 0.40 to 0.97) but not for 'nonsevere' trachoma (OR 0.81, CI 0.42 to 1.59). The number of clean faces was consistently higher in villages where face washing was combined with tetracycline treatment. The trial of aboriginal children in the Northern Territory found no statistically significant benefit of eye washing alone or in combination with tetracycline drops in reducing active trachoma.	

Summary	Group
In the case of trachoma, there is conflicting evidence as to whether infection control methods, such as insecticide sprays, antibiotics, health education and face washing reduce the incidence of the disease.	NA

Summary table 233 — obesity and hyperopia

Paper no.	Reference	Type of study	Population/ study information	Risk factor	Comparator	*N*	Quality	Results	Other notes
3394	Saw et al 2002	Cross-sectional	Singapore Chinese children	Height, weight and body mass index (BMI)	Height, weight and BMI	1449	IV	Heavier and more obese children had refractions that were more hyperopic ($P = 0.01$, $P = 0.08$) after analyses controlling for age, parental myopia, reading and school.	

Summary	Group
Obesity may be a risk factor for hyperopia, although more research is required in this area.	*Group 1* — Clear association/causality *Group 2* — Possible association/causality (more research needed) *Group 3* — Lack of association/causality *Group 4* — Possible lack of association/causality (more research needed) *Group 5* — Conflicting results *Group 6* — Possible protection *Group 7* — No studies

Summary table 240 — diet and myopia

Paper no.	Reference	Type of study	Population/ study information	Risk factor	Comparator	*N*	Level (quality)	Results	Other notes
3393	Cordain et al 2002	General review					NA	Cordain et al take an evolutionary perspective and propose that chronic hyperinsulinaemia, resulting from consumption of high glycaemic carbohydrates, has a key role in the pathogenesis of juvenile-onset myopia. They cite studies demonstrating increased myopia in people with type II diabetes and propose that the higher prevalence of myopia in Asian populations is due to increased genetic susceptibility to insulin resistance.	Background

Summary	Group
The link between a high glycaemic diet and myopia remains a theory but would be an interesting area for future research.	*Group 1* — Clear association/causality *Group 2* — Possible association/causality (more research needed) *Group 3* — Lack of association/causality *Group 4* — Possible lack of association/causality (more research needed) *Group 5* — Conflicting results *Group 6* — Possible protection *Group 7* — No studies

Summary table 244 — obesity and cataract

Paper no.	Reference	Type of study	Population/ study information	Risk factor	Comparator	*N*	Level (quality)	Results	Other notes
1532	Schaumberg et al 2000	Prospective cohort	Physicians' Health Study (male US physicians aged 40–84 years in 1982)	Higher body mass index (BMI), height, waist-to-hip ratio (WHR)	Lower BMI, height or WHR	17,150	II (LPS)	Body mass index (RR 1.25 for BMI of ≥ 27.8 compared with < 22) height (RR 1.23 for ≥ 184 cm compared with ≤ 170 cm) and WHR (RR 1.31 for WHR of ≥ 0.986 compared with < 0.897) were each independently associated with incident cataract. Therefore, men who are very tall or obese (measured either by BMI or WHR, which focuses on abdominal obesity) may be at greater risk of cataract.	
3096	Weintraub et al 2002	Prospective cohort	Nurses' Health Study and Health Professionals Follow-up Study (people aged ≥ 45 years without diagnosed cataract at baseline)	BMI ≥ 30	BMI < 23	87,682 women and 45,549 men	II (LPS)	After adjustment for established risk factors such as age and smoking, participants with a BMI ≥ 30 were at a greater risk of developing cataract than those with a BMI < 23 (RR 95%CI 1.23 to 1.49). The association was strongest for posterior subcapsular cataract, even when adjusted for diabetes (RR 1.68; 95%CI 1.30 to 2.17). Obesity was not significantly associated with nuclear cataract. Obesity increases the risk of developing cataract overall, and PSC cataract in particular.	

Summary	Group
Although causality has not been established, these studies suggest that obesity is associated with an increased risk of cataract, especially posterior subcapsular cataract.	*Group 1* — clear evidence of causality *Group 2* — possible causality (more research needed) *Group 3* — clear evidence of no causality *Group 4* — possible lack of causality (more research needed) *Group 5* — conflicting results *Group 6* — possible protective effect *Group 7* — no studies

Summary table 246 — obesity and diabetic retinopathy

Paper no.	Reference	Type of study	Population/ study information	Risk factor	Comparator	*N*	Level (quality)	Results	Other notes
2002	van Leiden 2003	Prospective cohort	The Hoorn Study (both people with and without diabetes, aged 50–74 years, 10-year follow-up)	Higher body mass index (BMI), high waist-to-hip ratio (WHR) in normal and abnormal glucose metabolism people	Lower BMI/WHR	233	II	Those with a WHR between 0.957 and 1.133 were at a greater risk of developing retinopathy than those with a WHR of 0.5829 and 0.8772. In contrast, there was no consistent or statistically significant association between BMI and the risk of developing retinopathy ($P > 0.05$). This means that abdominal obesity is a better measure of retinopathy risk than general obesity. The authors note that this conclusion was supported by previous studies of retinopathy, and recommend that screening and management of abdominal obesity should be conducted on those who are at risk of developing this condition.	

Summary	Group
Abdominal obesity appears to be a risk factor for retinopathy in people with and without diabetes; however, body mass index is not.	*Group 1* — Clear association/causality *Group 2* — Possible association/causality (more research needed) *Group 3* — Lack of association/causality *Group 4* — Possible lack of association/causality (more research needed) *Group 5* — Conflicting results *Group 6* — Possible protection *Group 7* — No studies

Summary table 247 — obesity and glaucoma

Paper no.	Reference	Type of study	Population/ study information	Risk factor	Comparator	*N*	Level (quality)	Results	Other notes
1980	Gasser et al 1999	Case–control	People with or without glaucoma	Body mass index (BMI)	People without glaucoma	288 controls; 186 patients	III-3	There was no statistical difference in BMI between patients with glaucoma and control subjects.	Extracted from abstract

Summary	Group
Glaucoma does not appear to be a risk factor for glaucoma, although more research is required in this area.	*Group 1* — Clear association/causality *Group 2* — Possible association/causality (more research needed) *Group 3* — Lack of association/causality *Group 4* — Possible lack of association/causality (more research needed) *Group 5* — Conflicting results *Group 6* — Possible protection *Group 7* — No studies

Summary table 248 — obesity and macular degeneration

Paper no.	Reference	Type of study	Population/ study information	Risk factor	Comparator	*N*	Level (quality)	Results	Other notes
3108	Schaumberg 2001	Prospective cohort	Physicians' Health Study (male physicians 40–84 years, follow-up mean 14.5 years)	Obesity (measured by BMI). Four groups: Lean (BMI < 22) normal (22–24.9), overweight (25–29.9), obese (> 30)	See 4 groups	21,071	II (LPS)	Incidence of ARM was lowest in men with normal BMI, after adjustment for age, smoking and aspirin and beta-carotene supplementation. Obesity was a risk factor for visually significant ARM in males (especially dry ARM) but lean people also had an increased risk, indicating a J-shaped relationship. BMI was not significantly related to neovascular ARM; however, there were only a small number of cases, which may have affected this finding. Relative risks (95%CIs) compared with normal BMI: Lean: 1.43 (1.01 to 2.04) Overweight: 1.24 (0.93 to 1.66) Obese: 2.15 (1.3 to 3.45)	The Physician's Health Study was a randomised trial of aspirin and beta-carotene for prevention of cardiovascular disease and cancer
1538	Seddon 2003	Prospective cohort	Elderly population (≥ 60 years); hospital-based retina practice; all had some signs of nonadvanced AMD and visual acuity of 20/200 or better in at least 1 eye at baseline. Follow-up of 4.6 years	Obesity (measured using BMI, waist circumference and waist-to-hip ratio — WHR)	BMI, waist circumference, WHR	261	II	After controlling for other risk factors, patients with a BMI between 25 and 29 (RR 2.32; 95%CI 1.32 to 4.07) and BMI ≥ 30 (RR 2.35; 95%CI 1.27 to 4.34) were at an increased risk of progression to advanced forms of AMD, compared with those with a BMI < 25. Higher WHR was also associated with an increased risk of progression to advanced ARM (RR 1.85; 95%CI 1.07 to 3.15 for the highest tertile compared to the lowest tertile). In summary, overall obesity and abdominal obesity were risk factors for increased progression to advanced forms of AMD.	

Summary	Group
High BMI is a risk factor for visually significant AMD (but possibly not neovascular) in males and in all elderly people; however, a lower than average BMI is also associated with increased risk of visually significant ARM indicating a J-shaped relationship. A BMI and WHR within the normal range offer the lowest risk of ARM.	*Group 1* — Clear association/causality *Group 2* — Possible association/causality (more research needed) *Group 3* — Lack of association/causality *Group 4* — Possible lack of association/causality (more research needed) *Group 5* — Conflicting results *Group 6* — Possible protection *Group 7* — No studies