

## VIII. Visual and Auditory Examinations

### 1) Visual system

#### 1. Refraction

Spherical Equivalent of Refractive Error (diopters)

#### 2. Visual acuity (5 m)

Presenting Visual Acuity

Best-corrected Visual Acuity

#### 3. Contrast sensitivity

Contrast Sensitivity at 1.5, 3, 6, 12, 18 cycles per degree

#### 4. Intraocular pressure (mmHg)

#### 5. Quantitative test of lens opacity

Anterior Cortex Opacification (scattering intensity)

Anterior Nuclear Opacification (scattering intensity)

#### 6. Retinal fundus camera

Cup-Disc Ratio of Optic Disc

Diabetic Retinopathy

Arteriosclerosis (Keith-Wagener)

Macular Degeneration

#### 7. Specular microscope

Corneal thickness (mm)

Endothelial cell density of cornea (cells/mm<sup>2</sup>)

## 2) Auditory system

### 1. Pure-tone audiometry

Air conduction thresholds at 125,250,500,1000,2000,4000,8000Hz(dBHL)

Bone conduction thresholds at 250,500,1000,2000,4000Hz(dBHL)

Pure-tone audiometry (Audiometer RION AA-73A)

※ If no response occurs at the maximum output level of this audiometer, the threshold is treated as following.

	Air conduction		Bone conduction	
	Maximum output level	Inputed level	Maximum output level	Inputed level
125Hz	70	75	-	-
250Hz	85	90	55	60
500Hz	100	105	65	70
1000Hz	100	105	70	75
2000Hz	100	105	70	75
4000Hz	100	105	60	65
8000Hz	95	100	-	-

### 2. Impedance audiometry

#### (1) Single frequency tympanometry

Tympanometric peak pressure in the single frequency tympanogram at 226Hz(daPa)

Static compliance in the single frequency tympanogram at 226Hz(ml)

#### (2) Multifrequency tympanometry

Middle ear resonance frequency(Hz)

### 3. Distortion product otoacoustic emission (DPOAE)

Signal-to-noise differences of the DPOAEs in the DP-gram (= DP amplitude above the noise floor) (dB SPL)

1. Refraction

Autorefracton was obtained with the NIDEK-ARK700A.  
 Refractive errors, in spherical equivalent, were assessed.

Spherical Equivalent of Refractive Error - Right Eye (Diopters)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	-1.54	1.45	272	-1.19	1.39	292	-0.31	1.21	282	-0.15	1.04	264	-0.47	0.79	15	-0.80	1.40	1125
Female	-1.37	1.42	260	-0.93	1.50	284	-0.12	1.36	264	-0.02	1.19	251	-0.86	1.05	20	-0.62	1.48	1079
Total	-1.46	1.43	532	-1.06	1.45	576	-0.22	1.29	546	-0.09	1.11	515	-0.69	0.95	35	-0.71	1.44	2204

Spherical Equivalent of Refractive Error - Left Eye (Diopters)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	-1.51	1.40	272	-1.12	1.35	289	-0.23	1.10	286	-0.05	0.99	261	-0.54	1.42	16	-0.73	1.37	1124
Female	-1.35	1.39	261	-0.95	1.55	283	-0.09	1.36	266	-0.01	1.14	250	-1.13	0.87	20	-0.62	1.48	1080
Total	-1.43	1.40	533	-1.04	1.46	572	-0.16	1.23	552	-0.03	1.07	511	-0.87	1.16	36	-0.68	1.42	2204

2. Visual acuity: distant vision (5 m)

Distant visual acuity was measured for each eye with a Landolt C letter at 5m. Presenting visual acuity was measured with the participant's current distance correction; when distance correction was not used, the unaided distant visual acuity was measured. Subsequently, best-corrected visual acuity for each eye was determined after objective autorefraction and subjective refinement.

Presenting Visual Acuity - Right Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80yr-		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	-	0.0	1	0.3	-	0.0	1	0.4	-	0.0	2	0.2
	Female	1	0.4	-	0.0	-	0.0	-	0.0	-	0.0	1	0.1
	Total	1	0.2	1	0.2	-	0.0	1	0.2	-	0.0	3	0.1
0.3 or worse	Male	6	2.2	10	3.4	16	5.5	16	5.8	4	23.5	52	4.5
	Female	6	2.3	10	3.5	12	4.4	32	11.9	6	27.3	66	6.0
	Total	12	2.2	20	3.4	28	5.0	48	8.8	10	25.6	118	5.2
0.3-0.6	Male	38	13.9	34	11.5	41	14.1	76	27.6	5	29.4	194	16.8
	Female	28	10.7	46	16.2	85	31.4	95	35.3	6	27.3	260	23.5
	Total	66	12.4	80	13.8	126	22.4	171	31.4	11	28.2	454	20.1
0.7 or better	Male	229	83.9	251	84.8	234	80.4	182	66.2	8	47.1	904	78.5
	Female	226	86.6	228	80.3	174	64.2	142	52.8	10	45.5	780	70.5
	Total	455	85.2	479	82.6	408	72.6	324	59.6	18	46.2	1684	74.5

Presenting Visual Acuity - Left Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80yr-		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	-	0.0	2	0.7	-	0.0	-	0.0	-	0.0	2	0.2
	Female	1	0.4	-	0.0	-	0.0	-	0.0	-	0.0	1	0.1
	Total	1	0.2	2	0.3	-	0.0	-	0.0	-	0.0	3	0.1
0.3 or worse	Male	6	2.2	8	2.7	6	2.1	17	6.2	1	5.9	38	3.3
	Female	9	3.4	15	5.3	12	4.4	27	10.0	8	36.4	71	6.4
	Total	15	2.8	23	4.0	18	3.2	44	8.1	9	23.1	109	4.8
0.3-0.6	Male	27	9.9	32	10.8	58	19.9	81	29.5	5	29.4	203	17.6
	Female	27	10.3	38	13.4	74	27.3	103	38.3	4	18.2	246	22.2
	Total	54	10.1	70	12.1	132	23.5	184	33.8	9	23.1	449	19.9
0.7 or better	Male	240	87.9	254	85.8	227	78.0	177	64.4	11	64.7	909	78.9
	Female	224	85.8	231	81.3	185	68.3	139	51.7	10	45.5	789	71.3
	Total	464	86.9	485	83.6	412	73.3	316	58.1	21	53.8	1698	75.2

Best-corrected Visual Acuity - Right Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80yr-		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	-	0.0	2	0.7	-	0.0	2	0.7	-	0.0	4	0.3
	Female	-	0.0	-	0.0	-	0.0	1	0.4	-	0.0	1	0.1
	Total	-	0.0	2	0.3	-	0.0	3	0.6	-	0.0	5	0.2
0.3 or worse	Male	2	0.7	3	1.0	6	2.1	3	1.1	2	11.8	16	1.4
	Female	1	0.4	-	0.0	3	1.1	15	5.6	2	9.1	21	1.9
	Total	3	0.6	3	0.5	9	1.6	18	3.3	4	10.3	37	1.6
0.3-0.6	Male	6	2.2	6	2.0	21	7.2	51	18.5	1	5.9	85	7.4
	Female	2	0.8	7	2.5	29	10.7	68	25.3	4	18.2	110	9.9
	Total	8	1.5	13	2.2	50	8.9	119	21.9	5	12.8	195	8.6
0.7 or better	Male	265	97.1	285	96.3	264	90.7	219	79.6	14	82.4	1047	90.9
	Female	258	98.9	277	97.5	239	88.2	185	68.8	16	72.7	975	88.1
	Total	523	97.9	562	96.9	503	89.5	404	74.3	30	76.9	2022	89.5

Best-corrected Visual Acuity - Left Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80yr-		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	-	0.0	3	1.0	-	0.0	1	0.4	-	0.0	4	0.3
	Female	-	0.0	-	0.0	-	0.0	2	0.7	-	0.0	2	0.2
	Total	-	0.0	3	0.5	-	0.0	3	0.6	-	0.0	6	0.3
0.3 or worse	Male	-	0.0	2	0.7	4	1.4	11	4.0	-	0.0	17	1.5
	Female	1	0.4	-	0.0	4	1.5	8	3.0	3	13.6	16	1.4
	Total	1	0.2	2	0.3	8	1.4	19	3.5	3	7.7	33	1.5
0.3-0.6	Male	2	0.7	8	2.7	25	8.6	54	19.6	2	11.8	91	7.9
	Female	3	1.1	15	5.3	26	9.6	65	24.2	6	27.3	115	10.4
	Total	5	0.9	23	4.0	51	9.1	119	21.9	8	20.5	206	9.1
0.7 or better	Male	271	99.3	283	95.6	262	90.0	209	76.0	15	88.2	1040	90.3
	Female	257	98.5	269	94.7	241	88.9	194	72.1	13	59.1	974	88.0
	Total	528	98.9	552	95.2	503	89.5	403	74.1	28	71.8	2014	89.2

3. Contrast sensitivity

Contrast sensitivity was measured at 1.5, 3, 6, 12, 18 cycles per degree with Vistech VCTS-6500.

Contrast Sensitivity at 1.5 cycles/degree

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	50.4	25.5	272	41.6	19.2	293	37.2	17.0	287	32.4	15.9	273	26.9	13.3	16	40.2	20.7	1141
Female	44.2	21.0	260	38.1	17.5	284	33.5	16.0	269	28.8	14.1	257	26.3	12.2	20	36.0	18.2	1090
Total	47.4	23.6	532	39.9	18.5	577	35.4	16.6	556	30.7	15.1	530	26.5	12.5	36	38.2	19.6	2231

Contrast Sensitivity at 3 cycles/degree

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	89.3	42.0	272	80.6	35.5	293	75.1	36.0	287	58.1	30.7	273	47.4	24.5	16	75.4	37.9	1141
Female	89.0	42.0	260	78.6	34.0	284	67.9	34.2	269	52.8	27.6	257	48.2	17.0	20	71.8	37.1	1090
Total	89.2	42.0	532	79.6	34.7	577	71.6	35.3	556	55.5	29.3	530	47.8	20.3	36	73.7	37.5	2231

Contrast Sensitivity at 6 cycles/degree

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	91.0	48.1	272	85.3	48.3	293	75.1	47.3	287	51.5	38.1	273	36.9	29.7	16	75.3	48.1	1141
Female	92.9	50.0	260	88.3	49.0	284	63.5	43.3	269	43.5	33.3	257	36.2	25.8	20	71.7	48.5	1090
Total	91.9	49.0	532	86.8	48.6	577	69.5	45.7	556	47.6	36.1	530	36.5	27.2	36	73.6	48.3	2231

Contrast Sensitivity at 12 cycles/degree

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	50.2	35.3	272	47.6	35.2	293	37.7	32.2	287	19.5	19.5	273	10.4	10.1	16	38.5	33.4	1141
Female	49.8	34.0	260	46.7	31.8	284	28.3	27.7	269	15.2	18.7	257	12.8	13.2	20	34.8	31.8	1090
Total	50.0	34.7	532	47.1	33.6	577	33.2	30.5	556	17.4	19.2	530	11.7	11.8	36	36.7	32.7	2231

Contrast Sensitivity at 18 cycles/degree

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	14.5	11.4	272	14.4	11.0	293	10.9	10.5	287	5.2	6.8	273	2.6	4.2	16	11.2	10.8	1141
Female	15.7	11.7	260	14.1	11.1	284	8.3	8.8	269	4.4	6.5	257	3.4	4.9	20	10.6	10.7	1090
Total	15.1	11.5	532	14.3	11.0	577	9.7	9.8	556	4.8	6.6	530	3.0	4.5	36	10.9	10.7	2231

#### 4. Intraocular pressure

Intraocular pressure was measured three times for each eye with a noncontact tomometer (NIDEK NT-3000) between 9 and 12 AM. The mean value of the three measurements was used for analysis.

##### Intraocular Pressure - Right Eye (mmHg)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	13.70	2.43	272	13.27	2.86	295	13.01	2.63	290	12.72	2.61	274	11.74	2.76	17	13.15	2.67	1148
Female	12.77	2.43	261	12.88	2.59	284	12.67	2.34	271	12.50	2.29	266	11.26	2.21	22	12.68	2.42	1104
Total	13.24	2.47	533	13.08	2.74	579	12.84	2.50	561	12.61	2.46	540	11.47	2.44	39	12.92	2.56	2252

##### Intraocular Pressure - Left Eye (mmHg)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	13.68	2.56	272	13.30	2.85	294	12.81	2.53	291	12.73	2.69	275	11.53	2.63	17	13.10	2.69	1149
Female	12.74	2.49	261	12.83	2.66	284	12.64	2.34	271	12.54	2.60	268	11.34	2.54	22	12.66	2.53	1106
Total	13.22	2.56	533	13.07	2.77	578	12.73	2.44	562	12.64	2.64	543	11.42	2.54	39	12.89	2.62	2255

5. Quantitative test of lens opacity

Scheimpflug images were recorded and analyzed with an anterior eye segment analysis system (NIDEK EAS-1000) version 3.05. The light scattering intensity, as an indicator of lens transparency, was evaluated from the slit images using the method of peak densitometry.

Anterior Cortex Opacification - Right Eye (scattering intensity)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	81.1	21.7	273	112.2	30.9	289	139.6	35.9	279	155.5	38.3	247	154.0	33.8	12	121.6	42.6	1100
Female	75.8	18.9	260	104.1	29.9	283	136.3	35.3	262	158.2	39.6	225	157.2	35.4	11	117.4	44.1	1041
Total	78.5	20.5	533	108.2	30.6	572	138.0	35.6	541	156.8	38.9	472	155.5	33.9	23	119.5	43.4	2141

Anterior Cortex Opacification - Left Eye (scattering intensity)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	85.3	23.7	273	116.6	33.1	287	146.2	36.1	279	163.9	40.7	245	153.8	42.0	12	127.3	44.8	1096
Female	78.2	19.4	259	108.9	30.9	282	143.4	40.8	262	166.3	40.3	228	154.5	32.4	13	123.1	47.0	1044
Total	81.8	21.9	532	112.8	32.2	569	144.8	38.4	541	165.0	40.5	473	154.2	36.5	25	125.2	46.0	2140

Anterior Nuclear Opacification - Right Eye (scattering intensity)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	47.9	9.0	270	60.6	11.4	273	77.0	20.0	244	98.3	28.9	199	104.1	17.4	8	69.1	25.7	994
Female	47.7	9.5	255	61.3	12.1	272	76.4	16.3	224	94.8	22.4	173	101.2	14.9	9	67.8	22.6	933
Total	47.8	9.2	525	60.9	11.7	545	76.7	18.3	468	96.6	26.1	372	102.6	15.7	17	68.4	24.3	1927

Anterior Nuclear Opacification - Left Eye (scattering intensity)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	48.6	8.5	259	63.2	14.6	262	78.5	19.5	223	99.6	25.6	169	116.6	29.1	7	69.9	25.2	920
Female	48.8	8.7	245	64.1	12.7	259	78.1	18.5	210	96.2	22.6	147	119.5	26.9	8	69.1	23.1	869
Total	48.7	8.6	504	63.6	13.7	521	78.3	19.0	433	98.0	24.2	316	118.1	27.0	15	69.5	24.2	1789

6. Retinal camera

Fundus photographs were taken with Topcon fundus camera (TRC-NW5S) at 20 and 45 degree angles for each eye without pupil dilatation.

Diabetic retinopathy, Arteriosclerosis, and macular degeneration were assessed on the photograph at 55 degree angles.

Vertical cup to disc ratio was measured on the photograph at 20 degree angles.

Cup-Disc Ratio of Optic Disc - Right Eye

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.37	0.12	272	0.37	0.12	289	0.38	0.12	285	0.39	0.14	260	0.32	0.10	15	0.38	0.12	1121
Female	0.35	0.11	259	0.36	0.11	282	0.37	0.13	268	0.37	0.13	250	0.37	0.15	19	0.36	0.12	1078
Total	0.36	0.12	531	0.37	0.12	571	0.38	0.13	553	0.38	0.13	510	0.35	0.13	34	0.37	0.12	2199

Cup-Disc Ratio of Optic Disc - Left Eye

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.37	0.13	272	0.37	0.13	288	0.38	0.12	287	0.39	0.13	263	0.32	0.10	16	0.38	0.13	1126
Female	0.35	0.12	260	0.36	0.11	282	0.38	0.13	269	0.37	0.13	252	0.39	0.13	19	0.37	0.12	1082
Total	0.36	0.12	532	0.37	0.12	570	0.38	0.13	556	0.38	0.13	515	0.36	0.12	35	0.37	0.13	2208

Diabetic Retinopathy - Right Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80yr-		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	-	0.0	3	1.0	1	0.3	1	0.4	-	0.0	5	0.4
	Female	-	0.0	-	0.0	-	0.0	4	1.5	-	0.0	4	0.4
	Total	-	0.0	3	0.5	1	0.2	5	0.9	-	0.0	9	0.4
nothing	Male	272	99.6	286	96.6	277	95.2	256	93.1	14	82.4	1105	95.9
	Female	259	99.2	280	98.6	263	97.0	243	90.3	17	77.3	1062	95.9
	Total	531	99.4	566	97.6	540	96.1	499	91.7	31	79.5	2167	95.9
simple	Male	-	0.0	1	0.3	4	1.4	1	0.4	-	0.0	6	0.5
	Female	1	0.4	1	0.4	1	0.4	1	0.4	1	4.5	5	0.5
	Total	1	0.2	2	0.3	5	0.9	2	0.4	1	2.6	11	0.5
preproliferative	Male	1	0.4	-	0.0	1	0.3	-	0.0	-	0.0	2	0.2
	Female	-	0.0	-	0.0	-	0.0	1	0.4	-	0.0	1	0.1
	Total	1	0.2	-	0.0	1	0.2	1	0.2	-	0.0	3	0.1
invisible	Male	-	0.0	6	2.0	8	2.7	17	6.2	3	17.6	34	3.0
	Female	1	0.4	3	1.1	7	2.6	20	7.4	4	18.2	35	3.2
	Total	1	0.2	9	1.6	15	2.7	37	6.8	7	17.9	69	3.1

Diabetic Retinopathy - Left Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80yr-		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	-	0.0	4	1.4	1	0.3	-	0.0	-	0.0	5	0.4
	Female	-	0.0	-	0.0	-	0.0	4	1.5	-	0.0	4	0.4
	Total	-	0.0	4	0.7	1	0.2	4	0.7	-	0.0	9	0.4
nothing	Male	272	99.6	287	97.0	281	96.6	259	94.2	15	88.2	1114	96.7
	Female	259	99.2	281	98.9	265	97.8	251	93.3	17	77.3	1073	96.9
	Total	531	99.4	568	97.9	546	97.2	510	93.8	32	82.1	2187	96.8
simple	Male	-	0.0	1	0.3	3	1.0	1	0.4	-	0.0	5	0.4
	Female	-	0.0	1	0.4	1	0.4	1	0.4	1	4.5	4	0.4
	Total	-	0.0	2	0.3	4	0.7	2	0.4	1	2.6	9	0.4
preproliferative	Male	1	0.4	-	0.0	1	0.3	-	0.0	-	0.0	2	0.2
	Female	-	0.0	-	0.0	-	0.0	1	0.4	-	0.0	1	0.1
	Total	1	0.2	-	0.0	1	0.2	1	0.2	-	0.0	3	0.1
invisible	Male	-	0.0	4	1.4	5	1.7	15	5.5	2	11.8	26	2.3
	Female	2	0.8	2	0.7	5	1.8	12	4.5	4	18.2	25	2.3
	Total	2	0.4	6	1.0	10	1.8	27	5.0	6	15.4	51	2.3

Arteriosclerosis (Keith-Wagener) - Right Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80yr-		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	-	0.0	3	1.0	1	0.3	1	0.4	-	0.0	5	0.4
	Female	-	0.0	-	0.0	-	0.0	4	1.5	-	0.0	4	0.4
	Total	-	0.0	3	0.5	1	0.2	5	0.9	-	0.0	9	0.4
nothing	Male	137	50.2	73	24.7	48	16.5	11	4.0	1	5.9	270	23.4
	Female	154	59.0	98	34.5	39	14.4	16	5.9	-	0.0	307	27.7
	Total	291	54.5	171	29.5	87	15.5	27	5.0	1	2.6	577	25.5
K-W I	Male	124	45.4	174	58.8	178	61.2	150	54.5	8	47.1	634	55.0
	Female	97	37.2	150	52.8	158	58.3	132	49.1	5	22.7	542	49.0
	Total	221	41.4	324	55.9	336	59.8	282	51.8	13	33.3	1176	52.1
K-W II a	Male	11	4.0	31	10.5	46	15.8	76	27.6	5	29.4	169	14.7
	Female	8	3.1	28	9.9	57	21.0	72	26.8	9	40.9	174	15.7
	Total	19	3.6	59	10.2	103	18.3	148	27.2	14	35.9	343	15.2
K-W II b	Male	1	0.4	9	3.0	11	3.8	19	6.9	-	0.0	40	3.5
	Female	-	0.0	4	1.4	10	3.7	23	8.6	3	13.6	40	3.6
	Total	1	0.2	13	2.2	21	3.7	42	7.7	3	7.7	80	3.5
K-W III	Male	-	0.0	1	0.3	1	0.3	3	1.1	-	0.0	5	0.4
	Female	1	0.4	-	0.0	-	0.0	2	0.7	1	4.5	4	0.4
	Total	1	0.2	1	0.2	1	0.2	5	0.9	1	2.6	9	0.4
invisible	Male	-	0.0	5	1.7	6	2.1	15	5.5	3	17.6	29	2.5
	Female	1	0.4	4	1.4	7	2.6	20	7.4	4	18.2	36	3.3
	Total	1	0.2	9	1.6	13	2.3	35	6.4	7	17.9	65	2.9

Arteriosclerosis (Keith-Wagener) - Left Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80yr-		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	-	0.0	4	1.4	-	0.0	-	0.0	-	0.0	4	0.3
	Female	-	0.0	-	0.0	-	0.0	4	1.5	-	0.0	4	0.4
	Total	-	0.0	4	0.7	-	0.0	4	0.7	-	0.0	8	0.4
nothing	Male	131	48.0	69	23.3	45	15.5	12	4.4	1	5.9	258	22.4
	Female	150	57.5	98	34.5	41	15.1	17	6.3	-	0.0	306	27.6
	Total	281	52.6	167	28.8	86	15.3	29	5.3	1	2.6	564	25.0
K-W I	Male	127	46.5	180	60.8	186	63.9	156	56.7	8	47.1	657	57.0
	Female	101	38.7	154	54.2	156	57.6	136	50.6	5	22.7	552	49.9
	Total	228	42.7	334	57.6	342	60.9	292	53.7	13	33.3	1209	53.5
K-W II a	Male	14	5.1	30	10.1	45	15.5	71	25.8	6	35.3	166	14.4
	Female	7	2.7	24	8.5	61	22.5	75	27.9	9	40.9	176	15.9
	Total	21	3.9	54	9.3	106	18.9	146	26.8	15	38.5	342	15.1
K-W II b	Male	1	0.4	11	3.7	9	3.1	19	6.9	-	0.0	40	3.5
	Female	2	0.8	5	1.8	9	3.3	22	8.2	3	13.6	41	3.7
	Total	3	0.6	16	2.8	18	3.2	41	7.5	3	7.7	81	3.6
K-W III	Male	-	0.0	-	0.0	1	0.3	2	0.7	-	0.0	3	0.3
	Female	-	0.0	-	0.0	1	0.4	2	0.7	1	4.5	4	0.4
	Total	-	0.0	-	0.0	2	0.4	4	0.7	1	2.6	7	0.3
invisible	Male	-	0.0	2	0.7	5	1.7	15	5.5	2	11.8	24	2.1
	Female	1	0.4	3	1.1	3	1.1	13	4.8	4	18.2	24	2.2
	Total	1	0.2	5	0.9	8	1.4	28	5.1	6	15.4	48	2.1

Macular Degeneration - Right Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80yr-		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	-	0.0	3	1.0	1	0.3	1	0.4	-	0.0	5	0.4
	Female	-	0.0	1	0.4	-	0.0	4	1.5	-	0.0	5	0.5
	Total	-	0.0	4	0.7	1	0.2	5	0.9	-	0.0	10	0.4
nothing	Male	266	97.4	271	91.6	262	90.0	244	88.7	13	76.5	1056	91.7
	Female	257	98.5	274	96.5	242	89.3	218	81.0	15	68.2	1006	90.9
	Total	523	97.9	545	94.0	504	89.7	462	84.9	28	71.8	2062	91.3
drusen	Male	2	0.7	7	2.4	7	2.4	4	1.5	1	5.9	21	1.8
	Female	2	0.8	-	0.0	3	1.1	12	4.5	1	4.5	18	1.6
	Total	4	0.7	7	1.2	10	1.8	16	2.9	2	5.1	39	1.7
atrophic change	Male	1	0.4	3	1.0	2	0.7	-	0.0	-	0.0	6	0.5
	Female	-	0.0	1	0.4	3	1.1	4	1.5	-	0.0	8	0.7
	Total	1	0.2	4	0.7	5	0.9	4	0.7	-	0.0	14	0.6
exudative change	Male	-	0.0	-	0.0	-	0.0	1	0.4	-	0.0	1	0.1
	Female	-	0.0	1	0.4	1	0.4	1	0.4	1	4.5	4	0.4
	Total	-	0.0	1	0.2	1	0.2	2	0.4	1	2.6	5	0.2
epiretinal membrane	Male	1	0.4	1	0.3	3	1.0	4	1.5	-	0.0	9	0.8
	Female	-	0.0	2	0.7	6	2.2	5	1.9	-	0.0	13	1.2
	Total	1	0.2	3	0.5	9	1.6	9	1.7	-	0.0	22	1.0
others	Male	-	0.0	1	0.3	3	1.0	1	0.4	-	0.0	5	0.4
	Female	-	0.0	-	0.0	1	0.4	2	0.7	-	0.0	3	0.3
	Total	-	0.0	1	0.2	4	0.7	3	0.6	-	0.0	8	0.4
invisible	Male	3	1.1	10	3.4	13	4.5	20	7.3	3	17.6	49	4.3
	Female	2	0.8	5	1.8	15	5.5	23	8.6	5	22.7	50	4.5
	Total	5	0.9	15	2.6	28	5.0	43	7.9	8	20.5	99	4.4

Macular Degeneration - Left Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80yr-		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	-	0.0	4	1.4	-	0.0	-	0.0	-	0.0	4	0.3
	Female	-	0.0	-	0.0	-	0.0	4	1.5	-	0.0	4	0.4
	Total	-	0.0	4	0.7	-	0.0	4	0.7	-	0.0	8	0.4
nothing	Male	266	97.4	282	95.3	259	89.0	240	87.3	14	82.4	1061	92.1
	Female	254	97.3	276	97.2	242	89.3	229	85.1	13	59.1	1014	91.6
	Total	520	97.4	558	96.2	501	89.1	469	86.2	27	69.2	2075	91.9
drusen	Male	2	0.7	2	0.7	10	3.4	5	1.8	-	0.0	19	1.6
	Female	1	0.4	1	0.4	4	1.5	6	2.2	-	0.0	12	1.1
	Total	3	0.6	3	0.5	14	2.5	11	2.0	-	0.0	31	1.4
atrophic change	Male	1	0.4	1	0.3	1	0.3	2	0.7	1	5.9	6	0.5
	Female	-	0.0	1	0.4	-	0.0	2	0.7	-	0.0	3	0.3
	Total	1	0.2	2	0.3	1	0.2	4	0.7	1	2.6	9	0.4
exudative change	Male	-	0.0	-	0.0	-	0.0	1	0.4	-	0.0	1	0.1
	Female	-	0.0	-	0.0	1	0.4	1	0.4	1	4.5	3	0.3
	Total	-	0.0	-	0.0	1	0.2	2	0.4	1	2.6	4	0.2
epiretinal membrane	Male	-	0.0	-	0.0	2	0.7	5	1.8	-	0.0	7	0.6
	Female	-	0.0	-	0.0	4	1.5	1	0.4	1	4.5	6	0.5
	Total	-	0.0	-	0.0	6	1.1	6	1.1	1	2.6	13	0.6
others	Male	-	0.0	1	0.3	-	0.0	-	0.0	-	0.0	1	0.1
	Female	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0
	Total	-	0.0	1	0.2	-	0.0	-	0.0	-	0.0	1	0.0
invisible	Male	4	1.5	6	2.0	19	6.5	22	8.0	2	11.8	53	4.6
	Female	6	2.3	6	2.1	20	7.4	26	9.7	7	31.8	65	5.9
	Total	10	1.9	12	2.1	39	6.9	48	8.8	9	23.1	118	5.2

7. Cornea

Corneal thickness and endothelial cell density were obtained with the Topcon SP-2000 specular microscope.

Central Corneal Thickness - Right Eye (mm)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.5198	.0316	272	0.5227	.0336	291	0.5177	.0314	289	0.5147	.0349	274	0.5014	.0410	17	0.5185	.0332	1143
Female	0.5105	.0336	259	0.5122	.0345	283	0.5127	.0316	270	0.5121	.0301	263	0.4973	.0300	21	0.5116	.0325	1096
Total	0.5152	.0329	531	0.5175	.0344	574	0.5153	.0316	559	0.5134	.0327	537	0.4992	.0349	38	0.5151	.0330	2239

Central Corneal Thickness - Left Eye (mm)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.5232	.0322	271	0.5251	.0328	290	0.5219	.0299	289	0.5183	.0354	271	0.5108	.0362	17	0.5220	.0327	1138
Female	0.5140	.0332	261	0.5159	.0350	284	0.5186	.0315	269	0.5172	.0309	265	0.5018	.0304	22	0.5161	.0327	1101
Total	0.5187	.0330	532	0.5205	.0342	574	0.5203	.0307	558	0.5178	.0332	536	0.5057	.0329	39	0.5191	.0329	2239

Cornelal Endothelial Cell Density - Right Eye (/mm\*mm)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	2731.6	279.5	259	2738.4	329.5	278	2642.7	341.9	275	2632.6	394.5	256	2541.8	301.5	15	2684.7	341.3	1083
Female	2686.3	292.4	229	2657.5	322.5	263	2606.8	344.9	247	2588.4	397.8	246	2487.7	311.8	21	2631.2	343.6	1006
Total	2710.3	286.2	488	2699.1	328.3	541	2625.7	343.4	522	2610.9	396.3	502	2510.2	304.4	36	2658.9	343.4	2089

Cornelal Endothelial Cell Density - Left Eye (/mm\*mm)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	2731.3	285.6	261	2744.1	358.2	272	2655.4	341.8	259	2636.9	393.5	251	2564.9	267.5	17	2691.0	348.4	1060
Female	2687.0	288.3	236	2669.8	321.2	263	2626.8	348.0	244	2598.8	375.6	245	2417.4	346.1	19	2641.3	337.7	1007
Total	2710.3	287.5	497	2707.6	342.2	535	2641.5	344.8	503	2618.1	384.9	496	2487.0	316.1	36	2666.8	344.0	2067

Auditory system

1. Pure-tone audiometry (Audiometer RION AA-73A)

Air conduction threshold of right ear at 125Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	21.6	7.6	273	25.1	10.4	295	26.7	10.3	291	31.7	13.6	275	33.2	12.1	17	26.4	11.3	1151
Female	21.9	8.3	261	25.7	10.1	284	29.0	12.4	271	35.0	13.2	268	38.2	15.9	22	28.1	12.3	1106
Total	21.8	7.9	534	25.4	10.2	579	27.8	11.4	562	33.4	13.5	543	36.0	14.4	39	27.2	11.8	2257

Air conduction threshold of right ear at 250Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	17.4	7.5	273	20.8	11.3	295	21.9	10.9	291	28.5	15.7	275	27.1	12.4	17	22.2	12.4	1151
Female	17.8	8.4	261	21.3	11.2	284	25.3	14.5	271	30.6	14.0	268	31.4	14.5	22	23.9	13.2	1106
Total	17.6	8.0	534	21.0	11.3	579	23.5	12.9	562	29.5	14.9	543	29.5	13.6	39	23.0	12.8	2257

Air conduction threshold of right ear at 500Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	13.2	6.7	273	17.0	11.5	295	18.4	11.1	291	26.2	16.0	275	27.6	15.0	17	18.8	12.7	1151
Female	13.5	7.8	261	16.6	11.8	284	22.2	15.5	271	28.0	14.4	268	29.8	14.8	22	20.3	13.9	1106
Total	13.4	7.2	534	16.8	11.7	579	20.2	13.6	562	27.1	15.2	543	28.8	14.7	39	19.5	13.4	2257

Air conduction threshold of right ear at 1000Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	9.5	7.4	273	14.3	11.9	295	17.8	12.9	291	26.5	17.3	275	34.7	13.9	17	17.3	14.4	1151
Female	8.9	7.3	261	12.9	11.7	284	18.5	15.9	271	25.1	15.3	268	29.5	13.4	22	16.6	14.4	1106
Total	9.2	7.3	534	13.6	11.8	579	18.1	14.4	562	25.8	16.4	543	31.8	13.6	39	16.9	14.4	2257

Air conduction threshold of right ear at 2000Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	13.2	9.9	273	17.9	12.1	295	25.2	15.4	291	36.2	18.1	275	46.2	18.0	17	23.4	16.8	1151
Female	11.6	7.4	261	16.6	11.6	284	23.6	15.2	271	31.3	15.4	268	38.6	16.3	22	21.1	15.0	1106
Total	12.4	8.8	534	17.2	11.9	579	24.4	15.3	562	33.8	17.0	543	41.9	17.3	39	22.3	16.0	2257

Air conduction threshold of right ear at 4000Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	17.1	14.1	273	27.2	18.2	295	36.3	18.5	291	52.0	18.2	275	59.7	23.3	17	33.5	21.8	1151
Female	11.5	9.8	261	16.4	13.3	284	25.4	18.0	271	36.2	17.8	268	48.9	20.6	22	22.9	18.2	1106
Total	14.3	12.5	534	21.9	16.9	579	31.0	19.1	562	44.2	19.6	543	53.6	22.2	39	28.3	20.8	2257

Air conduction threshold of right ear at 8000Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	23.8	17.2	273	34.8	20.0	295	47.2	20.5	291	66.4	19.0	275	75.6	16.9	17	43.5	25.0	1151
Female	19.2	14.5	261	29.6	18.4	284	42.1	21.6	271	60.7	20.9	268	73.4	20.3	22	38.6	24.9	1106
Total	21.6	16.1	534	32.2	19.4	579	44.8	21.2	562	63.5	20.1	543	74.4	18.7	39	41.1	25.0	2257

Bone conduction threshold of right ear at 250Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	18.0	6.6	215	19.6	7.0	205	21.3	8.9	212	26.6	11.5	191	24.2	11.0	13	21.3	9.2	836
Female	16.9	7.1	213	19.4	7.5	198	22.4	9.4	200	28.5	11.0	194	28.9	9.7	19	21.9	9.9	824
Total	17.4	6.8	428	19.5	7.3	403	21.8	9.2	412	27.6	11.3	385	27.0	10.3	32	21.6	9.6	1660

Bone conduction threshold of right ear at 500Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	12.9	6.4	215	15.1	8.0	205	17.0	9.7	212	23.4	12.9	191	25.0	14.6	13	17.1	10.3	836
Female	12.5	7.6	213	14.5	8.5	198	19.3	10.7	200	25.0	12.0	194	26.6	10.1	19	17.9	11.0	824
Total	12.7	7.0	428	14.8	8.2	403	18.1	10.3	412	24.2	12.4	385	25.9	11.9	32	17.5	10.7	1660

Bone conduction threshold of right ear at 1000Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	10.1	6.2	215	13.1	8.4	205	16.7	12.4	212	24.4	14.5	191	31.2	11.4	13	16.1	12.1	836
Female	9.9	7.7	213	12.8	9.1	198	18.3	11.8	200	24.8	12.8	194	28.7	11.6	19	16.6	12.1	824
Total	10.0	7.0	428	13.0	8.7	403	17.5	12.1	412	24.6	13.7	385	29.7	11.4	32	16.3	12.1	1660

Bone conduction threshold of right ear at 2000Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	12.5	7.2	215	16.1	9.6	205	24.1	14.3	212	33.1	16.4	191	42.3	17.6	13	21.5	14.8	836
Female	11.8	7.8	213	16.3	10.0	198	22.9	13.0	200	30.1	14.1	194	37.4	14.2	19	20.5	13.6	824
Total	12.2	7.5	428	16.2	9.8	403	23.5	13.7	412	31.6	15.3	385	39.4	15.6	32	21.0	14.2	1660

Bone conduction threshold of right ear at 4000Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	17.4	12.5	215	25.9	15.8	205	34.3	16.7	212	47.1	15.6	191	50.8	16.4	13	31.1	18.8	836
Female	11.6	9.1	213	15.6	11.2	198	23.4	14.5	200	34.8	15.3	194	44.2	16.5	19	21.7	15.9	824
Total	14.5	11.3	428	20.9	14.7	403	29.0	16.6	412	40.9	16.6	385	46.9	16.5	32	26.4	18.0	1660

Air conduction threshold of left ear at 125Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	19.4	8.2	273	23.5	11.7	294	25.2	11.4	291	29.7	13.2	275	36.2	16.5	17	24.6	12.0	1150
Female	20.4	9.1	261	23.5	9.4	284	26.3	11.2	270	32.9	13.5	268	37.0	17.1	22	26.0	12.1	1105
Total	19.9	8.7	534	23.5	10.6	578	25.7	11.3	561	31.3	13.4	543	36.7	16.6	39	25.3	12.0	2255

Air conduction threshold of left ear at 250Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80yr-			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	14.9	8.2	273	19.1	13.0	294	20.5	12.5	291	26.3	15.1	275	30.9	18.0	17	20.4	13.2	1150
Female	16.0	10.6	261	18.5	10.1	284	21.8	12.4	270	28.7	15.3	268	32.3	18.6	22	21.5	13.3	1105
Total	15.4	9.5	534	18.8	11.7	578	21.1	12.4	561	27.5	15.2	543	31.7	18.1	39	20.9	13.3	2255