

VIII. Visual and Auditory Examinations

1) Visual system

1. Refraction

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

2. Visual acuity (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 autorefractometry and subjective refinement.

3. Contrast sensitivity

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

4. Intraocular pressure (mmHg)

5. Retinal fundus camera

Fundus photographs were taken with Topcon non-mydratric retinal camera (TRC-NW6S) at 30 and 45 degree angles for each eye without pupil dilatation. Diabetic retinopathy, arteriosclerosis, and macular degeneration were assessed on the photograph at 45 degree angles. Vertical cup to disc ratio was measured on the photograph at 30 degree angles.

6. Specular microscope

Corneal thickness was obtained with the Topcon SP-2000 specular microscope.

2) Auditory system

1. Pure-tone audiometry

Air conduction thresholds at 125, 250, 500, 1000, 2000, 3000, 4000, 6000, 8000 Hz (dBHL)

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

Pure-tone audiometry (Audiometer RION AA-78)

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

	Air conduction		Bone conduction	
	Maximum output level	Inputted level	Maximum output level	Inputted level
125 Hz	70	75	-	-
250 Hz	85	90	55	60
500 Hz	100	105	65	70
1000 Hz	100	105	70	75
2000 Hz	100	105	70	75
3000 Hz	100	105	-	-
4000 Hz	100	105	60	65
6000 Hz	100	105	-	-
8000 Hz	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. Video otoscopy

Two otologists classify status of one's ear canals and eardrums into the following 4 categories.

- Normal
- A-B gap suspected
- Wax
- Not recorded

4. Distortion product otoacoustic emission

Otoacoustic Distortion Product Analyser, ILO 292 ver.5 [Otodynamics]

2f1-f2 DPOAEs were measured by ILO 92 with the following parameters for the DP-gram:

Ratio of primary tones $f2 / f1 = 1.22$

Stimulus intensity of primary tones, $F1 = 70\text{dB SPL}$ and $F2 = 70\text{dB SPL}$.

DP-gram were recorded in 8 points/octave over a frequency range of the $f2$ which extended from 1001 to 6165 Hz. In this manner, 22 points in total were measured.

DP amplitudes above the noise floor at seven $f2$ frequencies ($f2 = 1001, 1416, 2002, 3088, 4004, 5652$ and 6165) were analyzed by age groups.

1) Visual system

1. Refraction

Autorefractation 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			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	-1.77	1.47	256	-1.47	1.48	273	-0.87	1.34	272	-0.38	1.14	252	-0.86	1.06	85	-1.11	1.44	1138
Female	-1.85	1.74	257	-1.29	1.47	245	-0.64	1.43	267	-0.26	1.14	236	-0.44	1.01	90	-0.97	1.55	1095
Total	-1.81	1.61	513	-1.39	1.48	518	-0.75	1.39	539	-0.32	1.14	488	-0.65	1.05	175	-1.04	1.50	2233

Spherical Equivalent of Refractive Error – Leftt Eye (Diopters)

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	-1.70	1.43	254	-1.42	1.41	274	-0.88	1.29	269	-0.39	1.05	249	-0.69	1.06	81	-1.07	1.38	1127
Female	-1.73	1.73	258	-1.29	1.47	245	-0.62	1.35	262	-0.32	1.24	224	-0.30	1.04	86	-0.95	1.54	1075
Total	-1.72	1.59	512	-1.35	1.44	519	-0.75	1.33	531	-0.35	1.15	473	-0.49	1.06	167	-1.01	1.46	2202

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 autorefractation and subjective refinement.

Presenting Visual Acuity – Right Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80 - yr		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	0	0.0	1	0.4	1	0.4	4	1.5	2	2.1	8	0.7
	Female	1	0.4	1	0.4	2	0.7	3	1.2	3	3.1	10	0.9
	Total	1	0.2	2	0.4	3	0.5	7	1.3	5	2.6	18	0.8
0.3 or worse	Male	0	0.0	7	2.6	4	1.4	12	4.4	15	15.6	38	3.2
	Female	4	1.5	3	1.2	5	1.8	13	5.2	8	8.2	33	2.9
	Total	4	0.8	10	1.9	9	1.6	25	4.8	23	11.9	71	3.1

0.3-0.6	Male	18	7.0	28	10.2	35	12.7	60	22.2	27	28.1	168	14.3
	Female	16	6.1	29	11.6	35	12.9	84	33.7	38	38.8	202	17.9
	Total	34	6.6	57	10.9	70	12.8	144	27.7	65	33.5	370	16.1
0.7 or better	Male	239	93.0	238	86.9	236	85.5	194	71.9	52	54.2	959	81.8
	Female	241	92.0	216	86.7	229	84.5	149	59.8	49	50.0	884	78.3
	Total	480	92.5	454	86.8	465	85.0	343	66.1	101	52.1	1843	80.1

Presenting Visual Acuity - Left Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80 - yr		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	1	0.4	0	0.0	1	0.4	2	0.7	2	2.1	6	0.5
	Female	0	0.0	0	0.0	0	0.0	4	1.6	3	3.1	7	0.6
	Total	1	0.2	0	0.0	1	0.2	6	1.2	5	2.6	13	0.6
0.3 or worse	Male	2	0.8	1	0.4	3	1.1	11	4.1	7	7.3	24	2.0
	Female	1	0.4	7	2.8	3	1.1	13	5.2	3	3.1	27	2.4
	Total	3	0.6	8	1.5	6	1.1	24	4.6	10	5.2	51	2.2
0.3-0.6	Male	12	4.7	31	11.3	29	10.5	62	23.0	36	37.5	170	14.5
	Female	18	6.9	26	10.4	47	17.3	56	22.5	35	35.7	182	16.1
	Total	30	5.8	57	10.9	76	13.9	118	22.7	71	36.6	352	15.3
0.7 or better	Male	242	94.2	242	88.3	243	88.0	195	72.2	51	53.1	973	82.9
	Female	243	92.7	216	86.7	221	81.5	176	70.7	57	58.2	913	80.9
	Total	485	93.4	458	87.6	464	84.8	371	71.5	108	55.7	1886	81.9

Best-corrected Visual Acuity - Right Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80 - yr		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	0	0.0	0	0.0	1	0.4	3	1.1	1	1.0	5	0.4
	Female	1	0.4	0	0.0	1	0.4	2	0.8	2	2.0	6	0.5
	Total	1	0.2	0	0.0	2	0.4	5	1.0	3	1.5	11	0.5
0.3 or worse	Male	0	0.0	2	0.7	2	0.7	6	2.2	7	7.3	17	1.4
	Female	1	0.4	2	0.8	2	0.7	4	1.6	1	1.0	10	0.9
	Total	1	0.2	4	0.8	4	0.7	10	1.9	8	4.1	27	1.2
0.3-0.6	Male	3	1.2	3	1.1	16	5.8	32	11.9	26	27.1	80	6.8
	Female	3	1.1	5	2.0	10	3.7	46	18.5	28	28.6	92	8.1
	Total	6	1.2	8	1.5	26	4.8	78	15.0	54	27.8	172	7.5
0.7 or better	Male	254	98.8	269	98.2	257	93.1	229	84.8	62	64.6	1071	91.3
	Female	257	98.1	242	97.2	258	95.2	197	79.1	67	68.4	1021	90.4
	Total	511	98.5	511	97.7	515	94.1	426	82.1	129	66.5	2092	90.9

Best-corrected Visual Acuity - Left Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80 - yr		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	1	0.4	0	0.0	1	0.4	2	0.7	2	2.1	6	0.5
	Female	0	0.0	0	0.0	0	0.0	3	1.2	4	4.1	7	0.6
	Total	1	0.2	0	0.0	1	0.2	5	1.0	6	3.1	13	0.6
0.3 or worse	Male	2	0.8	0	0.0	1	0.4	7	2.6	4	4.2	14	1.2
	Female	1	0.4	1	0.4	1	0.4	2	0.8	0	0.0	5	0.4
	Total	3	0.6	1	0.2	2	0.4	9	1.7	4	2.1	19	0.8
0.3-0.6	Male	0	0.0	2	0.7	12	4.3	33	12.2	26	27.1	73	6.2
	Female	0	0.0	5	2.0	19	7.0	33	13.3	25	25.5	82	7.3
	Total	0	0.0	7	1.3	31	5.7	66	12.7	51	26.3	155	6.7

0.7 or better	Male	254	98.8	272	99.3	262	94.9	228	84.4	64	66.7	1080	92.1
	Female	261	99.6	243	97.6	251	92.6	211	84.7	69	70.4	1035	91.7
	Total	515	99.2	515	98.5	513	93.8	439	84.6	133	68.6	2115	91.9

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 – Right Eye

	40-49yr			50-59yr			60-69yr			70-79yr			80 – yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	41.5	16.9	119	42.1	17.4	99	35.4	11.6	92	34.2	14.9	113	30.8	14.3	46	37.6	15.9	469
Female	39.8	16.2	127	38.7	15.0	89	36.1	11.3	98	32.2	11.0	95	34.8	12.5	24	36.8	13.9	433
Total	40.6	16.6	246	40.5	16.4	188	35.7	11.4	190	33.3	13.3	208	32.2	13.7	70	37.2	15.0	902

Contrast Sensitivity at 3 cycles/degree – Right Eye

	40-49yr			50-59yr			60-69yr			70-79yr			80 – yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	108.9	51.1	119	106.9	48.3	99	90.4	50.0	92	73.5	47.8	113	54.8	42.0	46	91.0	51.8	469
Female	107.4	51.1	127	105.4	50.1	89	97.3	49.8	98	75.8	50.8	95	57.8	29.3	24	95.0	51.6	433
Total	108.1	51.0	246	106.2	49.0	188	93.9	49.9	190	74.6	49.1	208	55.9	37.9	70	92.9	51.7	902

Contrast Sensitivity at 6 cycles/degree – Right Eye

	40-49yr			50-59yr			60-69yr			70-79yr			80 – yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	99.5	52.5	119	109.8	57.5	99	88.8	56.0	92	62.0	43.8	113	37.9	28.9	46	84.5	55.4	469
Female	109.6	56.8	127	114.1	65.6	89	96.1	55.7	98	57.9	43.9	95	50.0	33.3	24	92.8	59.5	433
Total	104.7	54.9	246	111.8	61.3	188	92.6	55.8	190	60.1	43.8	208	42.1	30.8	70	88.5	57.5	902

Contrast Sensitivity at 12 cycles/degree – Right Eye

	40-49yr			50-59yr			60-69yr			70-79yr			80 – yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	51.4	33.8	119	55.8	40.1	99	47.2	37.8	92	26.0	29.6	113	13.5	19.5	46	41.6	36.9	469
Female	62.0	40.3	127	56.4	45.0	89	46.7	40.5	98	20.9	21.1	95	14.0	12.5	24	45.7	40.7	433
Total	56.9	37.6	246	56.0	42.4	188	46.9	39.1	190	23.7	26.1	208	13.6	17.3	70	43.6	38.8	902

Contrast Sensitivity at 18 cycles/degree – Right Eye

	40-49yr			50-59yr			60-69yr			70-79yr			80 – yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	15.1	11.3	119	17.1	14.0	99	13.9	12.0	92	6.9	10.3	113	3.9	7.0	46	12.2	12.3	469
Female	18.7	14.8	127	15.1	13.0	89	12.8	12.2	98	5.4	7.5	95	4.5	6.0	24	12.9	13.2	433
Total	17.0	13.3	246	16.2	13.5	188	13.3	12.1	190	6.2	9.1	208	4.1	6.6	70	12.5	12.7	902

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			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	12.90	2.66	255	12.84	2.64	274	12.45	2.81	276	12.00	3.11	269	11.39	2.41	95	12.45	2.82	1169
Female	12.41	2.53	258	12.15	2.46	249	12.01	2.39	271	12.09	2.58	249	11.42	3.28	98	12.10	2.57	1125
Total	12.65	2.60	513	12.51	2.58	523	12.23	2.62	547	12.04	2.86	518	11.41	2.88	193	12.28	2.71	2294

Intraocular Pressure - Left Eye (mmHg)

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	13.04	2.76	253	13.02	2.78	273	12.63	2.75	275	12.11	2.67	269	11.49	2.69	96	12.60	2.78	1166
Female	12.60	2.56	258	12.14	2.60	249	12.27	2.46	271	12.30	2.84	249	11.55	2.81	97	12.26	2.64	1124
Total	12.82	2.67	511	12.60	2.73	522	12.45	2.61	546	12.20	2.75	518	11.52	2.75	193	12.43	2.72	2290

5. Retinal fundus camera

Fundus photographs were taken with Topcon fundus camera (TRC-NW6S) at 30 and 45 degree angles for each eye without pupil dilatation.

Diabetic retinopathy, Arteriosclerosis, and macular degeneration were assessed on the photograph at 45 degree angles.

Vertical cup to disc ratio was measured on the photograph at 30 degree angles.

Cup-Disc Ratio of Optic Disc - Right Eye

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.57	0.09	257	0.58	0.08	273	0.58	0.07	273	0.59	0.07	267	0.64	0.09	91	0.58	0.08	1161
Female	0.57	0.09	261	0.58	0.08	248	0.58	0.08	271	0.61	0.08	243	0.61	0.07	95	0.59	0.08	1118
Total	0.57	0.09	518	0.58	0.08	521	0.58	0.07	544	0.60	0.08	510	0.62	0.08	186	0.58	0.08	2279

Cup-Disc Ratio of Optic Disc - Left Eye

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.57	0.09	256	0.58	0.09	272	0.58	0.08	267	0.60	0.08	264	0.62	0.09	89	0.58	0.09	1148
Female	0.56	0.08	261	0.57	0.09	248	0.58	0.08	269	0.60	0.07	243	0.62	0.08	93	0.58	0.08	1114
Total	0.57	0.09	517	0.57	0.09	520	0.58	0.08	536	0.60	0.08	507	0.62	0.08	182	0.58	0.08	2262

Diabetic Retinopathy - Right Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80 - yr		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	0	0.0	0	0.0	0	0.0	2	0.7	2	2.1	4	0.3
	Female	0	0.0	0	0.0	0	0.0	0	0.0	1	1.0	1	0.1
	Total	0	0.0	0	0.0	0	0.0	2	0.4	3	1.5	5	0.2
nothing	Male	254	98.8	272	99.3	266	96.4	255	94.4	86	89.6	1133	96.6
	Female	261	99.6	248	99.6	261	96.3	236	94.8	90	91.8	1096	97.1
	Total	515	99.2	520	99.4	527	96.3	491	94.6	176	90.7	2229	96.8
proliferative	Male	0	0.0	0	0.0	0	0.0	1	0.4	0	0.0	1	0.1
	Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Total	0	0.0	0	0.0	0	0.0	1	0.2	0	0.0	1	0.0
invisible	Male	3	1.2	2	0.7	10	3.6	12	4.4	8	8.3	35	3.0
	Female	1	0.4	1	0.4	10	3.7	13	5.2	7	7.1	32	2.8
	Total	4	0.8	3	0.6	20	3.7	25	4.8	15	7.7	67	2.9

Diabetic Retinopathy - Left Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80 - yr		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	2	0.8	0	0.0	2	0.7	1	0.4	2	2.1	7	0.6
	Female	0	0.0	0	0.0	0	0.0	1	0.4	3	3.1	4	0.4
	Total	2	0.4	0	0.0	2	0.4	2	0.4	5	2.6	11	0.5
nothing	Male	252	98.1	270	98.5	256	92.8	244	90.4	83	86.5	1105	94.2
	Female	257	98.1	248	99.6	260	95.9	231	92.8	82	83.7	1078	95.5
	Total	509	98.1	518	99.0	516	94.3	475	91.5	165	85.1	2183	94.8
proliferative	Male	0	0.0	0	0.0	0	0.0	1	0.4	0	0.0	1	0.1
	Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Total	0	0.0	0	0.0	0	0.0	1	0.2	0	0.0	1	0.0
invisible	Male	3	1.2	4	1.5	18	6.5	24	8.9	11	11.5	60	5.1
	Female	5	1.9	1	0.4	11	4.1	17	6.8	13	13.3	47	4.2
	Total	8	1.5	5	1.0	29	5.3	41	7.9	24	12.4	107	4.6

Arteriosclerosis (Keith-Wagener) - Right Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80 - yr		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	0	0.0	0	0.0	0	0.0	1	0.4	2	2.1	3	0.3
	Female	0	0.0	0	0.0	0	0.0	0	0.0	1	1.0	1	0.1
	Total	0	0.0	0	0.0	0	0.0	1	0.2	3	1.5	4	0.2
nothing	Male	252	98.1	271	98.9	261	94.6	255	94.4	86	89.6	1125	95.9
	Female	260	99.2	248	99.6	259	95.6	233	93.6	90	91.8	1090	96.5
	Total	512	98.7	519	99.2	520	95.1	488	94.0	176	90.7	2215	96.2
K-W I	Male	2	0.8	1	0.4	3	1.1	0	0.0	0	0.0	6	0.5
	Female	1	0.4	0	0.0	2	0.7	2	0.8	0	0.0	5	0.4
	Total	3	0.6	1	0.2	5	0.9	2	0.4	0	0.0	11	0.5
K-W IIa	Male	0	0.0	0	0.0	1	0.4	1	0.4	0	0.0	2	0.2
	Female	0	0.0	0	0.0	0	0.0	1	0.4	0	0.0	1	0.1
	Total	0	0.0	0	0.0	1	0.2	2	0.4	0	0.0	3	0.1
K-W IIb	Male	0	0.0	0	0.0	0	0.0	1	0.4	0	0.0	1	0.1
	Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Total	0	0.0	0	0.0	0	0.0	1	0.2	0	0.0	1	0.0
K-W III	Male	0	0.0	0	0.0	1	0.4	0	0.0	0	0.0	1	0.1
	Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Total	0	0.0	0	0.0	1	0.2	0	0.0	0	0.0	1	0.0
invisible	Male	3	1.2	2	0.7	10	3.6	12	4.4	8	8.3	35	3.0
	Female	1	0.4	1	0.4	10	3.7	13	5.2	7	7.1	32	2.8
	Total	4	0.8	3	0.6	20	3.7	25	4.8	15	7.7	67	2.9

Arteriosclerosis (Keith-Wagener) - Left Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80 - yr		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	1	0.4	0	0.0	2	0.7	1	0.4	2	2.1	6	0.5
	Female	0	0.0	0	0.0	0	0.0	1	0.4	3	3.1	4	0.4
	Total	1	0.2	0	0.0	2	0.4	2	0.4	5	2.6	10	0.4
nothing	Male	251	97.7	269	98.2	254	92.0	245	90.7	83	86.5	1102	93.9
	Female	256	97.7	248	99.6	258	95.2	228	91.6	82	83.7	1072	95.0
	Total	507	97.7	517	98.9	512	93.6	473	91.1	165	85.1	2174	94.4

K-W I	Male	2	0.8	1	0.4	2	0.7	0	0.0	0	0.0	5	0.4
	Female	0	0.0	0	0.0	2	0.7	2	0.8	0	0.0	4	0.4
	Total	2	0.4	1	0.2	4	0.7	2	0.4	0	0.0	9	0.4
K-W IIa	Male	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Female	0	0.0	0	0.0	0	0.0	1	0.4	0	0.0	1	0.1
	Total	0	0.0	0	0.0	0	0.0	1	0.2	0	0.0	1	0.0
K-W III	Male	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Female	1	0.4	0	0.0	0	0.0	0	0.0	0	0.0	1	0.1
	Total	1	0.2	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0
invisible	Male	3	1.2	4	1.5	18	6.5	24	8.9	11	11.5	60	5.1
	Female	5	1.9	1	0.4	11	4.1	17	6.8	13	13.3	47	4.2
	Total	8	1.5	5	1.0	29	5.3	41	7.9	24	12.4	107	4.6

Macular Degeneration - Right Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80 - yr		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	0	0.0	0	0.0	0	0.0	1	0.4	2	2.1	3	0.3
	Female	0	0.0	0	0.0	0	0.0	0	0.0	1	1.0	1	0.1
	Total	0	0.0	0	0.0	0	0.0	1	0.2	3	1.5	4	0.2
nothing	Male	252	98.1	255	93.1	243	88.0	224	83.0	78	81.3	1052	89.7
	Female	253	96.6	238	95.6	245	90.4	203	81.5	74	75.5	1013	89.7
	Total	505	97.3	493	94.3	488	89.2	427	82.3	152	78.4	2065	89.7
drusen	Male	0	0.0	1	0.4	1	0.4	7	2.6	1	1.0	10	0.9
	Female	0	0.0	2	0.8	2	0.7	9	3.6	6	6.1	19	1.7
	Total	0	0.0	3	0.6	3	0.5	16	3.1	7	3.6	29	1.3
atrophic change	Male	0	0.0	4	1.5	1	0.4	5	1.9	0	0.0	10	0.9
	Female	0	0.0	1	0.4	1	0.4	2	0.8	1	1.0	5	0.4
	Total	0	0.0	5	1.0	2	0.4	7	1.3	1	0.5	15	0.7
exudative change	Male	0	0.0	0	0.0	1	0.4	0	0.0	0	0.0	1	0.1
	Female	0	0.0	0	0.0	1	0.4	1	0.4	1	1.0	3	0.3
	Total	0	0.0	0	0.0	2	0.4	1	0.2	1	0.5	4	0.2
epiretinal membrane	Male	0	0.0	1	0.4	7	2.5	2	0.7	0	0.0	10	0.9
	Female	1	0.4	0	0.0	3	1.1	1	0.4	0	0.0	5	0.4
	Total	1	0.2	1	0.2	10	1.8	3	0.6	0	0.0	15	0.7
others	Male	0	0.0	0	0.0	0	0.0	1	0.4	0	0.0	1	0.1
	Female	0	0.0	0	0.0	0	0.0	1	0.4	0	0.0	1	0.1
	Total	0	0.0	0	0.0	0	0.0	2	0.4	0	0.0	2	0.1
invisible	Male	5	1.9	13	4.7	23	8.3	30	11.1	15	15.6	86	7.3
	Female	8	3.1	8	3.2	19	7.0	32	12.9	15	15.3	82	7.3
	Total	13	2.5	21	4.0	42	7.7	62	11.9	30	15.5	168	7.3

Macular Degeneration - Left Eye

		40-49yr		50-59yr		60-69yr		70-79yr		80 - yr		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	1	0.4	0	0.0	2	0.7	1	0.4	2	2.1	6	0.5
	Female	0	0.0	0	0.0	0	0.0	1	0.4	3	3.1	4	0.4
	Total	1	0.2	0	0.0	2	0.4	2	0.4	5	2.6	10	0.4
nothing	Male	245	95.3	249	90.9	239	86.6	217	80.4	77	80.2	1027	87.6
	Female	250	95.4	237	95.2	240	88.6	205	82.3	70	71.4	1002	88.8
	Total	495	95.4	486	92.9	479	87.6	422	81.3	147	75.8	2029	88.1
drusen	Male	0	0.0	1	0.4	2	0.7	6	2.2	2	2.1	11	0.9
	Female	0	0.0	3	1.2	1	0.4	8	3.2	2	2.0	14	1.2

Male	19.4	7.8	256	22.6	8.4	274	27.0	13.0	276	30.7	13.2	270	40.8	16.1	96	26.3	12.9	1172
Female	19.3	8.5	262	21.7	8.4	249	25.8	10.7	271	33.4	15.5	246	38.7	15.1	98	26.2	13.1	1126
Total	19.3	8.1	518	22.2	8.4	523	26.4	11.9	547	32.0	14.4	516	39.7	15.6	194	26.2	13.0	2298

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	15.2	7.7	256	18.8	8.3	274	23.9	14.0	276	28.8	14.0	270	38.1	17.1	96	23.1	13.7	1172
Female	15.9	8.5	262	18.6	8.8	249	23.6	12.6	271	32.4	17.6	246	38.8	15.3	98	23.9	14.7	1126
Total	15.5	8.1	518	18.7	8.5	523	23.7	13.3	547	30.5	15.9	516	38.5	16.2	194	23.5	14.2	2298

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	11.2	7.8	256	14.2	8.4	274	18.9	14.8	276	26.1	15.2	270	33.8	16.7	96	19.0	14.3	1172
Female	10.7	8.3	262	13.7	9.6	249	18.6	13.1	271	28.6	17.5	246	33.6	15.0	98	19.2	15.0	1126
Total	10.9	8.0	518	14.0	9.0	523	18.7	14.0	547	27.3	16.4	516	33.7	15.8	194	19.1	14.6	2298

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	12.4	8.2	256	18.1	10.9	274	24.7	16.2	276	34.4	16.2	270	44.7	16.4	96	24.3	16.8	1172
Female	12.1	9.8	262	15.8	10.0	249	22.9	13.7	271	33.7	16.5	246	39.0	15.5	98	22.6	16.0	1126
Total	12.3	9.1	518	17.0	10.5	523	23.8	15.0	547	34.1	16.3	516	41.8	16.2	194	23.5	16.4	2298

Air conduction threshold of right ear at 3000Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	11.4	9.8	256	18.4	14.4	274	28.1	19.4	276	39.9	18.6	270	50.6	16.2	96	26.7	20.3	1172
Female	9.7	10.7	262	13.9	9.9	249	20.3	14.2	271	32.4	17.1	246	40.9	16.5	98	20.8	17.0	1126
Total	10.5	10.3	518	16.2	12.7	523	24.2	17.4	547	36.3	18.3	516	45.7	17.0	194	23.8	19.0	2298

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	15.4	12.5	256	24.4	16.4	274	35.5	20.3	276	46.6	18.6	270	57.1	16.9	96	32.9	21.8	1172
Female	10.1	10.5	262	15.8	12.1	249	22.7	15.7	271	36.6	18.5	246	45.5	18.0	98	23.3	18.8	1126
Total	12.7	11.8	518	20.3	15.1	523	29.2	19.2	547	41.9	19.2	516	51.2	18.4	194	28.2	20.9	2298

Air conduction threshold of right ear at 6000Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	13.7	12.1	256	24.1	16.7	274	34.9	20.7	276	48.1	20.0	270	57.7	18.1	96	32.6	22.8	1172
Female	9.3	10.7	262	15.8	12.1	249	25.1	17.5	271	39.3	21.7	246	49.5	18.6	98	24.6	20.9	1126
Total	11.5	11.6	518	20.1	15.3	523	30.0	19.8	547	43.9	21.3	516	53.6	18.8	194	28.7	22.3	2298

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	16.4	13.4	256	29.8	17.6	274	44.3	20.7	276	59.5	20.0	270	70.4	16.8	96	40.4	25.3	1172
Female	14.1	13.4	262	22.2	15.9	249	35.8	20.1	271	52.6	21.2	246	65.1	17.6	98	34.0	24.6	1126
Total	15.3	13.4	518	26.1	17.2	523	40.1	20.8	547	56.2	20.9	516	67.7	17.4	194	37.3	25.1	2298

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	17.6	8.7	256	19.4	9.6	274	22.0	10.1	276	26.4	11.9	270	31.8	14.6	96	22.3	11.4	1172
Female	19.1	8.7	262	19.1	9.1	249	22.1	9.6	271	28.0	12.8	245	31.2	14.4	98	22.8	11.4	1125
Total	18.4	8.7	518	19.2	9.3	523	22.0	9.8	547	27.2	12.3	515	31.5	14.5	194	22.5	11.4	2297

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	6.9	8.2	256	8.9	9.6	274	11.6	10.0	276	16.9	12.8	270	23.4	15.9	96	12.1	11.9	1172
Female	7.6	8.4	262	9.5	10.2	249	12.5	10.4	271	19.1	12.8	245	23.7	14.1	98	13.1	12.0	1125
Total	7.2	8.3	518	9.2	9.8	523	12.1	10.2	547	18.0	12.8	515	23.6	15.0	194	12.6	12.0	2297

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	11.7	8.9	256	15.4	10.8	274	19.7	13.2	276	27.6	14.6	270	32.6	16.0	96	19.8	14.2	1172
Female	12.7	9.2	262	16.2	10.8	249	20.5	12.4	271	29.3	13.6	245	33.4	14.0	98	20.8	13.7	1125
Total	12.2	9.1	518	15.8	10.8	523	20.1	12.8	547	28.4	14.1	515	33.0	15.0	194	20.3	14.0	2297

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	14.2	8.7	256	18.3	10.8	274	24.8	13.4	276	34.1	14.4	270	40.5	15.5	96	24.4	15.1	1172
Female	13.4	9.1	262	17.3	10.1	249	23.2	11.9	271	32.3	13.7	245	37.4	12.9	98	22.8	14.0	1125
Total	13.8	8.9	518	17.8	10.5	523	24.0	12.7	547	33.3	14.1	515	38.9	14.3	194	23.6	14.6	2297

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	11.8	10.8	256	18.1	13.8	274	27.3	15.7	276	35.8	14.7	270	43.1	13.8	96	25.0	17.2	1172
Female	8.2	8.1	262	13.3	10.8	249	17.9	12.5	271	28.9	14.5	245	35.6	14.2	98	18.6	14.9	1125
Total	10.0	9.7	518	15.8	12.7	523	22.7	15.0	547	32.5	15.0	515	39.3	14.4	194	21.9	16.4	2297

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	19.4	8.1	256	22.5	9.1	274	26.6	12.0	276	30.7	12.9	270	37.3	12.9	96	25.9	12.1	1172
Female	19.5	7.2	262	22.2	9.2	249	24.7	9.9	270	31.2	13.2	245	38.3	14.5	98	25.5	11.9	1124
Total	19.4	7.7	518	22.4	9.1	523	25.6	11.0	546	30.9	13.0	515	37.8	13.7	194	25.7	12.0	2296

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	18.0	9.0	256	20.3	9.1	274	25.1	13.9	276	29.5	14.4	270	37.4	14.3	96	24.4	13.4	1172
Female	17.7	8.1	262	20.8	10.3	249	23.5	10.7	270	30.6	14.8	245	37.5	16.5	98	24.3	13.2	1124
Total	17.8	8.5	518	20.5	9.7	523	24.3	12.4	546	30.0	14.6	515	37.4	15.4	194	24.4	13.3	2296

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	14.7	9.2	256	17.6	9.4	274	22.7	14.9	276	27.4	15.1	270	35.8	15.9	96	21.9	14.3	1172
Female	15.3	8.2	262	18.8	11.3	249	21.8	11.1	270	30.0	16.1	245	37.4	17.1	98	22.8	14.2	1124
Total	15.0	8.7	518	18.2	10.4	523	22.2	13.2	546	28.7	15.6	515	36.6	16.5	194	22.3	14.2	2296

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	10.8	9.7	256	13.5	9.9	274	18.9	16.1	276	26.0	17.1	270	34.8	16.6	96	18.8	15.7	1172
Female	9.0	8.1	262	12.9	12.0	249	16.4	11.8	270	26.0	16.6	245	32.8	17.1	98	17.4	15.0	1124
Total	9.9	9.0	518	13.2	10.9	523	17.7	14.2	546	26.0	16.8	515	33.8	16.9	194	18.1	15.4	2296

Air conduction threshold of left ear at 3000Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	12.5	12.8	256	19.8	15.7	274	30.7	20.0	276	42.3	19.7	270	50.9	17.4	96	28.5	21.5	1172
Female	8.0	9.8	262	13.4	11.7	249	19.4	13.3	270	31.7	17.1	245	42.3	16.2	98	20.1	17.3	1124
Total	10.3	11.6	518	16.8	14.3	523	25.1	17.9	546	37.2	19.3	515	46.6	17.3	194	24.4	20.0	2296

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	13.2	11.6	256	18.9	12.2	274	26.4	17.6	276	35.8	19.0	270	44.5	16.1	96	25.4	18.4	1172
Female	11.2	9.6	262	16.4	11.7	249	21.4	12.2	270	32.0	16.5	245	38.0	16.5	98	21.7	15.8	1124
Total	12.2	10.7	518	17.7	12.0	523	23.9	15.4	546	34.0	17.9	515	41.2	16.6	194	23.6	17.3	2296

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	16.5	15.3	256	25.4	16.8	274	37.4	19.7	276	47.7	18.5	270	57.2	16.0	96	34.0	21.9	1172
Female	9.7	10.0	262	15.9	13.2	249	22.6	14.0	270	36.5	17.9	245	46.9	16.7	98	23.2	18.6	1124
Total	13.0	13.3	518	20.9	15.9	523	30.1	18.6	546	42.4	19.0	515	52.0	17.1	194	28.8	21.1	2296

Air conduction threshold of left ear at 6000Hz (dBHL)

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	14.4	14.8	256	24.6	17.5	274	36.7	20.0	276	49.5	18.9	270	59.0	16.7	96	33.8	23.0	1172

Female	9.0	10.8	262	16.5	14.2	249	24.6	16.6	270	40.2	19.6	245	50.9	17.5	98	24.8	20.8	1124
Total	11.7	13.2	518	20.7	16.5	523	30.7	19.4	546	45.0	19.8	515	54.9	17.6	194	29.4	22.4	2296

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	16.6	15.1	256	29.1	19.0	274	43.9	21.6	276	59.5	19.6	270	71.2	15.7	96	40.3	25.9	1172
Female	12.8	12.9	262	21.7	16.5	249	34.6	19.7	270	52.7	19.0	245	63.9	17.1	98	33.2	24.3	1124
Total	14.7	14.2	518	25.6	18.2	523	39.3	21.2	546	56.3	19.6	515	67.5	16.8	194	36.8	25.3	2296

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	18.2	8.6	256	19.9	9.9	274	22.3	9.3	276	26.3	12.8	270	31.1	15.1	96	22.5	11.4	1172
Female	18.8	8.3	262	18.8	8.9	249	21.8	9.6	270	26.1	12.3	244	30.0	15.3	98	22.1	11.1	1123
Total	18.5	8.4	518	19.4	9.4	523	22.0	9.5	546	26.2	12.5	514	30.6	15.2	194	22.3	11.2	2295

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	8.1	8.5	256	9.6	10.0	274	13.0	10.3	276	17.9	13.8	270	23.8	16.0	96	13.2	12.3	1172
Female	7.5	8.0	262	9.3	8.8	249	12.1	10.7	270	17.9	13.0	244	23.0	16.3	98	12.6	12.0	1123
Total	7.8	8.3	518	9.5	9.5	523	12.6	10.5	546	17.9	13.4	514	23.4	16.1	194	12.9	12.1	2295

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	12.7	9.6	256	16.8	10.7	274	20.8	12.6	276	28.4	15.1	270	34.1	15.7	96	20.9	14.2	1172
Female	12.6	9.8	262	16.5	11.2	249	20.9	12.4	270	28.5	14.2	244	32.8	15.7	98	20.7	14.1	1123
Total	12.6	9.7	518	16.7	10.9	523	20.9	12.5	546	28.4	14.7	514	33.5	15.7	194	20.8	14.2	2295

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	15.0	10.4	256	20.5	11.8	274	26.5	13.7	276	35.2	15.9	270	42.0	14.9	96	25.9	15.8	1172
Female	13.9	9.1	262	17.4	10.2	249	23.1	11.8	270	31.8	13.4	244	37.1	14.2	98	22.8	13.9	1123
Total	14.4	9.8	518	19.0	11.2	523	24.8	12.9	546	33.6	14.9	514	39.6	14.7	194	24.4	15.0	2295

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	14.1	11.6	256	19.7	14.0	274	29.2	15.4	276	38.4	14.6	270	45.5	13.3	96	27.2	17.4	1172
Female	9.4	8.6	262	13.9	10.5	249	19.0	11.6	270	29.4	13.7	244	36.7	13.8	98	19.4	14.5	1123
Total	11.7	10.5	518	17.0	12.8	523	24.1	14.6	546	34.1	14.9	514	41.1	14.2	194	23.4	16.5	2295

2. Impedance Audiometry

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	-3.4	28.8	253	-7.5	33.6	267	-10.1	40.5	267	-9.5	42.5	254	-12.4	45.1	88	-8.0	37.5	1129
Female	-1.5	21.8	261	-8.3	36.7	243	-7.7	34.0	262	-13.9	48.2	237	-11.5	40.8	94	-8.0	36.7	1097
Total	-2.4	25.5	514	-7.9	35.1	510	-8.9	37.4	529	-11.7	45.3	491	-12.0	42.8	182	-8.0	37.1	2226

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.64	0.39	253	0.76	0.66	267	0.78	0.75	267	0.81	0.90	254	0.74	0.73	88	0.75	0.70	1129
Female	0.59	0.42	261	0.61	0.53	243	0.66	0.70	262	0.57	0.54	237	0.54	0.67	94	0.60	0.57	1097
Total	0.61	0.40	514	0.69	0.60	510	0.72	0.73	529	0.69	0.76	491	0.64	0.70	182	0.68	0.64	2226

Tympanometric peak pressure in the single frequency tympanogram at 226Hz for left ear (daPa).

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	-0.4	23.4	247	-4.9	32.1	260	-7.0	38.9	256	-3.7	33.7	250	-6.7	34.3	86	-4.2	32.7	1099
Female	2.1	16.3	254	-1.0	25.4	235	-3.5	29.8	248	-13.5	46.9	224	-9.4	34.5	81	-4.2	31.9	1042
Total	0.9	20.2	501	-3.0	29.1	495	-5.3	34.7	504	-8.4	40.7	474	-8.0	34.3	167	-4.2	32.3	2141

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

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.60	0.37	247	0.69	0.67	260	0.72	0.73	256	0.77	0.78	250	0.62	0.59	86	0.69	0.66	1099
Female	0.55	0.43	254	0.56	0.56	235	0.57	0.60	248	0.57	0.53	224	0.43	0.39	81	0.55	0.52	1042
Total	0.57	0.40	501	0.63	0.62	495	0.65	0.67	504	0.68	0.68	474	0.53	0.51	167	0.62	0.60	2141

Middle ear resonance frequency for right ear (Hz)

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	810.5	239.7	248	732.8	218.5	262	774.1	249.3	260	789.1	259.1	239	827.1	267.7	83	779.8	245.3	1092
Female	885.1	257.7	258	814.0	257.1	239	856.4	266.9	243	876.7	289.2	219	862.5	303.7	76	858.5	271.0	1035
Total	848.5	251.6	506	771.6	240.9	501	813.8	261.0	503	831.0	277.1	458	844.0	285.1	159	818.1	261.0	2127

Middle ear resonance frequency for left ear (Hz)

	40-49yr			50-59yr			60-69yr			70-79yr			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	822.6	240.9	234	806.4	222.2	250	801.1	244.5	232	828.4	264.3	213	875.5	269.7	75	818.8	245.0	1004
Female	847.5	270.0	243	854.6	258.0	227	881.9	258.3	232	868.4	290.2	198	883.8	345.5	61	864.1	273.9	961
Total	835.3	256.2	477	829.4	240.9	477	841.5	254.5	464	847.7	277.5	411	879.2	304.9	136	841.0	260.5	1965

3. Video otoscopy

status of one' s ear canals and eardrums
Otosopic CCD camera MP-5(RF SYSTEM lab.)

Finding of right ear

	40-49yr	50-59yr	60-69yr	70-79yr	80yr-	Total
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		N	%	N	%	N	%	N	%	N	%	N	%
normal	Male	227	89.0	222	82.8	208	76.5	193	72.3	62	65.3	912	78.8
	Female	241	93.4	215	86.7	196	72.9	173	70.3	60	62.5	885	79.2
	Total	468	91.2	437	84.7	404	74.7	366	71.3	122	63.9	1797	79.0
A-B gap susp	Male	2	0.8	11	4.1	24	8.8	24	9.0	8	8.4	69	6.0
	Female	3	1.2	7	2.8	28	10.4	17	6.9	11	11.5	66	5.9
	Total	5	1.0	18	3.5	52	9.6	41	8.0	19	9.9	135	5.9
wax	Male	11	4.3	8	3.0	14	5.1	17	6.4	15	15.8	65	5.6
	Female	3	1.2	9	3.6	17	6.3	16	6.5	13	13.5	58	5.2
	Total	14	2.7	17	3.3	31	5.7	33	6.4	28	14.7	123	5.4
other	Male	15	5.9	27	10.1	26	9.6	33	12.4	10	10.5	111	9.6
	Female	11	4.3	17	6.9	28	10.4	40	16.3	12	12.5	108	9.7
	Total	26	5.1	44	8.5	54	10.0	73	14.2	22	11.5	219	9.6

Finding of left ear

		40-49yr		50-59yr		60-69yr		70-79yr		80yr-		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
normal	Male	230	90.2	232	86.6	211	77.6	205	76.8	62	65.3	940	81.2
	Female	240	93.0	225	90.7	223	82.9	185	75.2	62	64.6	935	83.7
	Total	470	91.6	457	88.6	434	80.2	390	76.0	124	64.9	1875	82.5
A-B gap susp	Male	3	1.2	19	7.1	27	9.9	21	7.9	11	11.6	81	7.0
	Female	5	1.9	6	2.4	20	7.4	20	8.1	11	11.5	62	5.6
	Total	8	1.6	25	4.8	47	8.7	41	8.0	22	11.5	143	6.3
wax	Male	8	3.1	8	3.0	9	3.3	12	4.5	11	11.6	48	4.1
	Female	3	1.2	4	1.6	8	3.0	17	6.9	11	11.5	43	3.8
	Total	11	2.1	12	2.3	17	3.1	29	5.7	22	11.5	91	4.0
other	Male	14	5.5	9	3.4	25	9.2	29	10.9	11	11.6	88	7.6
	Female	10	3.9	13	5.2	18	6.7	24	9.8	12	12.5	77	6.9
	Total	24	4.7	22	4.3	43	7.9	53	10.3	23	12.0	165	7.3

4. Distortion product otoacoustic emission

Distortion product otoacoustic emission (Otoacoustic Distortion Product Analyser, ILO 292 ver.5 [Otodynamics])

DP amplitudes above the noise floor at f2=1001 Hz (Right ear)

	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	1.8	8.8	252	1.8	8.5	261	-0.8	8.1	267	-4.2	7.3	255	-6.5	5.9	92	-0.8	8.5	1127
Female	2.5	8.4	256	0.9	7.7	243	-1.6	7.4	259	-4.0	7.5	235	-6.7	7.1	89	-1.0	8.2	1082
Total	2.2	8.6	508	1.4	8.1	504	-1.2	7.8	526	-4.1	7.4	490	-6.6	6.5	181	-0.9	8.4	2209

DP amplitudes above the noise floor at f2=1001 Hz (Left ear)

	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	1.6	8.1	253	1.7	7.4	264	-1.3	7.7	269	-3.7	7.4	254	-6.2	6.2	91	-0.9	8.0	1131
Female	3.0	8.0	254	1.3	8.4	236	-1.3	7.7	256	-4.7	7.6	237	-5.2	5.7	84	-0.8	8.3	1067
Total	2.3	8.0	507	1.5	7.9	500	-1.3	7.7	525	-4.2	7.5	491	-5.7	6.0	175	-0.8	8.2	2198

DP amplitudes above the noise floor at f2=1416 Hz (Right ear)

	40 - 49yr	50 - 59yr	60 - 69yr	70 - 79yr	80yr -	Total
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	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	6.1	8.7	252	4.9	10.2	261	2.9	9.1	267	-2.3	8.8	256	-4.6	8.8	92	2.3	9.9	1128
Female	6.0	9.4	256	4.5	9.2	243	1.3	9.1	259	-1.6	8.8	235	-4.0	7.4	89	2.1	9.6	1082
Total	6.1	9.0	508	4.7	9.7	504	2.1	9.1	526	-1.9	8.8	491	-4.3	8.1	181	2.2	9.7	2210

DP amplitudes above the noise floor at f2=1416 Hz (Left ear)

	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	4.8	8.6	253	4.8	8.3	264	1.9	9.2	269	-2.2	9.3	254	-4.5	6.9	91	1.8	9.3	1131
Female	6.2	9.3	254	5.9	8.5	236	2.0	9.5	256	-1.4	8.8	237	-5.0	7.8	84	2.5	9.7	1067
Total	5.5	9.0	507	5.3	8.4	500	1.9	9.3	525	-1.8	9.1	491	-4.8	7.3	175	2.1	9.5	2198

DP amplitudes above the noise floor at f2=2002 Hz (Right ear)

	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	5.2	9.6	252	4.3	10.1	261	2.8	9.3	267	-2.8	8.7	256	-4.2	8.1	92	1.8	10.0	1128
Female	6.2	9.5	256	5.1	9.1	243	1.6	9.2	259	-0.5	9.3	235	-2.1	7.4	89	2.7	9.6	1082
Total	5.7	9.6	508	4.7	9.6	504	2.2	9.3	526	-1.7	9.1	491	-3.1	7.8	181	2.3	9.8	2210

DP amplitudes above the noise floor at f2=2002 Hz (Left ear)

	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	3.4	10.2	253	3.7	9.9	264	1.3	9.9	268	-2.9	9.0	254	-4.4	7.3	91	1.0	10.0	1130
Female	5.3	9.9	254	4.7	9.6	236	2.5	9.8	256	-1.2	9.6	237	-1.3	7.7	84	2.5	9.9	1067
Total	4.4	10.1	507	4.2	9.8	500	1.9	9.8	524	-2.1	9.3	491	-2.9	7.6	175	1.7	10.0	2197

DP amplitudes above the noise floor at f2=3088 Hz (Right ear)

	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	4.8	10.7	252	3.8	10.1	261	-0.8	9.0	268	-3.8	7.8	256	-4.9	7.3	92	0.5	10.0	1129
Female	5.5	10.1	256	4.3	9.2	243	1.4	9.1	259	-1.9	9.1	235	-4.1	8.0	89	1.9	9.8	1082
Total	5.2	10.4	508	4.0	9.7	504	0.3	9.1	527	-2.9	8.5	491	-4.5	7.7	181	1.2	9.9	2211

DP amplitudes above the noise floor at f2=3088 Hz (Left ear)

	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	4.0	9.8	253	3.0	9.0	264	-0.5	9.0	269	-3.6	7.2	254	-5.0	6.8	91	0.3	9.2	1131
Female	4.8	10.0	254	3.5	9.0	236	1.3	9.3	256	-2.3	7.5	237	-3.5	7.5	84	1.5	9.4	1067
Total	4.4	9.9	507	3.2	9.0	500	0.4	9.2	525	-2.9	7.4	491	-4.3	7.1	175	0.9	9.3	2198

DP amplitudes above the noise floor at f2=4004 Hz (Right ear)

	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	3.7	11.5	252	2.5	11.1	261	-2.0	9.4	268	-5.3	7.6	256	-6.1	6.7	92	-0.8	10.5	1129
Female	5.3	12.3	256	4.1	10.9	243	0.6	9.5	259	-2.4	8.8	234	-4.8	8.3	89	1.4	10.8	1081
Total	4.5	11.9	508	3.3	11.0	504	-0.7	9.5	527	-3.9	8.3	490	-5.5	7.5	181	0.3	10.7	2210

DP amplitudes above the noise floor at f2=4004 Hz (Left ear)

	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	3.8	10.6	253	2.8	9.2	263	-1.5	9.2	269	-4.5	8.6	254	-5.3	6.8	91	-0.3	9.9	1130
Female	5.1	10.9	254	4.4	10.2	236	0.2	10.3	256	-2.9	9.1	237	-4.5	8.0	84	1.2	10.6	1067
Total	4.4	10.8	507	3.6	9.7	499	-0.7	9.8	525	-3.7	8.8	491	-4.9	7.4	175	0.4	10.2	2197

DP amplitudes above the noise floor at f2=5652 Hz (Right ear)

	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	2.8	11.8	252	0.2	9.1	261	-3.3	7.9	268	-5.4	7.2	256	-5.7	5.7	92	-1.8	9.5	1129
Female	4.9	13.2	256	5.2	11.8	243	0.0	10.5	259	-2.8	8.0	235	-4.4	7.6	89	1.4	11.4	1082
Total	3.8	12.6	508	2.6	10.8	504	-1.7	9.4	527	-4.2	7.7	491	-5.0	6.7	181	-0.3	10.6	2211

DP amplitudes above the noise floor at f2=5652 Hz (Left ear)

	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	2.8	12.2	253	1.2	10.4	264	-3.2	8.0	269	-5.5	7.9	254	-5.9	6.4	91	-1.6	10.1	1131
Female	5.6	12.6	254	5.2	11.5	236	0.8	10.1	255	-3.8	8.9	236	-6.3	7.3	84	1.3	11.4	1065
Total	4.2	12.4	507	3.1	11.1	500	-1.3	9.3	524	-4.7	8.4	490	-6.1	6.9	175	-0.2	10.9	2196

DP amplitudes above the noise floor at f2=6165 Hz (Right ear)

	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	3.2	11.3	251	-0.2	9.7	261	-3.2	7.2	267	-4.6	6.3	256	-5.9	7.3	92	-1.6	9.3	1127
Female	5.3	11.9	256	4.3	11.0	243	-0.9	9.6	259	-2.6	7.7	235	-4.0	7.1	89	1.1	10.6	1082
Total	4.3	11.7	507	2.0	10.6	504	-2.0	8.5	526	-3.6	7.1	491	-5.0	7.2	181	-0.3	10.0	2209

DP amplitudes above the noise floor at f2=6165 Hz (Left ear)

	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	2.8	11.6	253	0.1	10.0	264	-3.1	8.3	269	-5.4	6.9	254	-5.8	6.0	91	-1.8	9.6	1131
Female	4.8	11.9	254	3.6	9.9	236	-0.6	9.1	256	-3.4	7.5	237	-5.0	5.7	84	0.7	10.1	1067
Total	3.8	11.8	507	1.8	10.1	500	-1.9	8.8	525	-4.4	7.3	491	-5.4	5.9	175	-0.6	9.9	2198