

11. Cornea

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

Corneal Thickness in the Right Eye (mm)

	40-49yr			50-59yr			60-69yr			70-80yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.522	0.034	136	0.518	0.029	130	0.516	0.032	148	0.512	0.034	140	0.517	0.032	554
Female	0.515	0.037	134	0.508	0.035	139	0.511	0.034	146	0.508	0.034	144	0.510	0.035	563
Total	0.519	0.035	270	0.513	0.033	269	0.513	0.033	294	0.510	0.034	284	0.514	0.034	1117

Corneal Thickness in the Left Eye (mm)

	40-49yr			50-59yr			60-69yr			70-80yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.525	0.032	135	0.522	0.029	128	0.522	0.034	149	0.518	0.035	141	0.522	0.033	553
Female	0.518	0.035	136	0.512	0.034	140	0.518	0.033	146	0.512	0.034	143	0.515	0.034	565
Total	0.521	0.034	271	0.517	0.032	268	0.520	0.033	295	0.515	0.035	284	0.518	0.034	1118

Endothelial cell density of Cornea in the Right Eye (cells/mm²)

	40-49yr			50-59yr			60-69yr			70-80yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	2585.7	334.2	131	2568.7	313.0	129	2486.5	375.1	143	2545.7	374.9	139	2545.2	352.5	542
Female	2498.5	371.0	129	2515.1	387.9	130	2456.7	375.3	142	2322.4	430.4	137	2446.6	398.3	538
Total	2542.4	355.0	260	2541.8	352.9	259	2471.6	374.9	285	2434.8	417.9	276	2496.1	379.0	1080

Endothelial cell density of Cornea in the Left Eye (cells/mm²)

	40-49yr			50-59yr			60-69yr			70-80yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	2575.8	332.3	130	2529.2	364.4	130	2458.9	408.5	146	2532.2	402.7	139	2522.3	380.9	545
Female	2544.8	374.1	133	2452.1	359.3	134	2450.6	352.7	142	2392.2	390.1	141	2458.8	372.3	550
Total	2560.1	353.7	263	2490.1	363.2	264	2454.8	381.4	288	2461.7	401.8	280	2490.4	377.8	1095

Auditory system

1. 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
500Hz	100	105	65		70
1000Hz	100	105	70		75
2000Hz	100	105	70		75
4000Hz	100	105	60		65
8000Hz	95	100			

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	11.5	8.6	282	15.1	12.6	279	18.8	12.6	284	24.6	15.5	282	17.5	13.4	1127
Male	11.5	8.2	291	14.8	12.2	281	17.6	12.4	283	23.8	15.8	282	16.9	13.2	1137
Total	11.5	8.4	573	15.0	12.4	560	18.2	12.5	567	24.2	15.7	564	17.2	13.3	2264

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	8.2	8.5	282	11.9	11.6	279	16.9	13.0	284	24.1	15.9	282	15.3	13.9	1127
Male	9.8	8.9	291	14.2	13.4	281	18.3	13.8	283	26.4	17.4	282	17.1	15.0	1137
Total	9.0	8.7	573	13.1	12.6	560	17.6	13.4	567	25.2	16.7	564	16.2	14.5	2264

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	11.6	7.8	282	15.6	12.6	279	22.3	13.5	284	30.5	16.8	282	20.0	14.9	1127
Male	12.6	10.7	291	18.0	13.6	281	25.5	15.7	283	36.2	18.8	282	23.0	17.4	1137
Total	12.1	9.4	573	16.8	13.1	560	23.9	14.7	567	33.4	18.0	564	21.5	16.3	2264

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	10.4	9.2	282	16.2	14.6	279	25.1	17.4	284	36.9	19.7	282	22.2	18.6	1127
Male	18.0	16.2	291	29.1	19.5	281	38.4	20.4	283	51.1	19.9	282	34.0	22.6	1137
Total	14.3	13.7	573	22.6	18.4	560	31.8	20.1	567	44.0	21.0	564	28.1	21.5	2264

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	18.1	12.9	282	28.2	17.2	279	40.3	20.6	284	59.8	21.0	282	36.6	23.9	1127
Male	23.1	15.9	291	34.3	19.1	281	48.0	21.2	283	65.2	18.4	282	42.5	24.5	1137
Total	20.6	14.7	573	31.3	18.4	560	44.1	21.3	567	62.5	19.9	564	39.6	24.4	2264

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	26.8	11.3	17	35.5	13.6	20	31.5	12.7	40	38.0	10.4	81	34.8	12.0	158
Male	34.2	16.3	6	30.6	13.2	24	31.8	13.2	44	37.0	14.4	85	34.5	14.1	159
Total	28.7	12.8	23	32.8	13.4	44	31.7	12.9	84	37.5	12.6	166	34.7	13.1	317

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	29.5	14.6	10	34.0	10.8	20	35.8	12.0	36	39.5	10.1	92	37.3	11.2	158
Male	34.2	26.2	6	36.2	14.9	25	34.5	16.3	52	40.0	14.6	105	37.8	15.6	188
Total	31.3	19.0	16	35.2	13.1	45	35.1	14.6	88	39.7	12.6	197	37.6	13.8	346

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	31.5	10.1	13	35.2	13.3	32	37.0	9.4	72	42.0	11.7	135	39.1	11.6	252
Male	43.2	16.5	11	38.6	11.9	39	39.6	12.6	97	45.5	13.8	169	42.8	13.6	316
Total	36.9	14.4	24	37.0	12.6	71	38.5	11.4	169	43.9	13.0	304	41.2	12.9	568

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	38.9	11.9	9	34.6	12.8	40	38.1	10.6	96	42.5	12.4	173	40.1	12.2	318
Male	41.7	12.1	47	42.0	11.1	111	44.6	11.6	180	49.1	11.2	234	45.7	11.7	572
Total	41.3	12.0	56	40.1	12.0	151	42.3	11.6	276	46.3	12.1	407	43.7	12.2	890

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	11.6	9.6	282	13.6	9.3	279	18.6	13.3	284	24.0	15.0	282	17.0	13.0	1127
Male	11.9	9.7	291	13.8	12.5	281	17.3	14.4	283	23.6	15.7	281	16.6	14.0	1136
Total	11.8	9.7	573	13.7	11.0	560	18.0	13.9	567	23.8	15.4	563	16.8	13.5	2263

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	6.6	10.0	282	8.9	8.4	279	14.8	13.3	284	21.6	16.6	282	13.0	13.7	1127
Male	9.7	10.0	291	12.9	13.1	281	17.5	16.1	283	26.2	17.8	281	16.5	15.8	1136
Total	8.1	10.1	573	10.9	11.1	560	16.1	14.8	567	23.9	17.3	563	14.8	14.9	2263

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	10.0	9.6	282	13.6	9.8	279	20.4	14.3	284	27.9	17.1	282	18.0	14.8	1127
Male	12.5	11.2	291	18.3	15.3	281	25.2	17.4	283	35.8	19.4	281	22.9	18.3	1136
Total	11.3	10.6	573	16.0	13.0	560	22.8	16.1	567	31.8	18.7	563	20.4	16.8	2263

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	9.1	9.9	282	15.5	12.3	279	24.6	16.6	284	37.7	34.8	282	21.8	23.4	1127
Male	18.3	15.3	291	28.2	18.4	281	39.3	20.3	283	51.2	18.9	281	34.1	22.1	1136
Total	13.8	13.7	573	21.9	16.9	560	31.9	19.9	567	44.5	28.8	563	28.0	23.6	2263

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	18.6	14.2	282	28.2	17.4	279	42.0	19.8	284	59.0	20.5	282	37.0	23.7	1127
Male	22.6	15.8	291	34.5	20.4	281	50.1	21.8	283	66.1	18.2	281	43.2	25.2	1136
Total	20.7	15.2	573	31.4	19.2	560	46.0	21.2	567	62.6	19.7	563	40.1	24.6	2263

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	31.5	11.3	13	28.2	7.7	19	32.2	12.6	48	36.8	11.3	80	34.0	11.7	160
Male	20.5	29.7	10	27.7	15.9	22	31.3	14.8	35	38.6	15.2	88	34.2	17.2	155
Total	26.7	21.5	23	27.9	12.6	41	31.8	13.5	83	37.7	13.5	168	34.1	14.6	315

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	40.0	16.0	8	35.6	10.8	8	35.9	13.2	29	41.2	11.4	73	39.4	12.3	118
Male	30.6	12.1	8	29.2	15.5	25	36.2	16.6	45	39.0	14.4	117	36.7	15.3	195
Total	35.3	14.5	16	30.8	14.6	33	36.1	15.3	74	39.8	13.3	190	37.8	14.2	313

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	40.0	14.7	7	36.4	8.7	21	38.2	9.2	65	43.2	11.0	123	40.9	10.7	216
Male	36.7	16.3	15	37.8	13.3	47	41.8	12.2	90	45.9	14.9	166	43.1	14.4	318
Total	37.7	15.6	22	37.4	12.0	68	40.3	11.2	155	44.8	13.4	289	42.2	13.0	534

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	32.7	13.5	11	35.6	11.5	35	39.5	11.5	89	44.2	10.5	164	41.4	11.5	299
Male	39.0	11.3	56	39.9	11.0	118	45.2	11.4	181	49.3	11.6	243	45.2	12.0	598
Total	38.0	11.8	67	38.9	11.2	153	43.3	11.7	270	47.2	11.4	407	43.9	12.0	897

2. Impedance Audiometry

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	1.3	14.0	263	-5.9	35.9	256	-14.5	46.9	257	-11.8	43.6	246	-7.6	37.6	1022
Male	-5.1	32.0	269	-7.6	37.2	263	-9.4	44.2	242	-13.9	46.0	250	-8.9	40.1	1024
Total	-1.9	25.0	532	-6.8	36.5	519	-12.1	45.6	499	-12.9	44.8	496	-8.3	38.9	2046

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	0.67	0.52	263	0.70	0.63	256	0.66	0.62	257	0.62	0.59	246	0.66	0.59	1022
Male	0.83	0.68	269	0.92	0.88	263	0.87	0.85	242	0.82	0.74	250	0.86	0.79	1024
Total	0.75	0.61	532	0.82	0.78	519	0.76	0.75	499	0.72	0.67	496	0.76	0.71	2046

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	1.2	19.0	256	-3.7	33.2	257	-9.8	39.3	255	-9.7	39.4	244	-5.5	34.0	1012
Male	-3.9	28.7	267	-5.8	30.8	260	-8.2	44.7	246	-13.8	51.6	247	-7.8	39.9	1020
Total	-1.4	24.6	523	-4.8	32.0	517	-9.0	42.0	501	-11.8	46.0	491	-6.6	37.1	2032

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

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	0.64	0.65	256	0.67	0.59	257	1.05	5.95	255	0.58	0.49	244	0.74	3.03	1012
Male	0.81	0.71	267	0.84	0.79	260	0.91	0.83	246	0.82	0.83	247	0.84	0.79	1020
Total	0.73	0.69	523	0.75	0.70	517	0.98	4.28	501	0.70	0.69	491	0.79	2.21	2032

Middle ear resonance frequency for the right ear (Hz)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	900.8	252.4	259	865.1	240.9	244	906.1	265.6	246	906.7	257.1	231	894.6	254.3	980
Male	823.2	216.9	269	799.2	229.0	261	825.5	248.8	236	851.5	274.0	240	824.3	242.5	1006
Total	861.3	237.9	528	831.1	236.9	505	866.6	260.4	482	878.6	267.0	471	859.0	250.8	1986

Middle ear resonance frequency for the left ear (Hz)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Female	898.8	563.5	252	873.0	237.1	246	905.5	255.8	246	906.3	246.1	230	895.7	356.4	974
Male	841.7	242.4	266	810.3	229.6	257	834.2	229.1	228	799.4	237.8	232	821.8	235.2	983
Total	869.5	430.3	518	841.0	235.2	503	871.2	245.6	474	852.6	247.5	462	858.6	303.8	1957

3. Stabilometry (NEC corp.)

Stabilometry - out around area with eye opened (cm2)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	1.99	1.05	212	2.25	1.08	222	2.62	1.35	221	3.06	1.86	223	2.49	1.43	878
Female	1.71	0.84	225	2.07	0.92	220	2.42	1.19	225	2.81	1.48	209	2.24	1.20	879
Total	1.85	0.96	437	2.16	1.01	442	2.52	1.27	446	2.94	1.69	432	2.36	1.33	1757

Stabilometry - total power spectram X with eye opened (cm)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.26	0.20	213	0.28	0.22	222	0.32	0.21	221	0.37	0.25	223	0.31	0.23	879
Female	0.21	0.14	225	0.25	0.19	220	0.30	0.22	225	0.36	0.29	209	0.28	0.22	879
Total	0.23	0.17	438	0.26	0.20	442	0.31	0.21	446	0.37	0.27	432	0.29	0.22	1758

Stabilometry - total power spectram Y with eye opened (cm)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.46	0.43	213	0.50	0.37	222	0.53	0.41	221	0.58	0.46	223	0.52	0.42	879
Female	0.38	0.32	225	0.47	0.39	220	0.50	0.40	225	0.52	0.35	209	0.47	0.37	879
Total	0.42	0.38	438	0.48	0.38	442	0.52	0.41	446	0.55	0.41	432	0.49	0.40	1758

Stabilometry - center coodainates X with eye opened (cm)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	-0.09	0.76	213	-0.05	0.83	222	0.02	0.68	221	0.08	0.83	223	-0.01	0.78	879
Female	0.01	0.66	225	0.07	0.69	220	0.13	0.70	225	0.21	0.70	209	0.10	0.69	879
Total	-0.04	0.71	438	0.01	0.76	442	0.08	0.69	446	0.14	0.77	432	0.05	0.74	1758

Stabilometry - center coordinates Y with eye opened (cm)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.24	1.54	213	0.47	1.64	222	0.42	1.45	221	0.78	1.62	223	0.48	1.57	879
Female	-0.84	1.40	225	-0.63	1.46	220	-0.62	1.50	225	-0.46	1.43	209	-0.64	1.45	879
Total	-0.31	1.56	438	-0.08	1.64	442	-0.11	1.56	446	0.18	1.65	432	-0.08	1.61	1758

Stabilometry - back and forth difference with eye opened (cm)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	2.30	0.77	213	2.50	0.76	222	2.62	0.79	221	2.72	0.94	223	2.54	0.83	879
Female	2.14	0.66	225	2.37	0.66	220	2.51	0.69	225	2.58	0.73	209	2.40	0.70	879
Total	2.22	0.72	438	2.43	0.71	442	2.57	0.75	446	2.65	0.84	432	2.47	0.77	1758

Stabilometry - right and left difference with eye opened (cm)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	1.86	0.54	213	1.97	0.54	222	2.16	0.62	221	2.38	0.90	223	2.10	0.69	879
Female	1.72	0.46	225	1.90	0.51	220	2.08	0.61	225	2.30	0.79	209	1.99	0.64	879
Total	1.79	0.51	438	1.94	0.53	442	2.12	0.62	446	2.34	0.85	432	2.05	0.67	1758

Stabilometry - total locus length with eye opened (cm)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	75.26	15.33	213	79.40	14.03	222	83.67	14.22	221	97.46	29.27	223	84.05	21.06	879
Female	69.83	10.06	225	75.06	12.99	220	79.37	14.52	225	85.57	18.23	209	77.32	15.28	879
Total	72.47	13.16	438	77.24	13.68	442	81.50	14.52	446	91.71	25.24	432	80.69	18.70	1758

Stabilometry - out around area with eye closed (cm²)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	3.88	5.76	213	3.88	2.13	222	4.73	2.85	221	5.46	3.60	223	4.49	3.86	879
Female	2.87	1.83	225	3.16	1.74	220	4.09	2.61	225	4.38	3.49	209	3.61	2.57	879
Total	3.36	4.25	438	3.52	1.98	442	4.40	2.75	446	4.94	3.59	432	4.05	3.31	1758

Stabilometry - total power spectram X with eye closed (cm)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.42	0.40	213	0.43	0.30	222	0.57	0.45	221	0.66	0.54	223	0.52	0.44	879
Female	0.35	0.29	225	0.37	0.36	220	0.48	0.33	225	0.54	0.50	209	0.43	0.39	879
Total	0.39	0.35	438	0.40	0.33	442	0.52	0.40	446	0.60	0.52	432	0.48	0.42	1758

Stabilometry - total power spectram Y with eye closed (cm)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.60	0.49	213	0.62	0.37	222	0.77	0.54	221	0.78	0.55	223	0.70	0.50	879
Female	0.49	0.40	225	0.53	0.34	220	0.69	0.60	225	0.65	0.44	209	0.59	0.46	879
Total	0.54	0.45	438	0.57	0.36	442	0.73	0.57	446	0.72	0.51	432	0.64	0.48	1758

Stabilometry - center coodainates X with eye closed (cm)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	-0.14	0.82	213	-0.11	0.83	222	-0.04	0.77	221	-0.05	0.85	223	-0.08	0.82	879
Female	0.03	0.67	225	0.04	0.73	220	0.06	0.72	225	0.17	0.74	209	0.07	0.72	879
Total	-0.05	0.75	438	-0.03	0.78	442	0.01	0.75	446	0.06	0.81	432	-0.01	0.77	1758

Stabilometry - center coodainates Y with eye closed (cm)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.59	1.62	213	0.83	1.55	222	0.71	1.43	221	1.04	1.59	223	0.79	1.55	879
Female	-0.58	1.30	225	-0.20	1.46	220	-0.28	1.46	225	-0.15	1.46	209	-0.31	1.43	879
Total	-0.01	1.57	438	0.32	1.59	442	0.21	1.52	446	0.46	1.64	432	0.24	1.59	1758

Stabilometry - back and forth difference with eye closed (cm)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	2.91	0.85	213	3.03	0.85	222	3.29	1.03	221	3.41	1.14	223	3.16	1.00	879
Female	2.61	0.86	225	2.72	0.78	220	3.09	1.04	225	3.06	0.93	209	2.87	0.93	879
Total	2.75	0.87	438	2.87	0.83	442	3.19	1.04	446	3.24	1.06	432	3.01	0.97	1758

Stabilometry - right and left difference with eye closed (cm)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	2.48	0.84	213	2.57	0.83	222	2.92	0.99	221	3.11	1.16	223	2.77	1.00	879
Female	2.21	0.71	225	2.36	0.83	220	2.66	0.87	225	2.82	1.16	209	2.51	0.93	879
Total	2.34	0.79	438	2.46	0.84	442	2.79	0.94	446	2.97	1.16	432	2.64	0.97	1758

Stabilometry - total locus length with eye closed (cm)

	40-49yr			50-59yr			60-69yr			70-79yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	104.09	33.74	213	108.91	28.39	222	120.28	39.42	221	144.91	62.32	223	119.73	45.81	879
Female	89.84	18.57	225	95.02	22.64	220	107.59	30.49	225	114.07	40.44	209	101.44	30.54	879
Total	96.77	27.92	438	102.00	26.59	442	113.88	35.73	446	129.99	55.02	432	110.59	39.98	1758

MONOGRAPH

The Second Wave

April, 2000~ , September 2001

Visual, Auditory and Balance
Examinations

National Institute for
Longevity Sciences
Longitudinal Study of Aging

NILS-LSA

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/mm²)

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)

3) Stabilometry

With eyes open

With eyes closed

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			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	-1.57	1.47	149	-1.12	1.44	207	-0.32	1.26	209	-0.14	1.05	199	-0.46	0.82	14	-0.73	1.41	778
Female	-1.34	1.46	158	-0.92	1.59	196	-0.02	1.20	185	0.02	1.04	174	-0.70	0.81	12	-0.55	1.45	725
Total	-1.45	1.47	307	-1.02	1.51	403	-0.18	1.24	394	-0.07	1.05	373	-0.57	0.81	26	-0.64	1.43	1503

Spherical Equivalent of Refractive Error - Left 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	-1.51	1.41	149	-1.04	1.39	207	-0.24	1.14	209	-0.07	1.04	195	-0.24	0.83	14	-0.66	1.36	774
Female	-1.34	1.43	159	-0.92	1.53	195	-0.02	1.22	187	0.03	0.97	177	-1.16	0.84	12	-0.56	1.42	730
Total	-1.42	1.42	308	-0.98	1.46	402	-0.14	1.18	396	-0.03	1.01	372	-0.66	0.94	26	-0.61	1.39	1504

2. Visual acuity: near vision (33 cm), 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		80 - yr		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
not recorded	Male	-	-	-	-	-	-	-	-	-	-	-	-
	Female	1	0.6	-	-	-	-	-	-	-	-	1	0.1
	Total	1	0.3	-	-	-	-	-	-	-	-	1	0.1
0.3 or less	Male	3	2.0	7	3.3	12	5.6	12	5.9	3	21.4	37	4.7
	Female	3	1.9	7	3.6	7	3.7	19	10.2	4	30.8	40	5.4
	Total	6	1.9	14	3.5	19	4.7	31	7.9	7	25.9	77	5.0
0.3-0.6	Male	21	14.1	22	10.5	33	15.5	59	28.8	4	28.6	139	17.6
	Female	16	10.1	30	15.3	67	35.3	71	38.0	4	30.8	188	25.2
	Total	37	12.0	52	12.8	100	24.8	130	33.2	8	29.6	327	21.3
0.7 or more	Male	125	83.9	180	86.1	168	78.9	134	65.4	7	50.0	614	77.7
	Female	139	87.4	159	81.1	116	61.1	97	51.9	5	38.5	516	69.3
	Total	264	85.7	339	83.7	284	70.5	231	58.9	12	44.4	1130	73.6

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	-	-	-	-	-	-	-	-	-	-	-	-
	Female	1	0.6	-	-	-	-	-	-	-	-	1	0.1
	Total	1	0.3	-	-	-	-	-	-	-	-	1	0.1
0.3 or less	Male	1	0.7	3	1.4	6	2.8	12	5.9	1	7.1	23	2.9
	Female	7	4.4	12	6.1	7	3.7	18	9.6	8	61.5	52	7.0
	Total	8	2.6	15	3.7	13	3.2	30	7.7	9	33.3	75	4.9
0.3-0.6	Male	14	9.4	21	10.0	41	19.2	59	28.8	4	28.6	139	17.6
	Female	15	9.4	23	11.7	54	28.4	77	41.2	2	15.4	171	23.0
	Total	29	9.4	44	10.9	95	23.6	136	34.7	6	22.2	310	20.2
0.7 or more	Male	134	89.9	185	88.5	166	77.9	134	65.4	9	64.3	628	79.5
	Female	136	85.5	161	82.1	129	67.9	92	49.2	3	23.1	521	69.9
	Total	270	87.7	346	85.4	295	73.2	226	57.7	12	44.4	1149	74.9

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	-	-	1	0.5	-	-	-	-	-	-	1	0.1
	Female	-	-	-	-	-	-	1	0.5	-	-	1	0.1
	Total	-	-	1	0.2	-	-	1	0.3	-	-	2	0.1
0.3 or less	Male	1	0.7	2	1.0	6	2.8	2	1.0	2	14.3	13	1.6
	Female	1	0.6	-	-	1	0.5	9	4.8	1	7.7	12	1.6
	Total	2	0.6	2	0.5	7	1.7	11	2.8	3	11.1	25	1.6
0.3-0.6	Male	3	2.0	5	2.4	15	7.0	41	20.0	-	-	64	8.1
	Female	1	0.6	5	2.6	24	12.6	49	26.2	3	23.1	82	11.0
	Total	4	1.3	10	2.5	39	9.7	90	23.0	3	11.1	146	9.5
0.7 or more	Male	145	97.3	201	96.2	192	90.1	162	79.0	12	85.7	712	90.1
	Female	157	98.7	191	97.4	165	86.8	128	68.4	9	69.2	650	87.2
	Total	302	98.1	392	96.8	357	88.6	290	74.0	21	77.8	1362	88.7

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	0.5	-	-	-	-	-	-	1	0.1
	Female	-	-	-	-	-	-	1	0.5	-	-	1	0.1
	Total	-	-	1	0.2	-	-	1	0.3	-	-	2	0.1
0.3 or less	Male	-	-	-	-	4	1.9	8	3.9	-	-	12	1.5
	Female	1	0.6	-	-	2	1.1	4	2.1	3	23.1	10	1.3
	Total	1	0.3	-	-	6	1.5	12	3.1	3	11.1	22	1.4
0.3-0.6	Male	1	0.7	7	3.3	18	8.5	39	19.0	2	14.3	67	8.5
	Female	2	1.3	10	5.1	18	9.5	47	25.1	5	38.5	82	11.0
	Total	3	1.0	17	4.2	36	8.9	86	21.9	7	25.9	149	9.7
0.7 or more	Male	148	99.3	201	96.2	191	89.7	158	77.1	12	85.7	710	89.9
	Female	156	98.1	186	94.9	170	89.5	135	72.2	5	38.5	652	87.5
	Total	304	98.7	387	95.6	361	89.6	293	74.7	17	63.0	1362	88.7

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			80 - yr			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	50.4	25.1	148	41.8	19.9	208	37.2	17.3	209	32.5	15.9	204	26.2	14.3	13	39.5	20.3	782
Female	45.7	22.5	158	38.7	18.3	196	33.1	16.6	190	28.2	12.9	179	25.0	7.4	12	36.0	18.7	735
Total	48.0	23.9	306	40.3	19.2	404	35.2	17.1	399	30.5	14.7	383	25.6	11.3	25	37.8	19.6	1517

Contrast Sensitivity at 3 cycles/degree

	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	86.0	37.1	148	82.0	35.9	208	75.5	35.0	209	58.6	31.1	204	46.6	24.1	13	74.3	36.1	782
Female	89.1	43.8	158	79.6	35.6	196	66.0	34.3	190	51.5	26.3	179	42.3	5.8	12	70.7	37.7	735
Total	87.6	40.7	306	80.8	35.7	404	71.0	35.0	399	55.3	29.1	383	44.6	17.6	25	72.5	36.9	1517

Contrast Sensitivity at 6 cycles/degree

	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	85.4	44.6	148	86.3	49.7	208	75.9	47.7	209	49.3	34.6	204	33.8	18.4	13	72.8	46.9	782
Female	93.0	50.3	158	86.6	47.8	196	61.2	42.9	190	43.3	34.0	179	30.4	16.3	12	70.0	48.1	735
Total	89.3	47.7	306	86.5	48.7	404	68.9	46.0	399	46.5	34.4	383	32.2	17.2	25	71.4	47.5	1517

Contrast Sensitivity at 12 cycles/degree

	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	48.5	33.5	148	47.7	35.4	208	37.8	32.7	209	19.8	20.1	204	9.3	9.2	13	37.3	32.9	782
Female	49.9	34.5	158	47.3	32.5	196	26.3	25.4	190	14.6	18.5	179	7.5	5.6	12	33.8	31.7	735
Total	49.2	34.0	306	47.5	34.0	404	32.3	30.0	399	17.4	19.5	383	8.4	7.6	25	35.6	32.3	1517