25. A Chromosomal Aberrations on Senile Dementia

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A chromosomal study was conducted on the patients with senile dementia. The aneuploidy and the fragility in the chromosome were investigated.

All the 31 donors of peripheral blood, ranging from 55 to 96 years, were admitted to the National Sanatorium Kamo Hospital. Of 31 cases, 22 cases were females and 9 cases were males. All the cases had senile dementia, and 6 cases of them were Alzheimer-type dementia and initiated at the presenile period.

Cytological findings. The lymphocytes from the peripheral blood were cultured for 72 hrs in the medium of minimal essential medium without folic acid (MEM-FA) supplemented with 5% calf serum (Sutherland, 1979). Additionally, in order to enhance the fragility, the half of cells were exposed to 2.2 mM caffeine during the last 6 hrs of the culture (Yunis and Soreng, 1984). The slides were made by means of the flame-drying technique. The chromosome counts were made with 100 well-delineated and not-distributed metaphases for the respective case. The observation of breaks and/or gaps was found in 50 cells each by the culture with and without caffeine.

The details of the cytological findings of all the 31 cases are presented in Tables I and II. Table I shows the distribution of chromosome counts and the frequencies of aneuploidies. Out of the total 3100 cells counted, 347 cells had aneuploidies. Especially, out of 347 cells having aneuploidies, 294 cells had 45 chromosomes. On the average, the frequency of aneuploidies was 11.2% and the frequency of the cells having 45 chromosomes was 9.48%.

Table II shows the chromosome fragility as the frequency of breaks and/or gaps. In the medium of MEM-FA, the break points were observed in 26 cases out of all the 31 cases. The frequencies of break points distributed from once in one cell to 21 times in 13 cells. In the medium of MEM-FA with caffeine, the 30 out of 31 cases had the break points, and the frequencies of them distributed from once in one cell to 215 times in 42 cells, showing the higher frequency compared to the medium of MEM-FA.

Remarks and conclusion. In 1961, Jacobs *et al.* published the initial report of increasing aneuploidies with advancing age. On the other hand, the maternal age have been a matter of concern for the origin of Down's syndrome. Kadotani *et al.* (1978) revealed that cells with endoreduplication and fragments significantly increased in blood cultures from women over 60 years. Thus far, the relationship between the aging and the chromosome aberrations have been well investigated. However, the chromosomal studies on senile dementia have been remained still meager. In this study, the patients with senile dementia were investigated concerning the aneuploidy and the fragility in chromosome.

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Table I. Distribution of chromosome counts per cell

Case no.	Sex	Age	Cells obs.	Chromosome count					Aneuploidy (45)	Average of aneuploidy (45)
				≤ 44	45	46	47	$48 \leq$		
1	F	60	100	0	3	91	5	1	9 (3)	
2*	F	61	100	0	5	92	2	1	8 (5)	
3*	F	65	100	0	5	93	2	0	7 (5)	
4*	F	66	100	2	9	89	0	0	11 (9)	
5	F	68	100	1	5	92	2	0	8 (5)	15.3% (12.7%)
6	F	71	100	2	16	82	0	0	18 (16)	
7	F	72	100	2	15	81	2	0	19 (15)	
8	F	74	100	3	26	71	0	0	29 (26)	
9	F	75	100	0	5	93	2	0	7 (5)	
10	F	76	100	1	7	91	1	0	9 (7)	
11	F	78	100	0	8	92	0	0	8 (8)	
12	F	81	100	0	5	94	1	0	6 (5)	
13	F	81	100	0	4	96	0	0	4 (4)	
14	F	82	100	0	8	87	3	2	13 (8)	
15	F	84	100	2	19	78	1	0	22 (19)	11.1% (9.5%)
16	F	84	100	2	14	83	1	0	17 (14)	
17	F	85	100	1	14	85	0	0	15 (14)	
18	F	86	100	2	17	78	3	0	22 (17)	
19	F	88	100	1	11	88	0	0	12 (11)	
20	F	90	100	0	6	94	0	0	6 (6)	
21	F	90	100	0	11	89	0	0	11 (11)	
22	F	96	100	0	4	96	0	0	4 (4)	
23*	M	55	100	0	9	90	1	0	10 (9)	
24	M	63	100	0	14	84	1	1	16 (14)	10.7% (9.7%)
25	M	64	100	0	6	94	0	0	6 (6)	
26	M	67	100	0	13	86	1	0	14 (13)	
27	M	70	100	0	5	95	0	0	5 (5)	9.25% (9.0%)
28	M	71	100	0	7	93	0	0	7 (7)	
29	M	75	100	0	11	89	0	0	11 (11)	
30	M	83	100	0	9	91	0	0	9 (9)	
31	M	84	100	0	3	96	1	0	4 (3)	
Total			3100	19	294	2753	29	5	347 (294)	11.2% (9.48%)

Cells obs.: observed cells. *: Alzheimer-type presenile dementia.

As the results on the aneuploidy, except for females being over 75 years, the higher frequencies were gotten in comparison with the data by Jacobs *et al.* (1963, 1964) (Table III). Concerning the XO cells out of aneuploidies in females, Jacobs *et al.* reported 8.1% in the range from 55 to 75 years. Our data showed the higher frequencies, being 12.7% in the range from 65 to 74 years and 9.5% in the range over 75 years.

Kadotani *et al.* (1988) reported the fragile site on normal aged women. In the report, out of all the 30 cases, the break points were observed in 7 cases in the medium MEM-FA and in 20 cases in MEM-FA with caffeine. In this study, out of all the 31 cases, the break points were found in 26 cases in MEM-FA and in 30 cases in MEM-FA with caffeine, showing the higher frequency compared to the data by Kadotani *et al.* (1988).

Table II. Chromosome fragility

Case no.	Sex	Age	MEM-FA			MEM-FA with caffeine		
			Cells obs.	Cells with B. P.	B. P.	Cells obs.	Cells with B. P.	B. P.
1	F	60	50	1	1	50	9	13
2*	F	61	50	9	9	50	42	215
3*	F	65	50	7	8	50	27	70
4*	F	66	50	4	6	50	15	48
5	F	68	50	1	1	50	25	46
6	F	71	50	0	0	50	1	1
7	F	72	50	0	0	50	4	6
8	F	74	50	3	3	50	8	14
9	F	75	50	2	3	50	16	28
10	F	76	50	1	1	50	8	9
11	F	78	50	0	0	50	12	36
12	F	81	50	3	5	50	21	36
13	F	81	50	1	1	50	9	14
14	F	82	50	1	1	50	5	9
15	F	84	50	13	21	50	22	62
16	F	84	50	3	3	50	0	0
17	F	85	50	2	2	50	9	13
18	F	86	50	0	0	50	1	1
19	F	88	50	0	0	50	2	2
20	F	90	50	0	0	50	5	9
21	F	90	50	2	2	50	11	22
22	F	96	50	3	3	50	12	28
23*	M	55	50	8	8	50	13	24
24	M	63	50	2	2	50	20	70
25	M	64	50	5	5	50	7	8
26	M	67	50	4	4	50	8	11
27	M	70	50	6	6	50	34	152
28	M	71	50	0	0	50	6	9
29	M	75	50	3	3	50	15	26
30	M	83	50	2	2	50	2	2
31	M	84	50	2	2	50	8	10
Total			1550	88	102	1550	377	994

Cells obs.: observed cells. B.P.: break point. *: Alzheimer-type presenile dementia.

Table III. Frequencies of aneuploidies in comparison with the data Jacobs *et al.* (1963, 1964)

Sex	Age	Frequencies of aneuploidies	
		Jacobs <i>et al.</i>	Our data
Females	15-54	5.3%	
	55-64	10.3%	
	65-74	11.7%	15.3 %
	75-	12.9%	11.1 %
Males	15-64	0.2%	10.7 %
	65-75	0.7%	9.25%

On the break points, particularly in the medium MEM-FA with caffeine, various numbers were observed for each cases and the high frequencies were observed in 4 cases of Alzheimer-type presenile dementia (Table II).

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