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## Short communication: Breast parenchymal patterns and their changes with age

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### Abstract

In studies on mass screening, it has often been reported that tumours in breasts with dense parenchyma are difficult to detect and may have a more advanced stage at diagnosis. Shorter rescreening intervals have been suggested for these women but, before recommending such a strategy, it is important to investigate how often dense breast parenchyma (P2 and DY patterns according to Wolfe) is actually present in a screening population and to what extent these patterns change with age. The prevalence of dense breast parenchyma (P2 and DY) in our study population was 33% at first examination ( $n=2581$ ), which is fairly low compared with other screening populations. Its presence was strongly, inversely age-dependent. Breast patterns of 1177 women, aged 35–85 years, were followed for 12 years. In 39% (182/461) of the women with a P2 or DY pattern at their first examination, regression to a lucent pattern (N1 and P1) occurred over the years. The majority of these women were assumed to have reached menopause in the follow-up period. These findings support the hypothesis that the presence of dense breast parenchyma is related to the reproductive period and indicate that shortening the rescreening intervals would be most effective in pre-menopausal age groups.

Dense breast parenchyma, for example with P2 and DY patterns according to Wolfe [1], can cause problems in the interpretation of mammograms obtained in mass screening programmes for breast cancer. Tumours are difficult to distinguish in this type of breast [2], which may lead to a diagnostic delay. Ciatto and Zappa [3] have found that P2–DY patterns are associated with a more advanced stage at diagnosis and they have therefore suggested shortening the rescreening intervals for these women. The benefit of the proposed strategy will have to be proved by future research. We provide baseline information in the present study.

The purpose of this investigation was to determine how frequently dense breast parenchyma was present in a target screening population and to what extent its presence was age-dependent. Subsequently, we examined whether these patterns actually changed with increasing age, to establish whether shorter rescreening intervals can be restricted to specified subgroups at specific ages.

### Methods

The study population consisted of women who have been participating in the screening programme in Nijmegen. They have been screened by means of film/screen mammography, every 2 years, since 1975. Up to

1993, a total of 41 087 women aged 35 years and older have taken part in the screening programme. In Nijmegen parenchymal patterns are not classified routinely. Therefore a random sample of the screening population, who attended the first examination in 1975/1976, was taken ( $n=2581$ ) and the patterns were classified by one radiologist into Wolfe's categories N1, P1, P2 or DY.

The distribution of parenchymal patterns in various age groups was studied and compared with the findings in other screening populations [4–6].

We then analysed whether age-specific differences in the pattern distribution in our population were caused by changes in the mammography patterns by ageing, rather than by a cohort-effect, e.g. environmental influences. Changes in the patterns of 46% of the sampled women could be followed for 12 years ( $n=1177$ ).

### Results

Part A of Table I shows the distribution of parenchymal patterns by age group in our population at the first screening. 33% of the women appeared to have a P2 or DY pattern, ranging from 64% in the younger women to 10% in the oldest age group.

When the relationship between age and parenchymal pattern was studied longitudinally, we found that in most of the age cohorts a regression to lucent patterns (N1 and P1) occurred in the course of time (part B of Table I). In the cohort aged 35–44 years at the first screening, 37% (87/236) of the women with dense breast parenchyma changed to a lucent pattern. In the cohorts aged

*Received 18 April 1995 and accepted 27 June 1995.*

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**Table I.** Breast parenchymal patterns by age: transversal data at the first screening in 1975/1976 (A) and longitudinal data over a 12-year follow-up period (B)

## A. Transversal

Age	Number of women	Relative frequencies (%) of patterns at first screening			
		% N1	% P1	% P2	% DY
35-39	284	7	29	53	11
40-44	378	7	37	50	6
45-49	357	11	41	43	5
50-54	388	17	49	31	3
55-59	300	38	46	15	1
60-64	321	39	45	15	1
65-69	176	36	47	14	3
70-74	220	33	56	10	1
75-89	157	33	57	10	0

## B. Longitudinal

Age at first screening	Number of women	Absolute numbers of patterns after 12 year follow-up			
		N1	P1	P2	DY
35-44	N1 26	18	7	1	0
	P1 133	22	92	19	0
	P2 210	4	82	121	3
	DY 26	0	1	15	10
45-54	N1 69	51	18	0	0
	P1 200	43	143	14	0
	P2 163	1	82	78	2
	DY 14	1	0	11	2
55-64	N1 88	62	25	1	0
	P1 132	18	104	10	0
	P2 43	1	10	32	0
	DY 0	0	0	0	0
65-89	N1 23	10	13	0	0
	P1 45	4	36	5	0
	P2 5	0	0	5	0
	DY 0	0	0	0	0

45-54 years and 55-64 years, this proportion amounted up to 47% (84/177) and 26% (11/43), respectively. In the cohort aged 65-89 years, no change from dense to lucent patterns occurred.

**Discussion**

The prevalence of DY patterns in our population was extremely low and the prevalence of P2 patterns fairly high in comparison with the prevalence of DY and P2 patterns in other screening studies. Andersson et al [6], for example, studied the distribution of parenchymal patterns in five age groups between 45 and 69 years. The percentage of DY patterns ranged from 53% in the youngest group to 28% in the oldest age group, while the percentage of P2 patterns did not differ much between the age groups and fluctuated by about 16%. Similar distributions have also been found in other screening studies [4, 5].

Differences in mammography techniques may be responsible for the variation in classification. However, both xeromammography and film/screen mammography have been used in other screening studies, but the distributions in these studies were fairly similar [4-6].

Hormone replacement therapy, which is rarely prescribed in the Netherlands compared with prescription patterns in other countries, is sometimes said to lead to more dense patterns [7, 8]. In our population no relationship could be demonstrated between Wolfe's classification and the use of hormone replacement therapy.

Another possible explanation for the variation may be that our radiologist frequently classified the patterns as P2, whereas other authors have shown a greater tendency towards a DY classification. In our population the prevalence of P2 and DY together amounted to no more than 33%, whereas in other studies about half of the women had a P2 or DY pattern [4-6]. Therefore this cannot fully explain the difference.

The decrease in density with age that was apparent in the transversal data, was confirmed in the longitudinal study. Therefore the age-specific difference in the prevalence of dense patterns is more likely to be due to changes because of aging, than to a cohort-effect.

The cohorts aged 35-44 years and 45-54 years contained the largest proportion of women who changed from P2 or DY patterns to lucent patterns during the 12-year period. The regression was weaker in the older cohorts, but most of these women already had lucent patterns at their first examination. This finding is in agreement with other studies [6, 9] which have suggested an association between the presence of dense patterns and the reproductive period. It can be assumed that during the 12-year follow-up period, most of the women in the cohort aged 45-54 years and a large proportion of the cohort aged 35-44 years will have reached menopause. The results indicate that shortening the re-screening intervals would be most effective in premenopausal age groups.

**Acknowledgment**

This research was supported by a grant from The Netherlands Organization for Scientific Research.

**References**

1. WOLFE, J N, Risk for breast cancer development determined by mammographic parenchymal pattern, *Cancer*, 37, 2486-2492 (1976).
2. MA, L, FISHELL, E, WRIGHT, B ET AL, Case-control study of factors associated with failure to detect breast cancer by mammography, *J. Natl. Cancer Inst.*, 84, 781-785 (1992).
3. CIATTO, S and ZAPPA, M, A prospective study of the value of mammographic patterns as indicators of breast cancer risk in a screening experience, *Eur. J. Radiol.*, 17, 122-125 (1993).
4. KROOK, P M, CARLILE, T, BUSH, W and HALL, M H, Mammographic parenchymal patterns as a risk indicator for prevalent and incident cancer, *Cancer*, 41, 1093-1097 (1978).

5. THREATT, B, NORBECK, J M, SZABO ULLMAN, N ET AL, Association between mammographic parenchymal pattern classification and incidence of breast cancer, *Cancer*, 45, 2550-2556 (1980).
6. ANDERSSON, I A, JANZON, L and PETTERSON, H, Radiographic patterns of the mammary parenchyma, *Radiology*, 138, 59-62 (1981).
7. BERKOWITZ, J E, GATEWOOD, O M B, GOLDBLUM, L E and GAYLER, B W, Hormonal replacement therapy: mammographic manifestations, *Radiology*, 174, 199-201 (1990).
8. STOMPER, P C, VAN VOORHIS, B J, RAVNIKAR, V A and MEYER, J E, Mammographic changes associated with postmenopausal hormone replacement therapy: a longitudinal study, *Radiology*, 174, 487-490 (1990).
9. FLOOK, D, GILHOME, R W, HARMAN, J ET AL, Changes in Wolfe mammographic patterns with aging, *Br. J. Radiol.*, 60, 455-456 (1987).