

A FEW NOTES ON BLOOD-EOSINOPHILIA IN BRONCHIAL ASTHMA

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The normal number of eosinophils in the blood is, according to Heilmeyer (1), 40-600 per cubic millimeter (1-5 per cent of the leukocyte count). The eosinophilic leukocytes are subject to major 24-hour variations; in general their number is higher in the morning and falls during the day. (According to Appel and Hansen, H. J. (2), the influence of daylight is responsible for this).

The most extensive investigation of the eosinophils in healthy persons was made by the Norwegian, Rud (3, 4) between 1939 and 1943, his findings being reported in 1947. According to this studies the upper limit for a normal eosinophil count lies at 230-250 per cubic millimeter. Best, Kark, Muehrcke and Samter (5) reported six different eosinophil counts in each of 42 healthy persons without allergic symptoms, and obtained a median value of 179 per cubic millimeter. According to them, analysis of the 51 healthy subjects investigated by Rud showed a mean of 159 eosinophils and a range of 54-465 for each cubic millimeter. In their opinion the lower and upper limits for the number of circulating eosinophilic leukocytes in healthy persons are 70 and 450 per cubic millimeter. In the major investigations conducted by Rud (3, 4) the number of eosinophils decreased in the forenoons up to 11 o'clock, and thereafter it gradually returned to normal during the course of the day. Bonner (6) (1952) found a decrease of more than 50 per cent in the number of eosinophils

between 9 a.m. and 1 p.m. in 12 per cent, of his patients on an empty stomach. In 16 per cent of non-fasting patients he observed a reduction of 20–50 per cent in the eosinophil count, and in 8 per cent a decrease of over 50 per cent. If the same group of healthy subjects ingested the same food and eosinophil counts were made between 1 p.m. and 5 p.m., only 12 per cent showed a fall of between 20 and 50 per cent, and none a fall exceeding 50 per cent. Thorn tests, it was pointed out, should therefore be performed on non-fasting patients between 1 and 5 p.m., and not in the forenoons, as recommended.

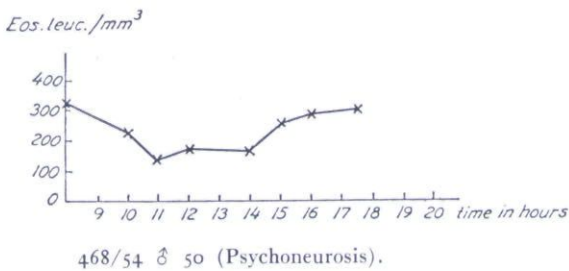


Fig. 1.

Eosinophil counts in a non-allergic person.

Figure 1 shows a 24-hour eosinophil curve in a non-allergic patient (468/54. E. E. Male, 50).

Hedström (7) (1955) demonstrated instability of the eosinophil counts during 24-hour periods in patients with allergic conditions. In asthmatics, substantial variations may be observed during the course of 1 hour, and the tendency to a reduced count in the forenoons and a rise in the afternoons may be quite absent. Figures 2, 3, 4, 5, 6 and 7 show different curves. In asthma, of course, numerous factors influence these curves, and therefore I do not think that a study of them can reveal anything more than the presence of an allergic condition.

Figures 2, 3, 4, 5, 6 and 7 show different curves of eosinophils in the blood in patients suffering from bronchial asthma. There is no stability in curves of eosinophils in blood.

Bronchial asthma

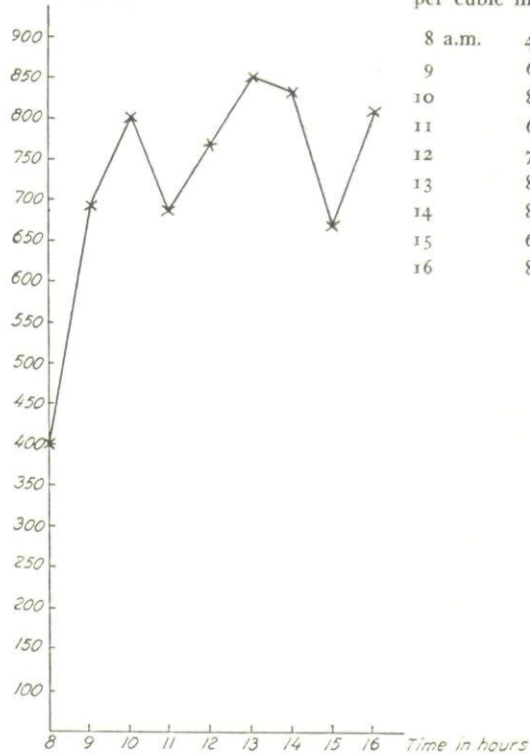
316/55

♀ 43

21.7.1955

Intracutaneous test:

Birch leaf +

*Eosinophils
in the blood*Eosinophils in the blood
per cubic millimetre

8 a.m.	400
9	686
10	800
11	676
12	768
13	850
14	832
15	662
16	808

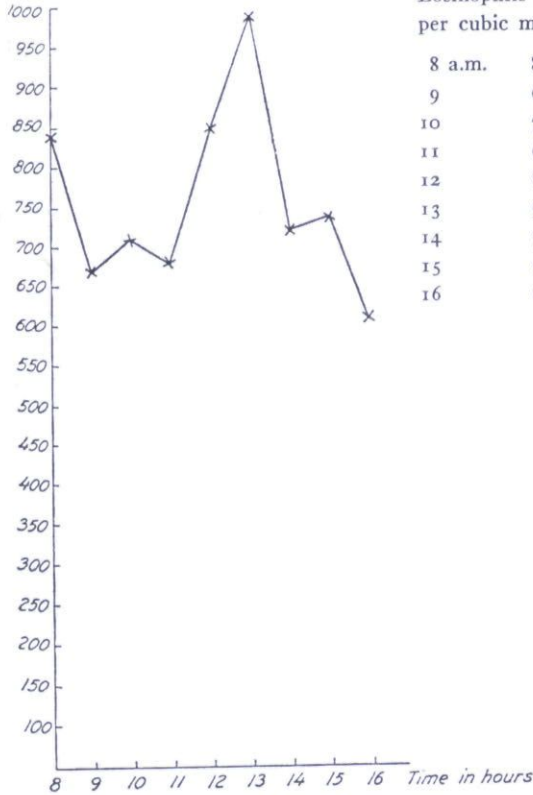
Fig. 2.

In food testing, repeated determinations should be useful during the morning hours, when the only possibility exists of testing a single food. Comparison with a food to which the patient definitely is not allergic may provide some indication whether sensitivity is present or not. A rise, and particularly a constant one, in the number of eosinophils during the morning will point clearly to sensitivity, for otherwise there should normally be a fall. Figures 8, 9, 10 and 11 show distinctly how

378/55

♀ 54

Bronchial asthma

*Eosinophils
in the blood*

10.6.1955

Intracutaneous test:

Histamine +

Beef +

Eosinophils in the blood
per cubic millimetre

8 a.m.	844
9	668
10	708
11	676
12	850
13	994
14	722
15	738
16	616

Fig. 3.

sensitivity imparts a characteristic appearance to the eosinophil curve. In leukopenia tests one of the principal faults in the technical procedure has been the counting of both lymphocytes and leukocytes, or all white blood cells. The lymphocytes do not conform to the same laws as the leukocytes, but as regards the leukocytes, neither do the eosinophils have the same mode of reactions as the polynuclears. All this affects the reliability of the leukopenic index. (See Table 12).

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♂ 48

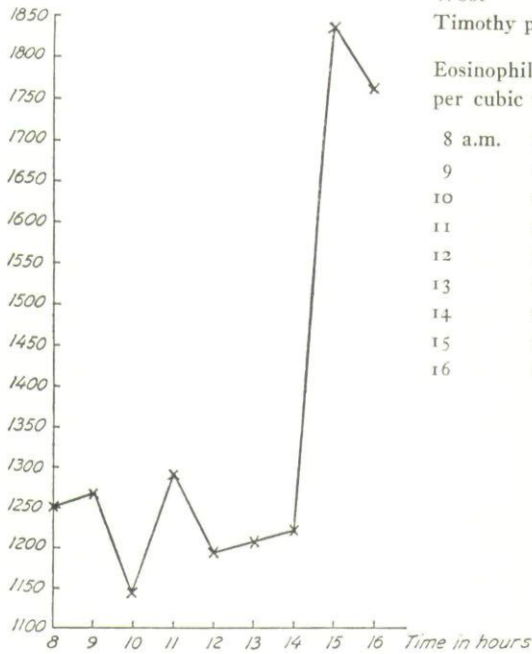
*Eosinophils
in the blood*

Fig. 4.

27.10.1955

Intracutaneous tests:

Horse dander +

Cow dander +

Wool +

Timothy pollen +++

Eosinophils in the blood
per cubic millimetre

8 a.m. 1250

9 1264

10 1140

11 1282

12 1196

13 1202

14 1224

15 1842

16 1760

Table 12 shows the arrangement of the counted leucocytes and lymphocytes. Decrease of the number of leucocytes with $1000/\text{mm}^3$ or more 1 hour after eating of a foodstuff points to hypersensitiveness, also the increase of the number of eosinophils in the blood. Asthmatic troubles, movement of the body, anxiety can make the examination values. Also infections, when the number of leucocytes and lymphocytes exceeds $10000/\text{mm}^3$ which may be indicated as an infection, there is no examination done.

This brief preliminary report is designed to call attention to a new method of demonstrating allergic conditions, especially food allergy in bronchial asthma.

671/55

♂ 45

Bronchial asthma

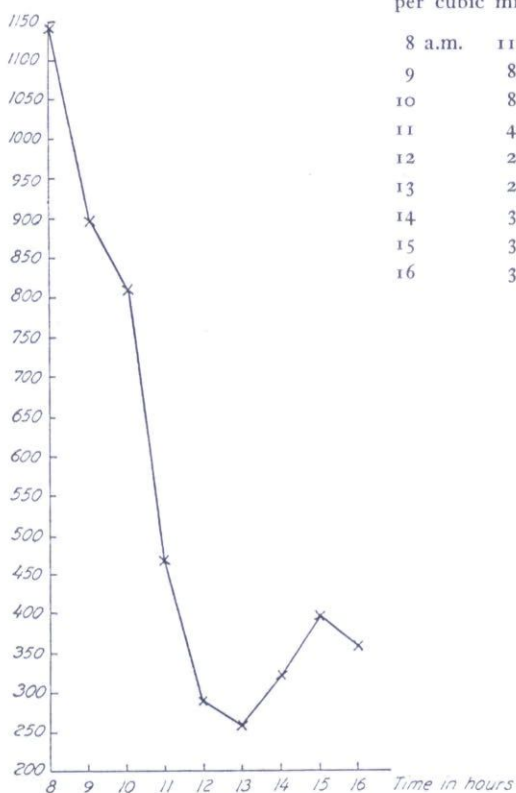
*Eosinophils
in the blood*

Fig. 5.

12.1.1956

Intracutaneous test:

Histamine +

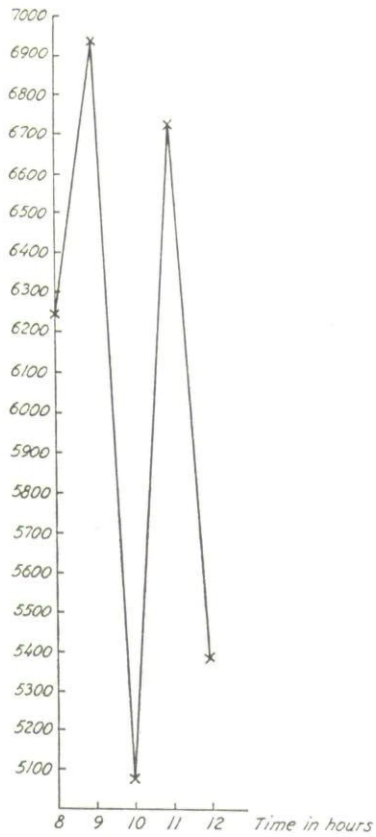
Eosinophils in the blood
per cubic millimetre

8 a.m.	1138
9	898
10	812
11	474
12	284
13	252
14	324
15	394
16	352

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♂ 51

Bronchial asthma

*Eosinophils in
the blood*Eosinophils in the blood
per cubic millimetre

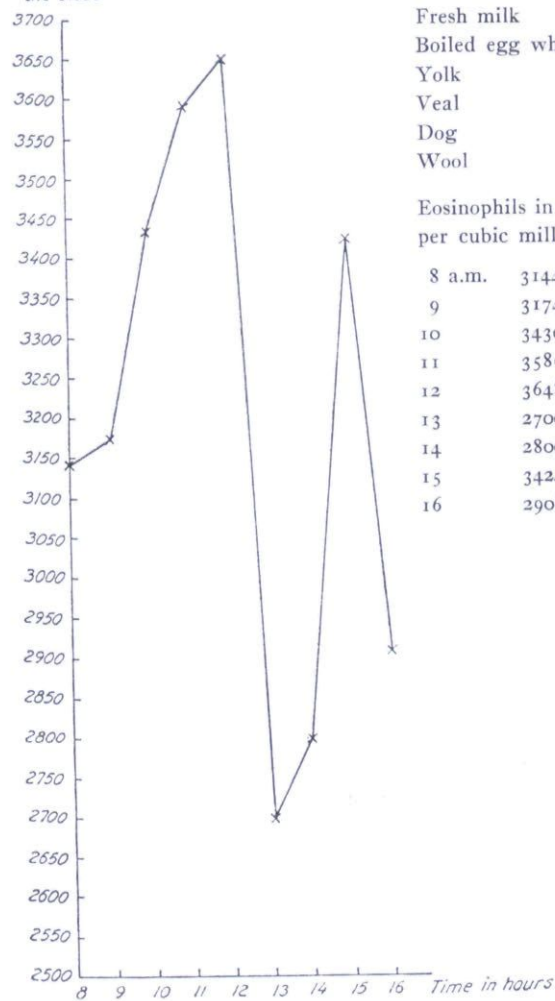
8 a.m.	6242
9	6940
10	5070
11	6716
12	5370

Fig. 6.

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♀ 15

Bronchial asthma

*Eosinophils in
the blood*

21.7.1955

Intracutaneous tests:

Horse dander	++
Cow dander	+
Timothy	+++
Fresh milk	+
Boiled egg white	+
Yolk	+
Veal	+
Dog	+
Wool	+

Eosinophils in the blood
per cubic millimetre

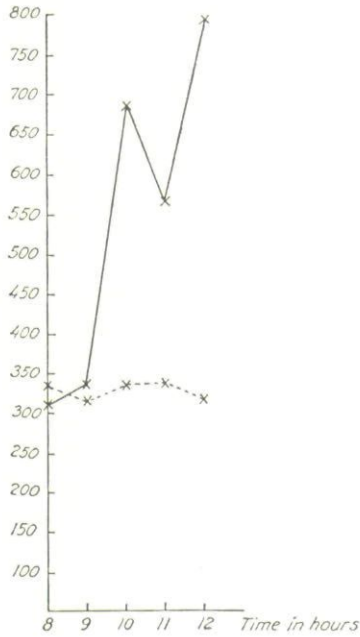
8 a.m.	3144
9	3174
10	3430
11	3586
12	3648
13	2700
14	2800
15	3424
16	2908

Fig. 7.

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♀ 48

Bronchial asthma

*Eosinophils in
the blood*

12.4.1957

Intracutaneous tests:

Histamine +

Red beans +

Peas +

Mould +

Eosinophils in the blood
per cubic millimetre

13.5.1957

Special food-test:

Apple

No symptoms

8 a.m. 334

9 318

10 332

11 336

12 318

14.5.1957

Special food-test:

Cream ———

Symptoms: Asthma

8 a.m. 302

9 334

10 682

11 568

12 798

Fig. 8.

The eosinophil curve in patient with hypersensitiveness to cream: tendency to increase of eosinophils in the blood after 1 hour, and for apple, which patient is not hypersensitive to: tendency to decrease of the number of eosinophils in the blood after 1 hour.

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♀ 54

Bronchial asthma

Eosinophils in the blood

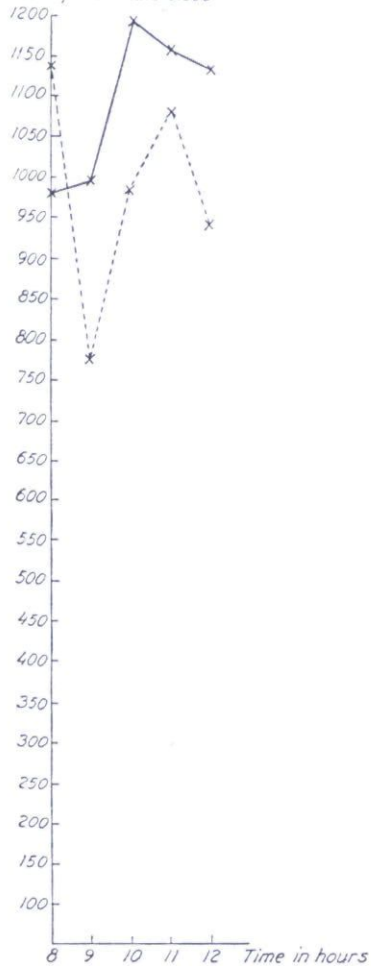


Fig. 9.

Eosinophil curve in patient, who is hypersensitive to sugar: increase of eosinophils in blood after 1 hour. No hypersensitiveness to wheat: decrease of the number of eosinophils in the blood after 1 hour.

22.3.1957

Intracutaneous test:

Cow dander +

Eosinophils in the blood
per cubic millimetre

14.5.1957

Special food-test:

Sugar ———

Symptoms: Asthma

8 a.m. 982

9 998

10 1194

11 1166

12 1138

15.5.1957

Special food-test:

Wheat

No symptoms

8 a.m. 1142

9 774

10 982

11 1077

12 944

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♀ 18

Bronchial asthma

17.5.1957

Intracutaneous tests:

Histamine ++

Wheat +

Peas +

Mould +

Timothy pollen +

Eosinophils in the blood
per cubic millimetre

24.5.1957

Special food-test: Cheese

Symptoms: Asthma —

8 a.m. 220

9 399

10 422

11 398

12 338

27.5.1957

Special food-test:

Sugar

No symptoms

8 a.m. 344

9 228

10 304

11 302

12 194

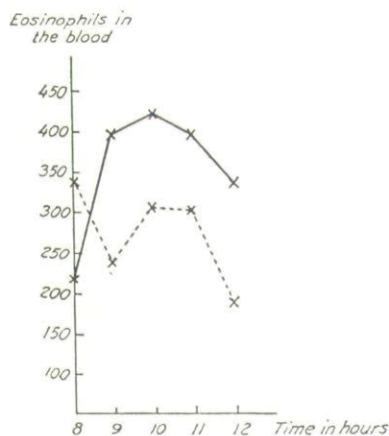


Fig. 10.

Hypersensitiveness to cheese: increase of eosinophils in the blood after 1 hour.

No hypersensitiveness to sugar: decrease of the number of eosinophils in the blood after 1 hour.

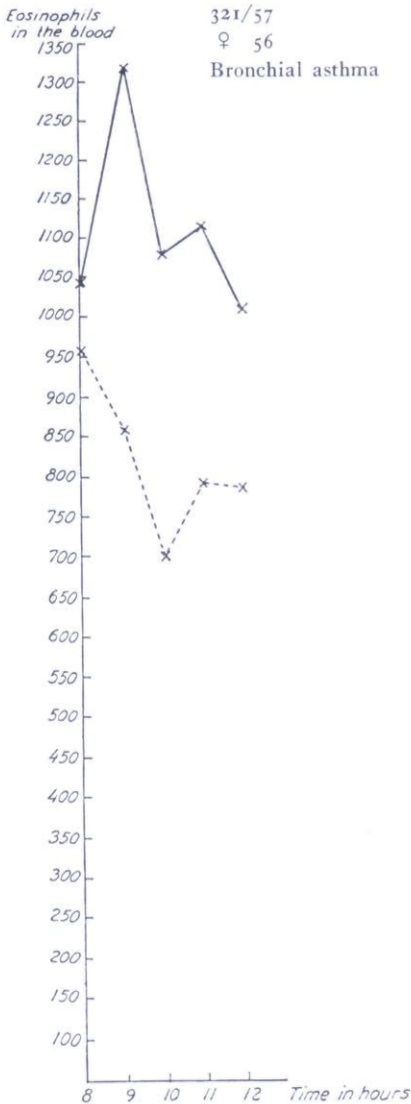


Fig. 11.

Hypersensitiveness to sugar: increase of the number of eosinophils in the blood after 1 hour. No hypersensitiveness to milk: decrease of eosinophils in blood after 1 hour.

17.5.1957

Intracutaneous test:

Wheat +

Eosinophils in the blood
per cubic millimetre

31.5.1957

Special food-test:

Milk (boiled)

No symptoms

8 a.m. 954

9 858

10 700

11 792

12 782

1.6.1957

Special food-test: Sugar

Symptoms: Asthma ———

8 a.m. 1044

9 1330

10 1076

11 1116

12 1008

TABLE 12
Food allergy.
Eosinophile leucocytes in blood.

	Intracutaneous food-tests	Special food-tests according to method Hedstrom		Eosinophile leucocytes in blood		Symptoms
		Before	After 1 hour	Before	After 1 hour	
676/60 ♀ 4	Fish	Baltic herring	Baltic herring	Baltic herring	Baltic herring	No symptoms
		9/4 1951	9/4 1951	440	352	
		5900 3200 (leucocytes)	2400 2200 (lymphocytes)			
696/50 ♂ 4	Chocolate Fish	Baltic herring	Baltic herring	Baltic herring	Baltic herring	No symptoms
		6/4 1951	6/4 1951	542	542	
		3000 1600	2500 3200			
770/50 ♂ 6	-	Dog-rose	Dog-rose	Dog-rose	Dog-rose	No symptoms
		10/5 1951	10/5 1951	10/5 1951	10/5 1951	
		3000 2000	3100 2700	1152	1200	
133/51 ♂ 9	-	Beef	Beef	Beef	Beef	No symptoms
		26/5 1951	26/5 1951	26/5 1951	26/5 1951	
		4500 3300	4200 1500	1756	1412	
178/51 ♀ 40	-	Fresh milk	Fresh milk	Fresh milk	Fresh milk	Asthma
		16/4 1951	16/4 1951	16/4 1951	16/4 1951	
		3700 2500	2600 2000	598	484	
	11/4 1951					
	Epithel of hair +++					
	Epithel of cow +++					
	Histamine +++					

212/51 ♀ 6	Egg Chocolate Orange Apple Horse Cat Oats Pike	White of egg Yolk Chocolate Orange Apple Horse Cat Oats	Veal 23/4 1951 3400 3300 2100 1800 16/6 1951 White of egg 4100 3900 3100 3100 18/6 1951 Yolk 4600 2800 2500 3500 17/4 1951 Cocoa 3700 2800 1400 2600 19/4 1951 Cream 3700 2700 2500 1900 11/4 1951 Wheat + Oats + Manna groats + + + Histamine + Oats + 19/4 1951 Oats 5300 3900 2500 1300 19/5 1951 Wheat 3300 2100 2300 1600	23/4 1951 514 346 16/6 1951 White of egg 2368 3000 18/6 1951 Yolk 2178 2700 17/4 1951 2400 2726 19/4 1951 Cream 824 546 19/4 1951 Oats 656 780 19/5 1951 Wheat 3150 3040	Asthma No symptoms No symptoms No symptoms No symptoms Asthma No symptoms Asthma
225/51 ♂ 37	-	11/4 1951 Wheat + Oats + Manna groats + + + Histamine + Oats +	19/4 1951 Cream 3700 2700 2500 1900 11/4 1951 Wheat + Oats + Manna groats + + + Histamine + Oats + 19/4 1951 Oats 5300 3900 2500 1300 19/5 1951 Wheat 3300 2100 2300 1600	19/4 1951 Cream 824 546 19/4 1951 Oats 656 780 19/5 1951 Wheat 3150 3040	Asthma
234/51 ♀ 7	-	Oats +	19/4 1951 Oats 5300 3900 2500 1300 19/5 1951 Wheat 3300 2100 2300 1600	19/4 1951 Oats 656 780 19/5 1951 Wheat 3150 3040	No symptoms
243/51 ♀	-	Chocolate + Banana +	19/5 1951 Wheat 3150 3040	19/5 1951 Wheat 3150 3040	Asthma

TABLE 12 (continued)

		Intracutaneous food-tests	Special food-tests according to method Hedström			Eosinophile leucocytes in blood		Symptoms
			Before	After 1 hour		Before	After 1 hour	
246/51 ♀ 8	Horse Cat Dog	Horse + Cow +	4/6 1951 Carrot	6700 3000		4/6 1951 Carrot	898 1188	Asthma
			3300 2300					
248/51 ♀ 7	-	Carrot +	28/5 1951 Carrot	4300 2400		28/5 1951 Carrot	1562 1444	Itching
			5100 3400					
277/51 ♀ 11	Horse Cat	Cow dander + Dog-rose +	18/6 1951 Beef	4800 3800		18/6 1951 Beef	1118 1000	No symptoms
			3200 2500					
394/51 ♀ 21	-	Horse dander +++ Cow dander +++	18/9 1951 Fresh milk	5700 3900		18/9 1951 Fresh milk	5300 246	No symptoms
			2700 2500					
396/51 ♀ 19	Egg Chocolate Fish	Histamine +++	4/10 1951 Cod	3600 2700		4/10 1951 Cod	250 232	Urticaria
			2000 700					

420/51 ♀ 11	Egg	-	2/11 1951 Whey-cheese 3200 1700 3100 2800	2/11 1951 Whey-cheese 846 978	No symptoms
424/51 ♀ 7	Egg Orange Banana	-	20/10 1951 White of egg 2100 2000 5000 4600	20/10 1951 White of egg 1500 1510	No symptoms
428/51 ♀ 13	Horse Egg Fish	-	26/9 1951 2400 1000 2300 3200	26/9 1951 940 810	No symptoms
448/51 ♀ 7	-	-	7/11 1951 Yolk 2400 1000 2600 800	7/11 1951 1500 1652	No symptoms
567/51 ♀ 5	-	-	22/10 1951 Haddock 3300 2300 2000 2000	22/10 1951 Haddock 428 268	No symptoms

The special food-tests according to method Hedström, see Food Allergy in
Bronchial Asthma in this number of Acta Allergologica.

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