CHAPTER IV

RESULTS

Patients data

Thirty patients, 10 male, and 20 female, aged 16 to 71 years (mean 41.4 $\pm$ 12.94 years) were studied by echocardiography and cardiac catheterization. The diagnosis was valvular heart disease in 21 patients, congenital heart disease in 6, and coronary artery disease in 4 patients, 1 patient had both CAD and VHD. Heart rate was varied from 47 to 107 bpm (mean 72.13 $\pm$ 14.72 bpm). Table 1 shows clinical characteristics of the subjects.

Pulmonary artery pressure

From cardiac catheterization, systolic pulmonary artery pressure range from 20 to 126 mmHg (mean 48.63 $\pm$ 23.83 mmHg) and diastolic pulmonary artery pressure range from 7 to 51 mmHg (mean 21.23 $\pm$ 10.61 mmHg). Mean pulmonary artery pressure detected between 14 and 79 mmHg (mean 31.90 $\pm$ 15.37 mmHg) with 5 patients had mean pulmonary artery pressure less than or equal to 19 mmHg and 25 had pulmonary artery hypertension which mean pulmonary artery pressure more than or equal to 20 mmHg.

Data obtained from echocardiography

Data measured from echocardiogram is demonstrated in

Table 1. Patients data (n = 30)

ID	SEX	Dx	SPAP (mmHg)	DPAP (mmHg)	MPAP (mmHg)	AGE (year)	HR (bpm)
1	F	RHD	38	18	26	20	88
2	F	ASD	30	14	20	21	80
3	F	RHD	110	40	70	34	107
4	M	CAD	68	30	40	56	75
5	M	CAD	30	10	18	62	54
6	M	RHD	50	30	36	27	47
7	F	RHD	30	10	20	33	66
8	F	RHD	40	10	20	53	55
9	M	AR	64	24	38	52	70
10	F	RHD	46	30	29	41	82
11	M	CAD+AR	44	12	20	71	62
12	F	AS,AR	40	15	24	52	57
13	M	RHD	48	26	34	59	61
14	F	PDA	23	7	14	16	62
15	F	RHD	37	20	26	40	87
16	F	VSD+PDA	126	51	79	38	70
17	F	RHD	50	23	35	41	78
18	M	RHD	64	34	47	30	84
19	F	ASD	49	22	32	58	101
20	M	RHD	47	20	33	34	63
21	F	RHD	30	10	20	42	52
22	M	CAD	23	10	15	36	73
23	F	PDA	20	9	14	28	71
24	F	RHD	23	8	15	44	50
25	F	RHD	80	38	52	44	72
26	F	RHD	47	21	37	48	74
27	F	PDA	75	30	50	39	82
28	M	RHD	46	23	33	30	68
29	F	RHD	39	20	26	41	75
30	F	RHD	42	22	34	52	98
MAX			126.00	51.00	79.00	71.00	107.00
MIN			20.00	7.00	14.00	16.00	47.00
MEAN			48.63	21.23	31.90	41.40	72.13
SD			23.83	10.61	15.37	12.94	14.72
VAR			567.90	112.58	236.16	167.44	216.65

Table 2 and all parameters were calculated to compare to pulmonary artery pressure in Table 3.

1. MPA diameter

Fig. 5 shows correlation between systolic PAP and MPA with r = 0.10. The comparison between diastolic or mean PAP and MPA diameter shown in fig. 6 and 7 with r = 0.12 and 0.14, respectively.

2. Preejection period

Fig. 8 , 9 and 10 show correlation of PEP with systolic, diastolic and mean PAP with r = 0.16, 0.27 and 0.17, respectively.

3. Acceleration time

The correlation of AT compared to systolic or diastolic and mean PAP are shown in fig. 11, 12 and 13 with r = -0.69, -0.76 and -0.70, respectively , and also show statistical significant ($p < 0.001$).

4. Deceleration time

The comparison between DT and pulmonary artery pressure are demonstrated in fig. 14, 15 and 16. There are no statistical significant between DT and systolic, diastolic or mean PAP with r = 0.39, 0.35 and 0.37, respectively.

5. Ejection time

Fig. 17, 18 and 19 shows poor correlation between the ET and PAP, r = -0.12 with systolic PAP, -0.19 with diastolic PAP and -0.15 with mean PAP, respectively.

6. Preejection period/acceleration time

This ratio has correlation with PAP, whether compared to systolic, diastolic or mean PAP, with r = 0.62, 0.72 and 0.64, as shown in fig. 20, 21 and 22, respectively ($p < 0.001$).

Table 2. Data obtained from echocardiography

ID	MPA (cm)	PEP (msec)	AT (msec)	DT (msec)	ET (msec)	PEP/AT	PEP/ET	AT/DT	AT/ET
1	2.10	128.17	123.83	142.67	266.50	1.03	0.48	0.87	0.46
2	3.10	58.33	172.17	233.17	405.33	0.34	0.14	0.74	0.42
3	2.10	100.17	58.33	187.83	246.17	1.72	0.41	0.31	0.24
4	1.70	114.67	95.00	182.00	277.00	1.21	0.41	0.52	0.34
5	2.00	121.00	130.83	209.33	340.17	0.92	0.36	0.63	0.38
6	2.60	116.23	84.33	239.67	324.00	1.38	0.36	0.35	0.26
7	2.10	88.67	94.33	103.00	197.33	0.94	0.45	0.92	0.48
8	2.20	115.67	103.67	105.67	209.33	1.12	0.55	0.98	0.50
9	2.70	91.67	109.00	180.67	289.67	0.84	0.32	0.60	0.38
10	2.10	134.33	77.00	177.00	254.00	1.74	0.53	0.44	0.30
11	2.30	119.00	95.67	122.33	218.00	1.24	0.55	0.78	0.44
12	2.20	108.00	135.00	165.00	300.00	0.80	0.36	0.82	0.45
13	2.70	121.33	100.67	169.00	269.67	1.21	0.45	0.60	0.37
14	2.80	105.00	171.33	159.67	331.00	0.61	0.32	1.07	0.52
15	2.40	125.67	76.67	117.00	193.67	1.64	0.65	0.66	0.40
16	2.50	116.67	60.67	265.33	326.00	1.92	0.36	0.23	0.19
17	2.40	102.00	124.33	173.00	297.33	0.82	0.34	0.72	0.42
18	2.30	106.33	67.33	104.33	171.67	1.58	0.62	0.65	0.39
19	3.30	120.67	109.00	140.67	249.67	1.11	0.48	0.77	0.44
20	2.80	118.00	109.00	164.33	273.33	1.08	0.43	0.66	0.40
21	2.00	88.00	161.33	167.33	328.67	0.55	0.27	0.96	0.49
22	2.30	102.67	152.33	162.00	314.33	0.67	0.33	0.94	0.48
23	2.30	120.00	193.00	168.67	361.67	0.62	0.33	1.14	0.53
24	2.60	135.00	146.33	154.67	301.00	0.92	0.45	0.95	0.49
25	3.00	184.00	60.00	136.00	196.00	3.07	0.94	0.44	0.31
26	2.60	118.00	119.33	154.00	273.33	0.99	0.43	0.77	0.44
27	3.20	111.67	109.00	247.33	356.33	1.02	0.31	0.44	0.31
28	2.10	104.00	80.00	112.00	192.00	1.30	0.54	0.71	0.42
29	2.20	110.67	111.67	129.33	241.00	0.99	0.46	0.86	0.46
30	2.10	124.00	74.67	102.67	177.33	1.66	0.70	0.73	0.42
MAX	3.30	184.00	193.00	265.33	405.33	3.07	0.94	1.14	0.53
MIN	1.70	58.33	58.33	102.67	171.67	0.34	0.14	0.23	0.19
MEAN	2.43	113.65	110.19	162.52	272.72	1.17	0.44	0.71	0.40
SD	0.38	20.10	35.14	43.00	59.59	0.52	0.15	0.22	0.08
VAR	0.15	403.82	1234.85	1849.36	3550.62	0.27	0.02	0.05	0.01

Table 3. Correlation of PAP compared to echocardiographic data

PARAMETERS	SYSTOLIC PAP (mmHg)	DIASTOLIC PAP (mmHg)	MEAN PAP (mmHg)
MPA (cm)	0.10	0.12	0.14
PEP (msec)	0.16	0.27	0.17
AT (msec)	-0.69**	-0.76**	-0.70**
DT (msec)	0.39	0.35	0.37
ET (msec)	-0.12	-0.19	-0.15
PEP/AT	0.62**	0.72**	0.64**
PEP/ET	0.16	0.28	0.19
AT/DT	-0.82**	-0.89**	-0.83**
AT/ET	-0.85**	-0.90**	-0.85**

2-tailed significant: * -0.01 , ** -0.001

7. Preejection period/ejection time

The PEP/ET ratio also has poor correlation with PAP, when compared to systolic PAP shows in fig. 23 with r = 0.16, diastolic PAP in fig. 24 r = 0.28, and mean PAP in fig. 25 r = 0.19.

8. Acceleration time/deceleration time

Ratio of AT/DT seems to correlate well with PAP. When compared to systolic PAP, $r = -0.82$, $p < 0.001$, or diastolic PAP, $r = -0.88$, $p < 0.001$, and mean PAP, $r = -0.82$, $p < 0.001$ (Fig. 26, 27 and 28).

9. Acceleration time/ejection time

Fig. 29, 30 and 31 shows the linear regression line and regression correlation of AT/ET ratio with the systolic PAP, $Y = 146.81 - 243.02(X)$, $r = -0.85$ ($p < 0.001$); diastolic PAP, $Y = 67.35 - 114.16(X)$, $r = -0.90$ ($p < 0.001$); and mean PAP, $Y = 95 - 156.73(X)$, $r = -0.85$ ($p < 0.001$).

Fig.5 DIAGRAM SHOWING CORRELATION BETWEEN SYSTOLIC PAP & MPA DIAMETER

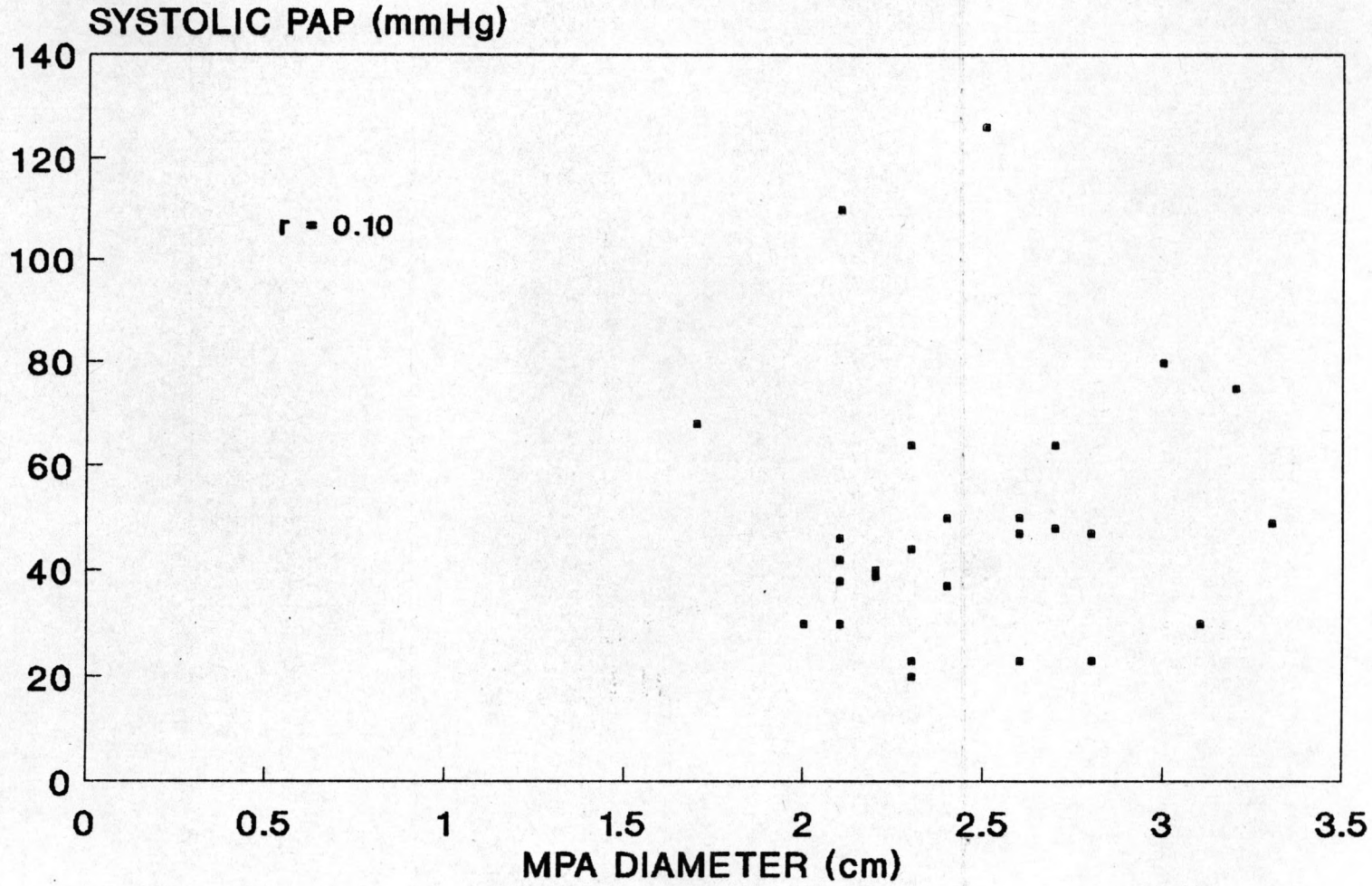

Fig.6 DIAGRAM SHOWING CORRELATION BETWEEN DIASTOLIC PAP & MPA DIAMETER

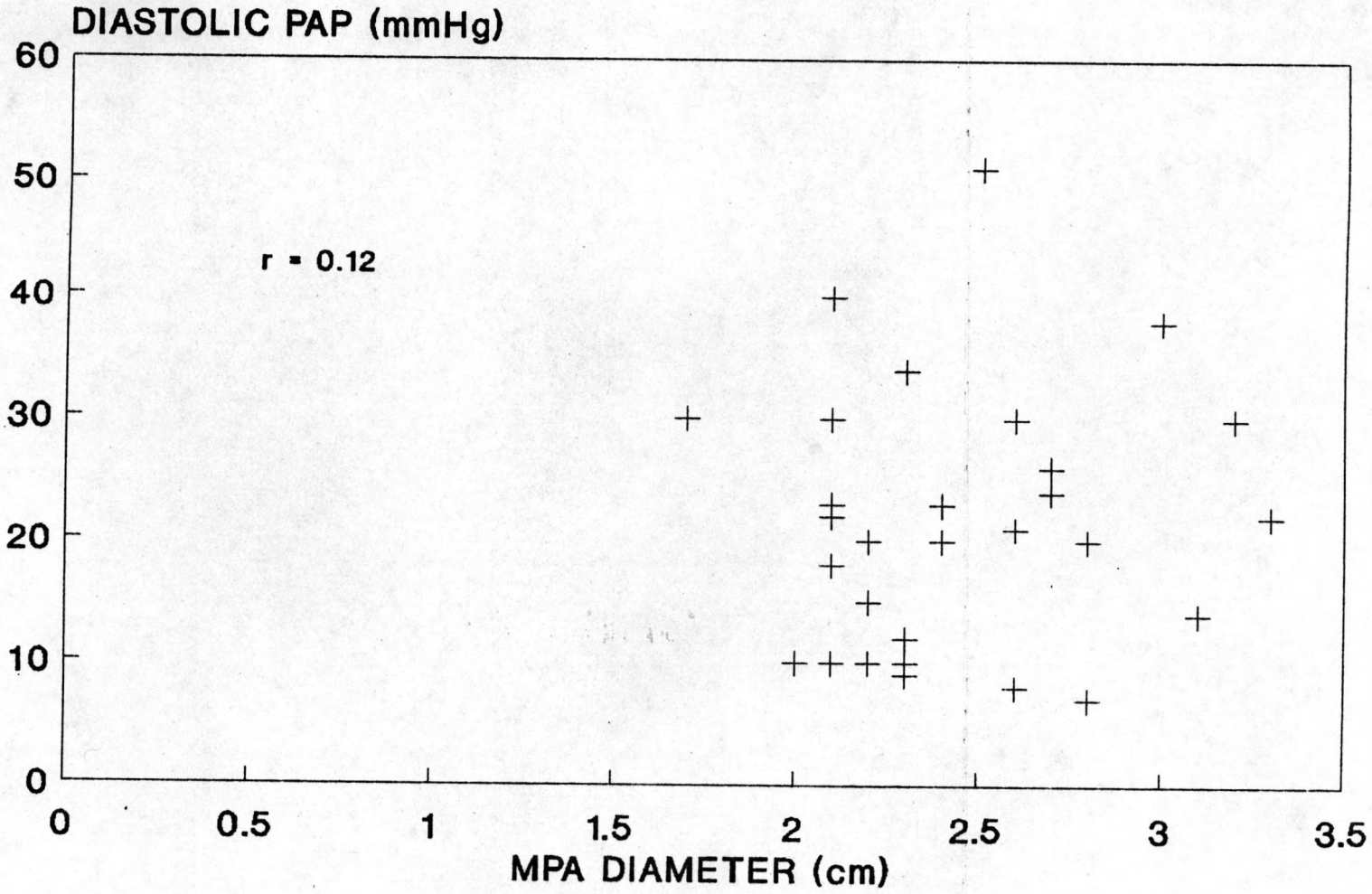

Fig.7 DIAGRAM SHOWING CORRELATION BETWEEN MEAN PAP & MPA DIAMETER

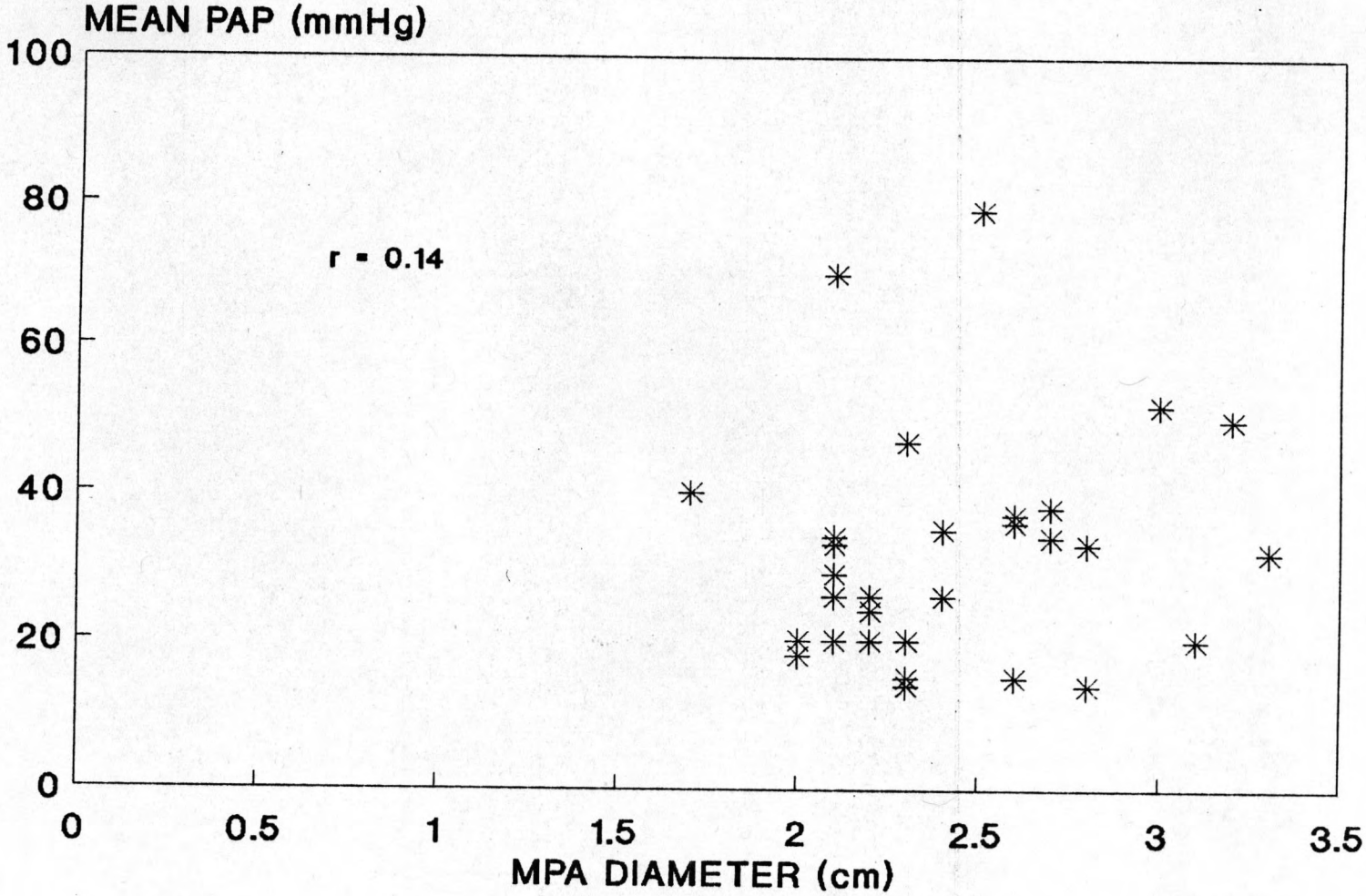

Fig.8 DIAGRAM SHOWING CORRELATION BETWEEN SYSTOLIC PAP & PEP

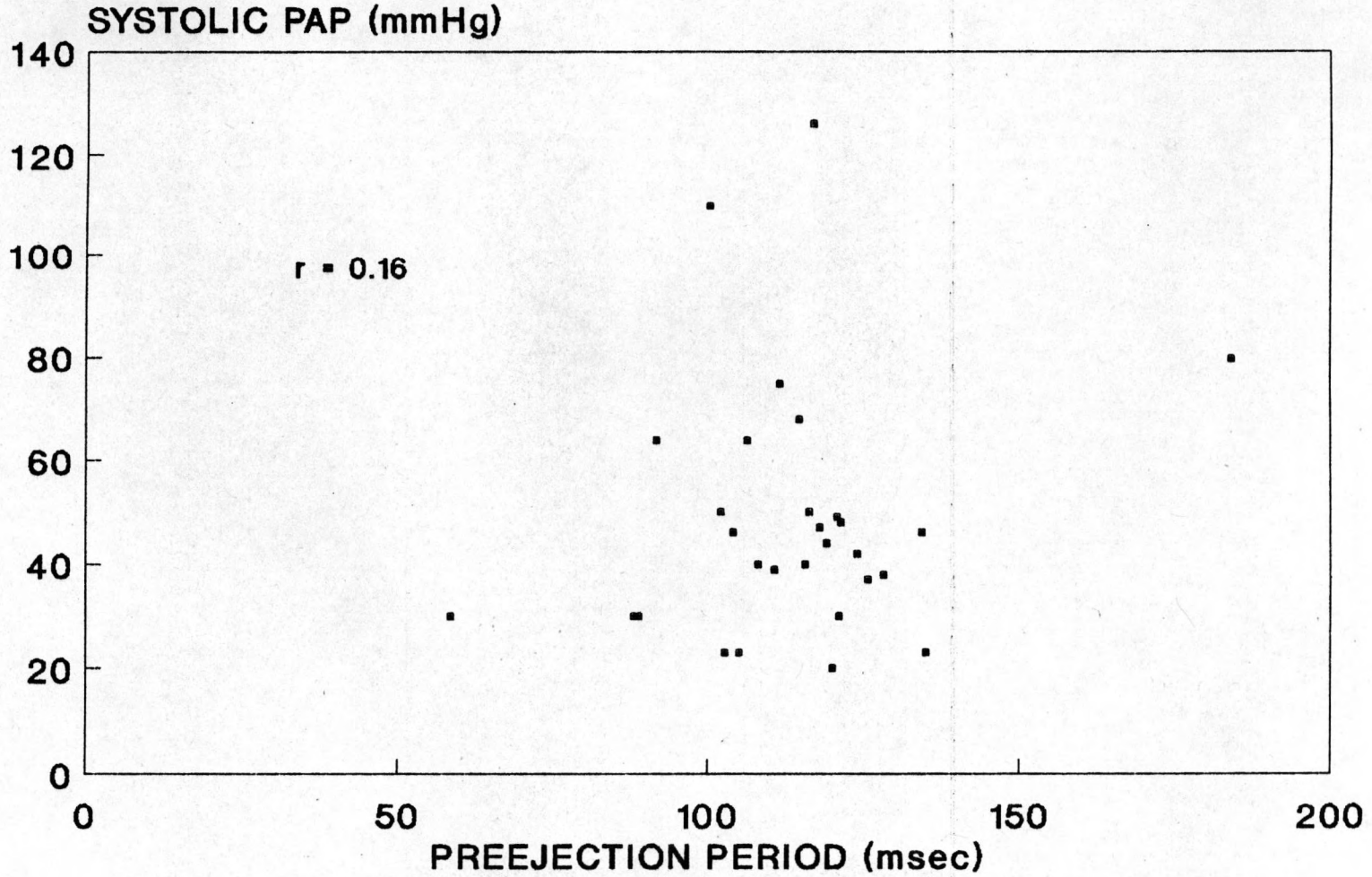

Fig.9 DIAGRAM SHOWING CORRELATION BETWEEN DIASTOLIC PAP & PEP

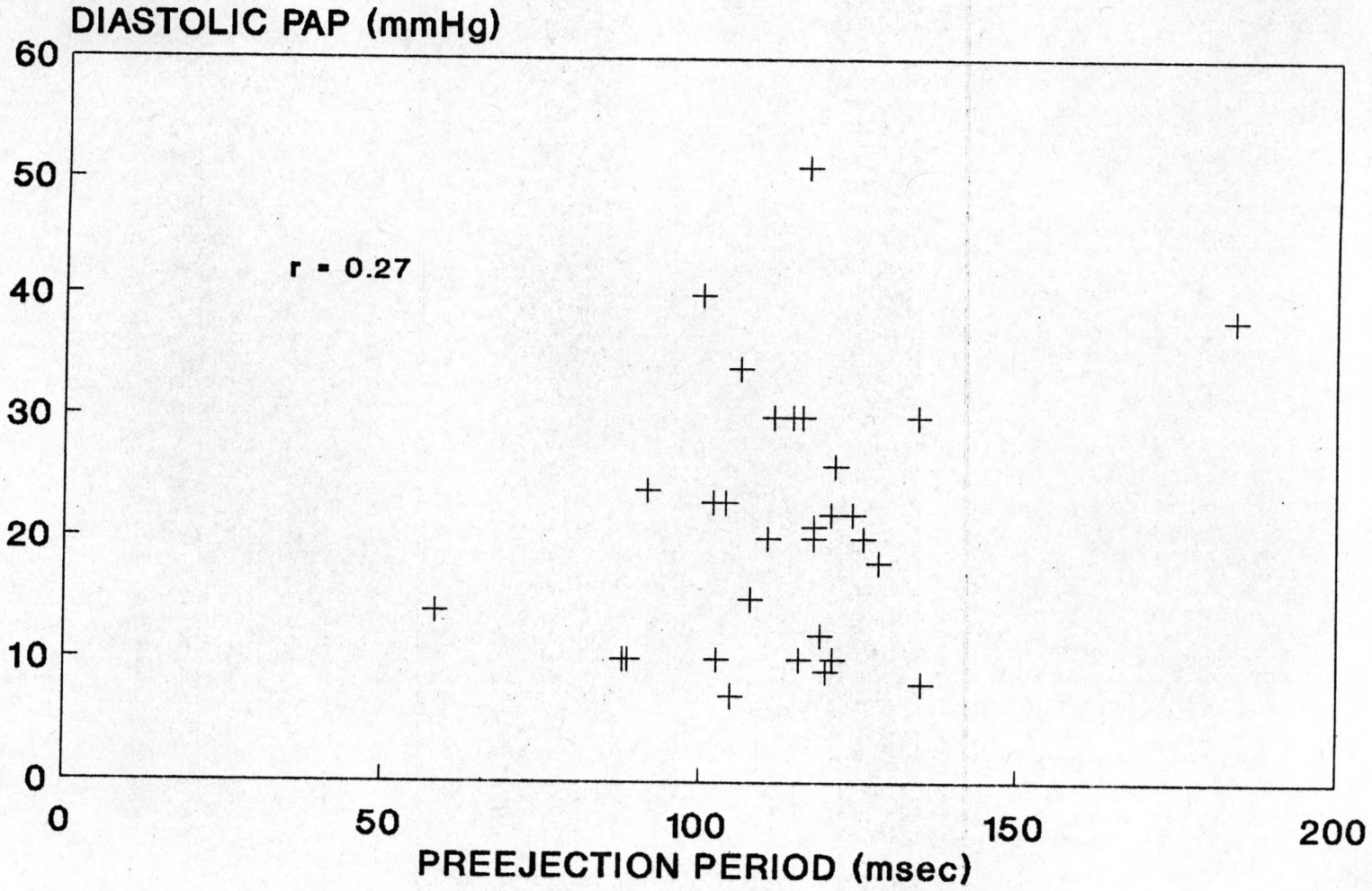

Fig.10 DIAGRAM SHOWING CORRELATION BETWEEN MEAN PAP & PEP

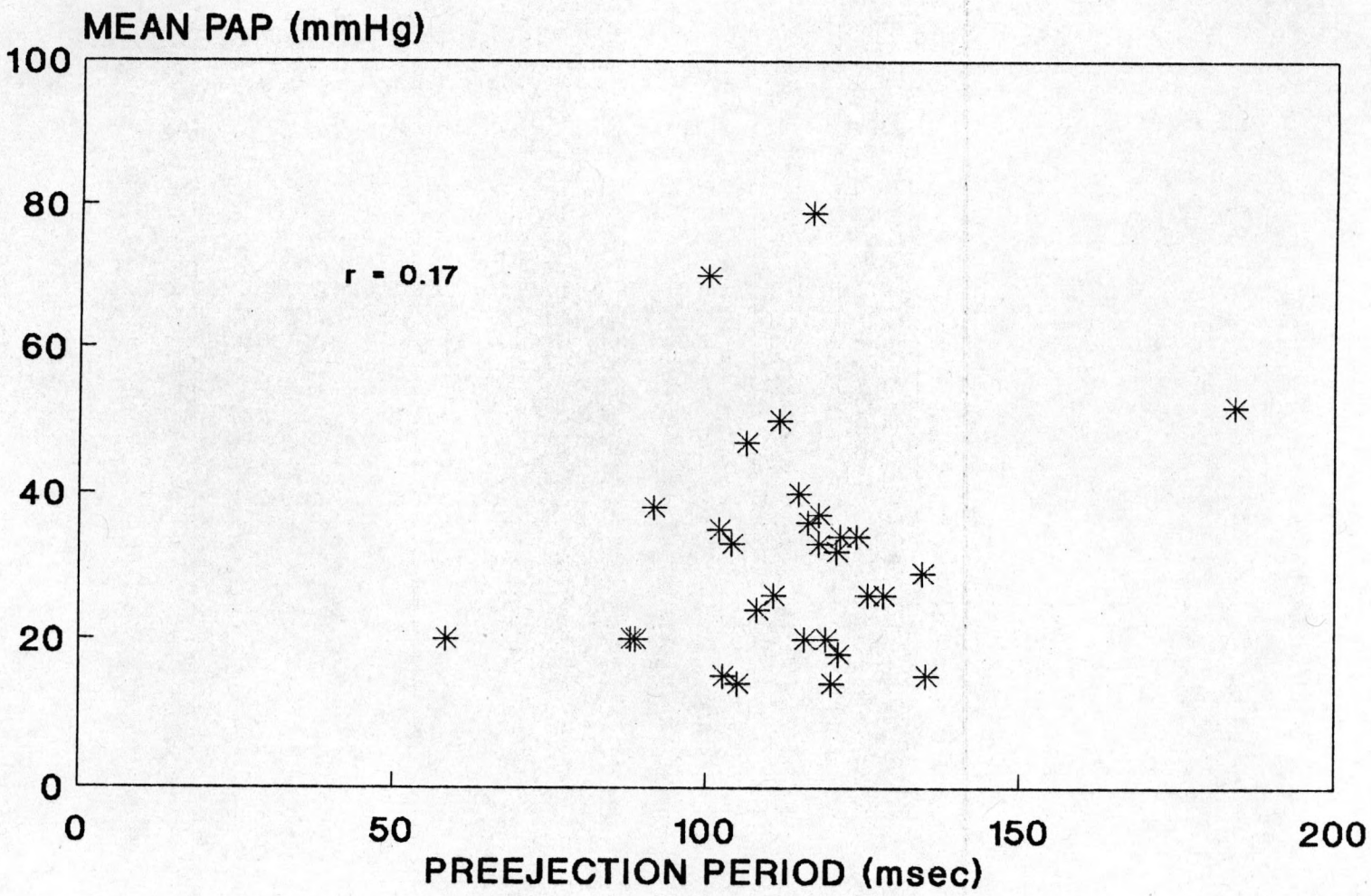

Fig.11 DIAGRAM SHOWING CORRELATION BETWEEN SYSTOLIC PAP & AT

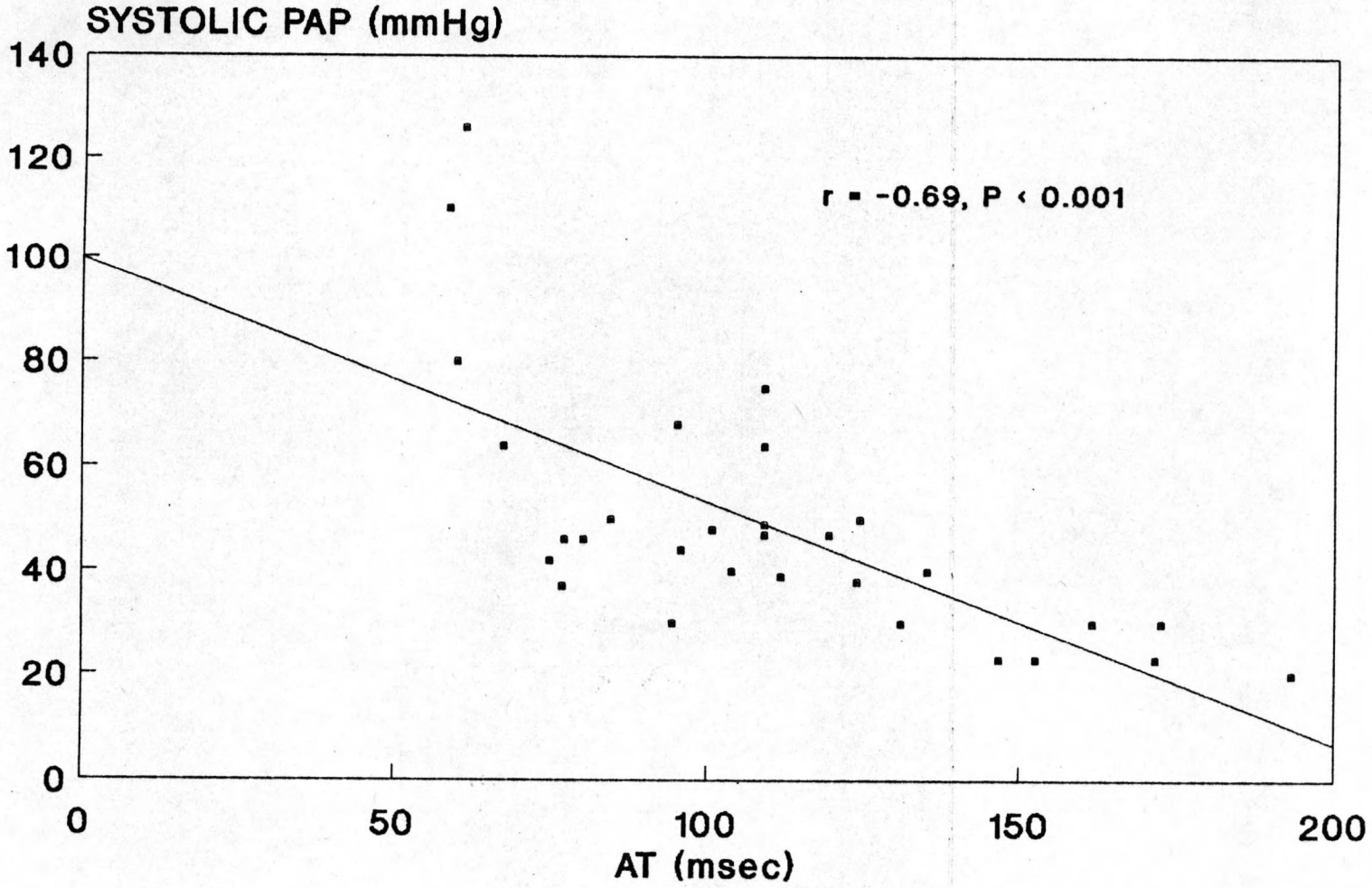

Fig.12 DIAGRAM SHOWING CORRELATION BETWEEN DIASTOLIC PAP & AT

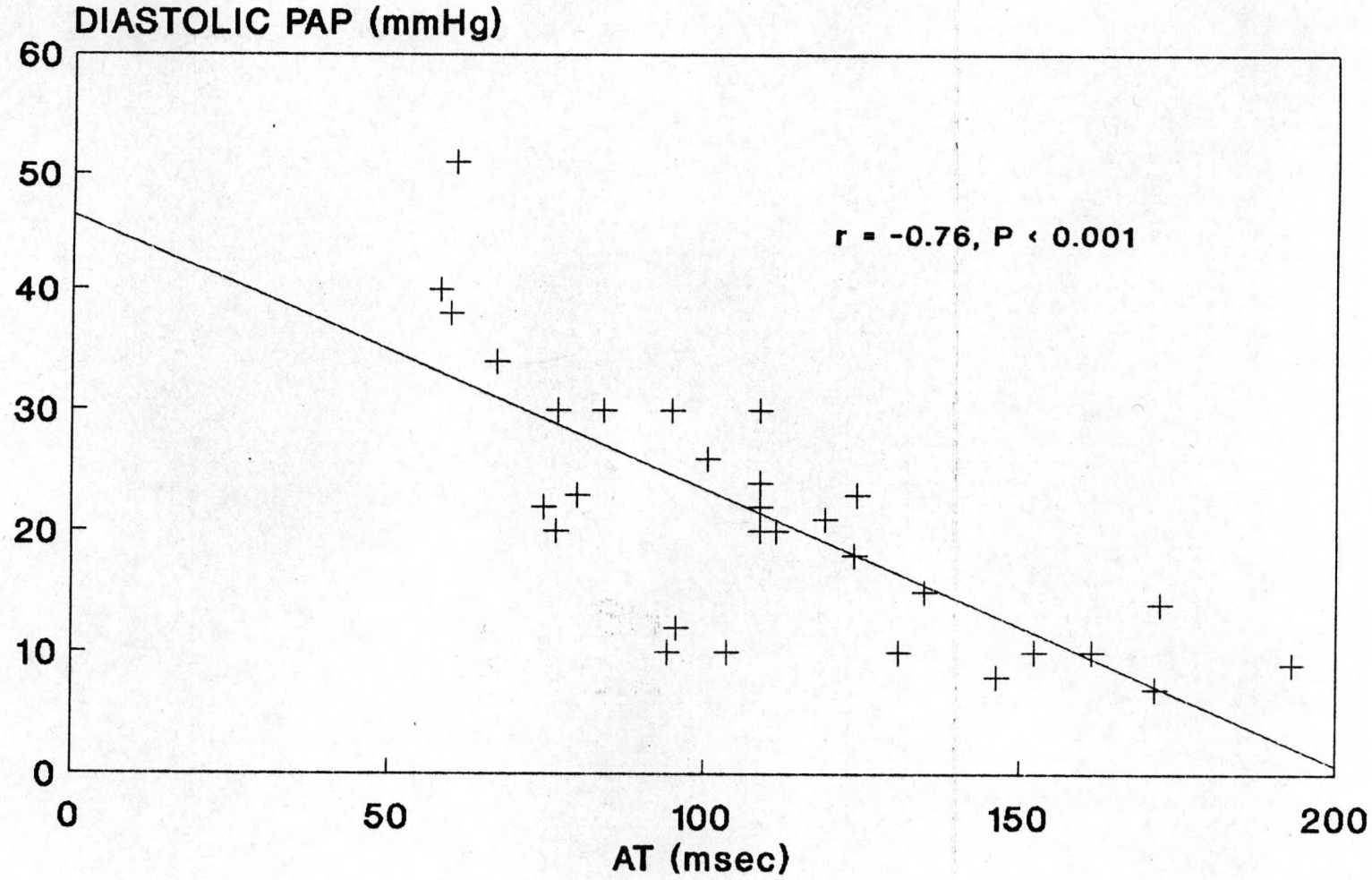

Fig.13 DIAGRAM SHOWING CORRELATION BETWEEN MEAN PAP & AT

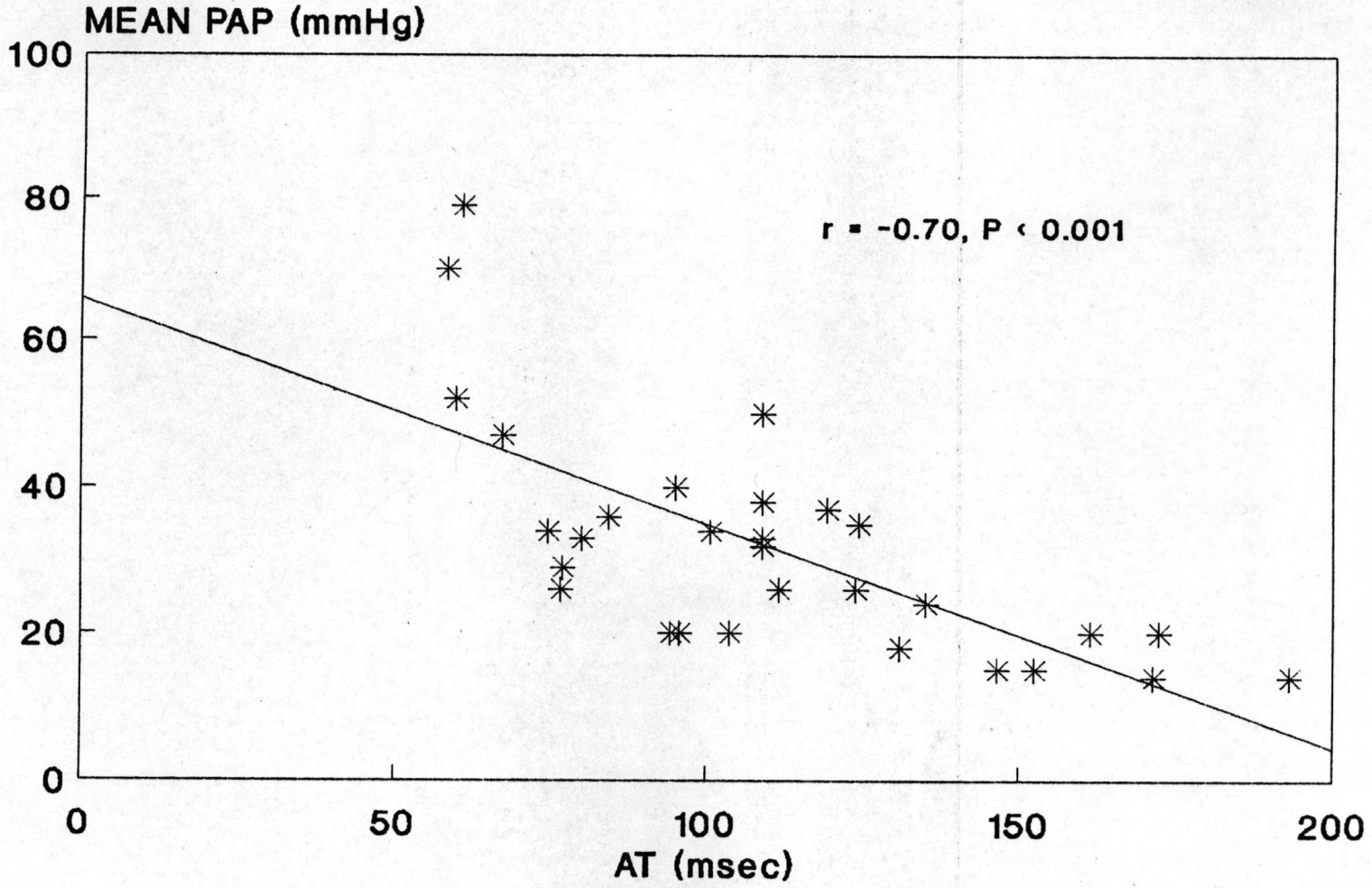

Fig.14 DIAGRAM SHOWING CORRELATION BETWEEN SYSTOLIC PAP & DT

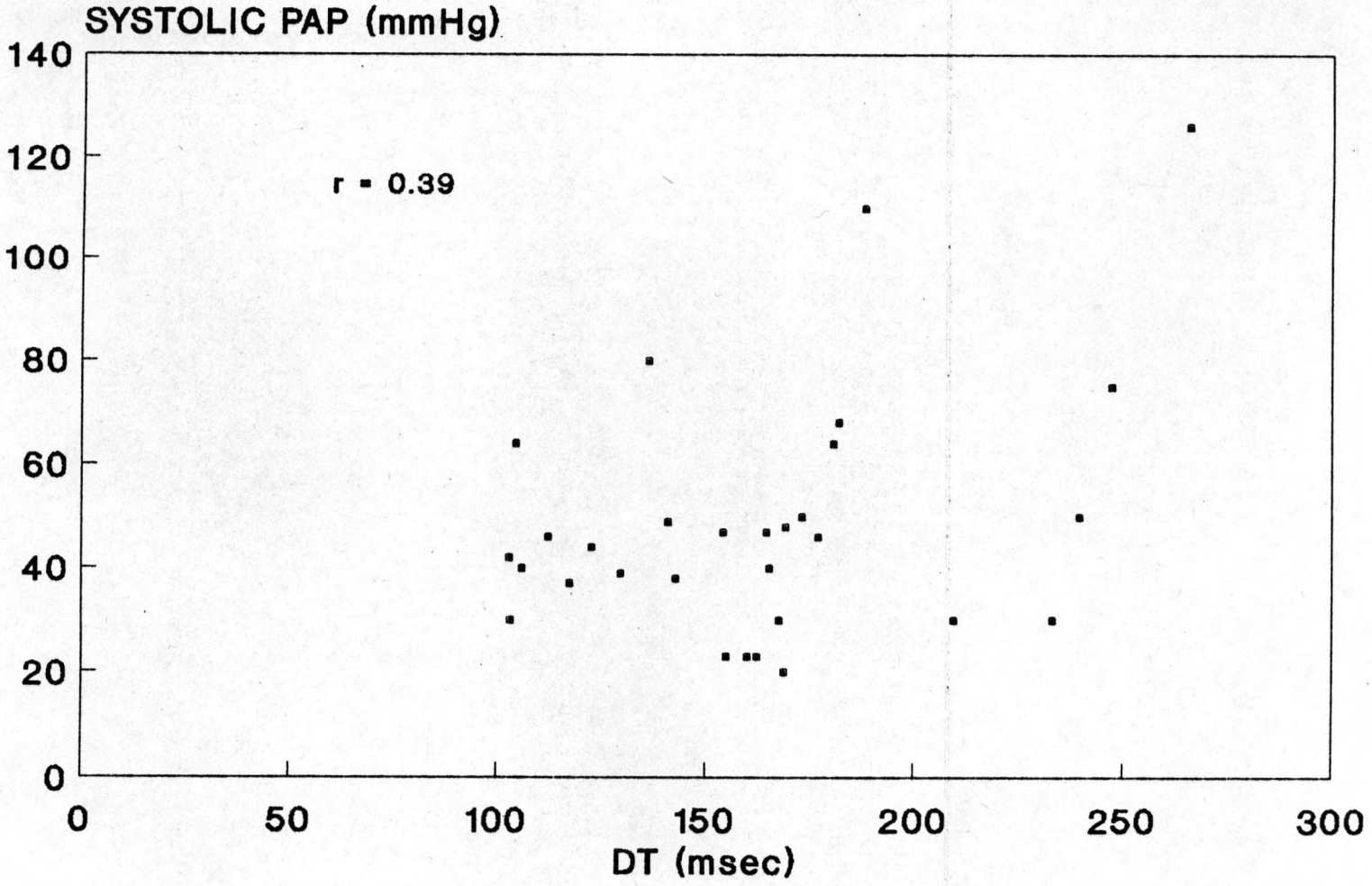

Fig.15 DIAGRAM SHOWING CORRELATION BETWEEN DIASTOLIC PAP & DT

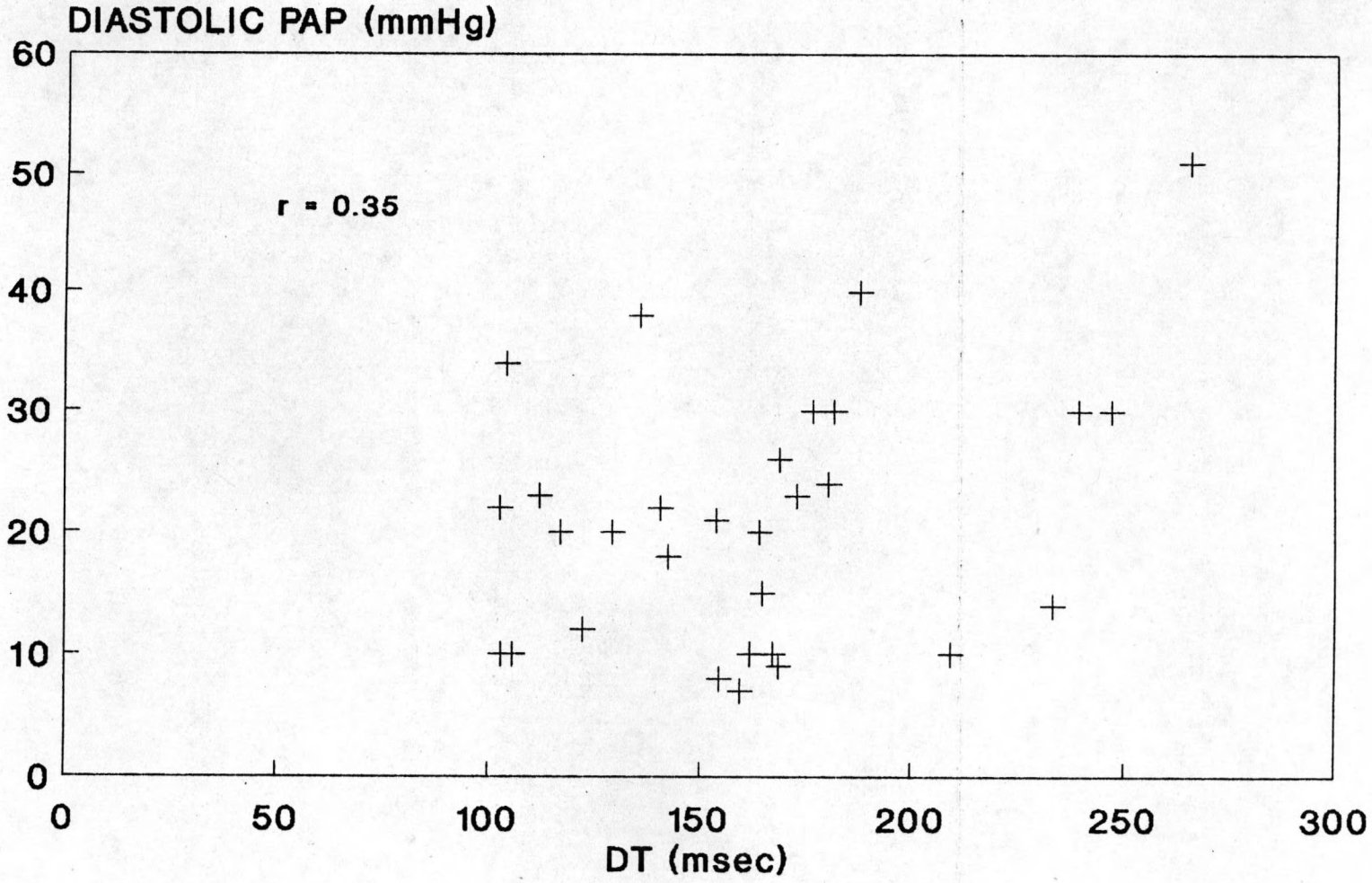

Fig.16 DIAGRAM SHOWING CORRELATION BETWEEN MEAN PAP & DT

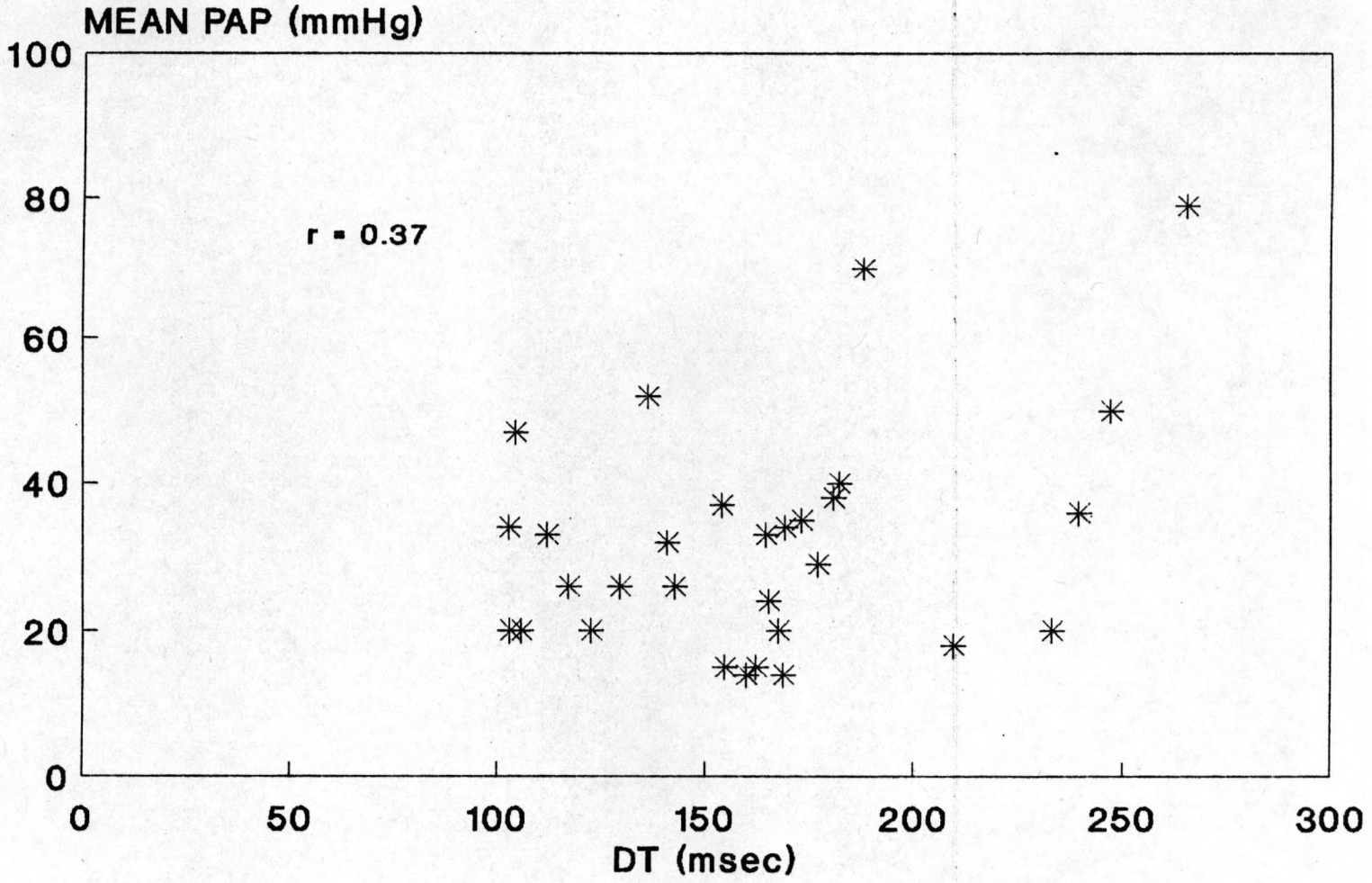

Fig.17 DIAGRAM SHOWING CORRELATION BETWEEN SYSTOLIC PAP & ET

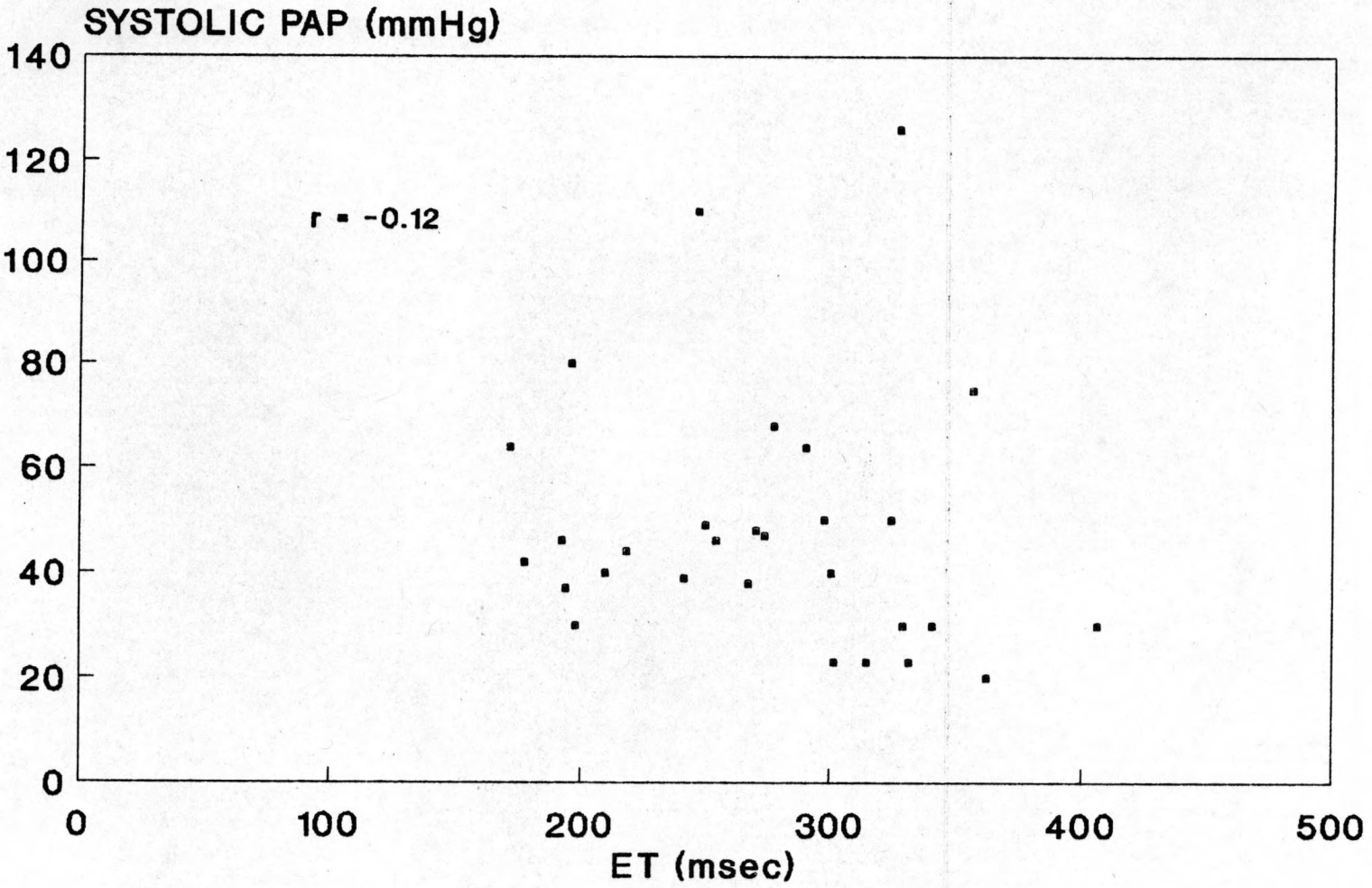

Fig.18 DIAGRAM SHOWING CORRELATION BETWEEN DIASTOLIC PAP & ET

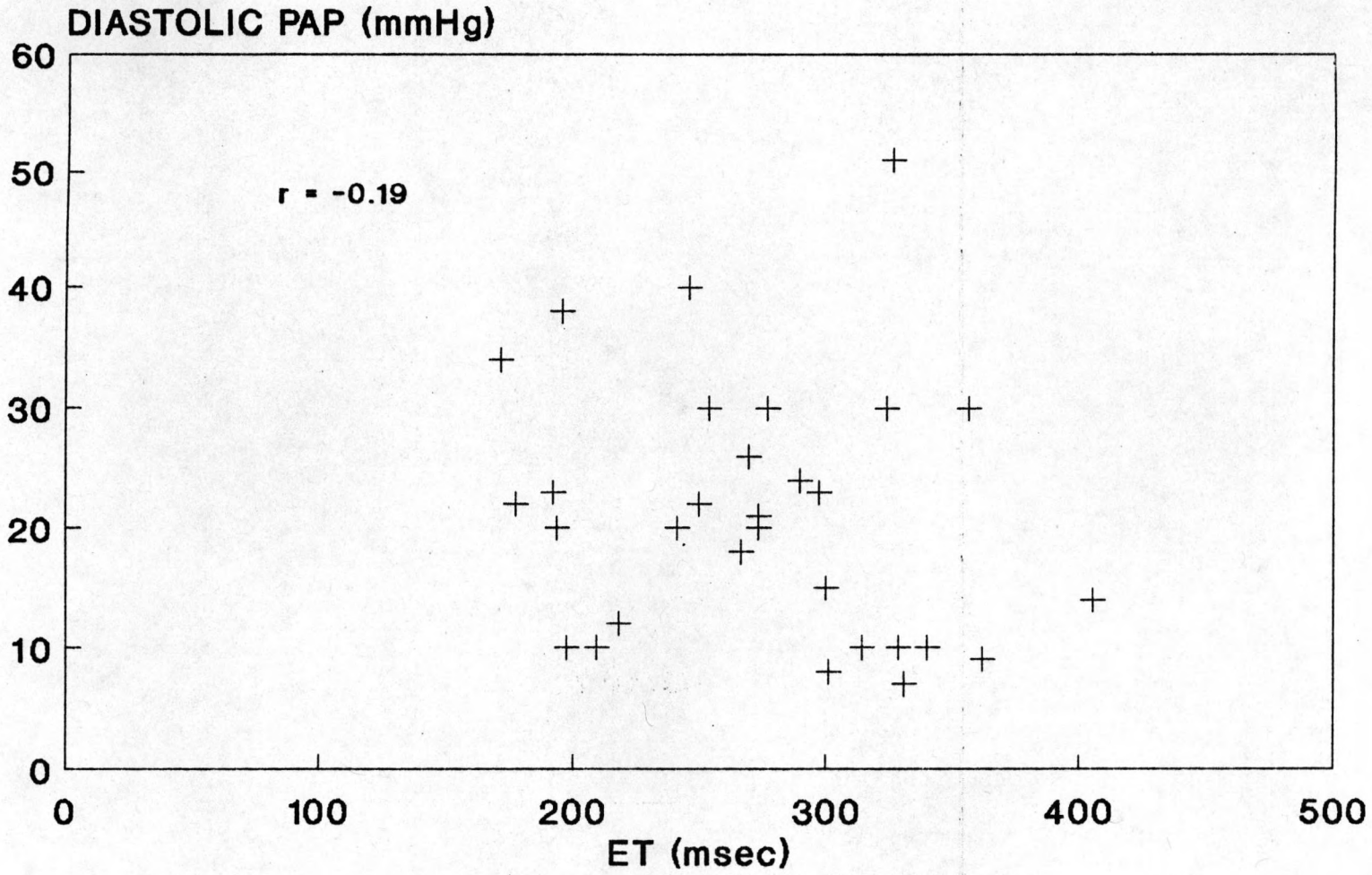

Fig.19 DIAGRAM SHOWING CORRELATION BETWEEN MEAN PAP & ET

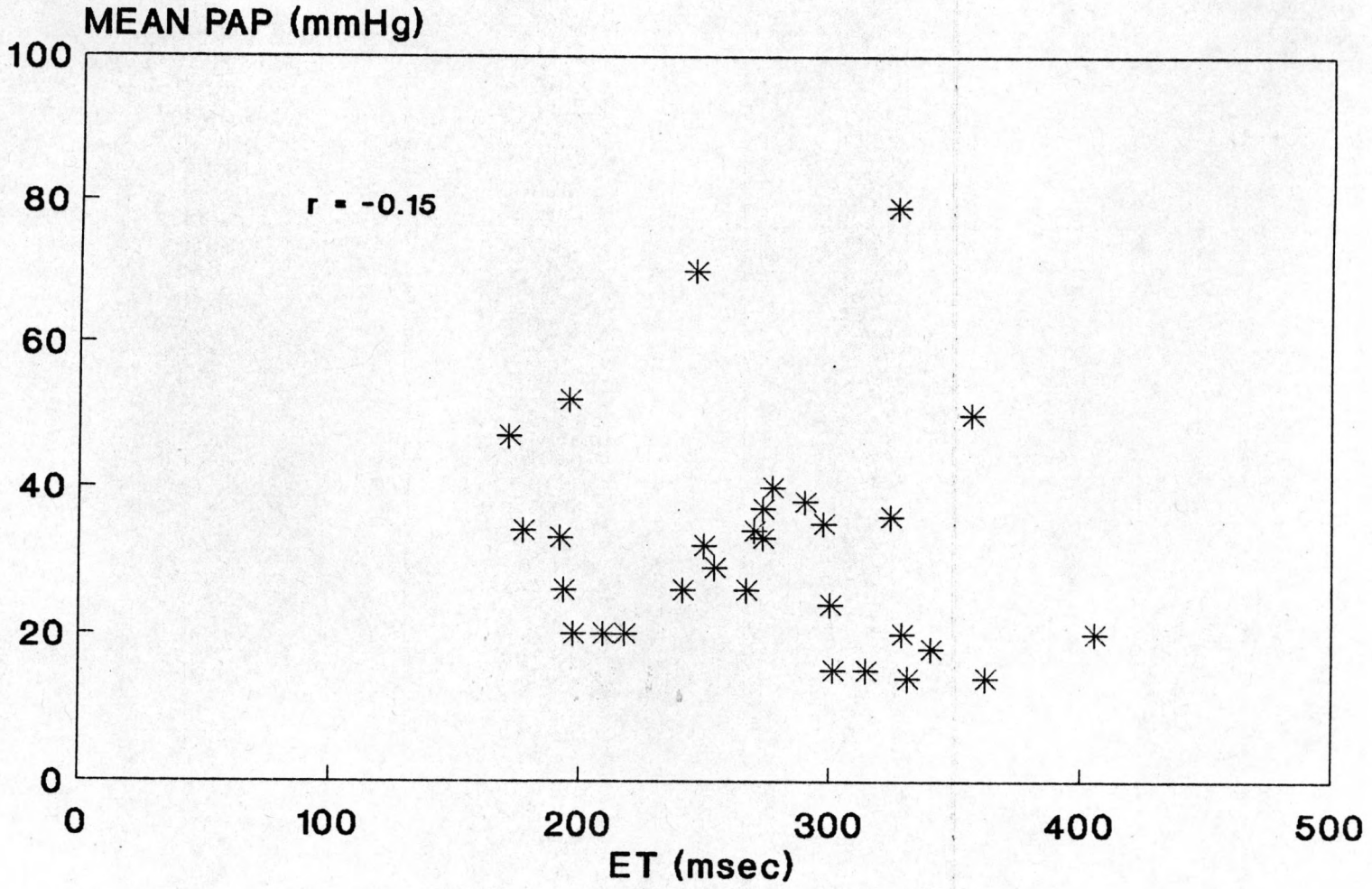

Fig.20 DIAGRAM SHOWING CORRELATION BETWEEN SYSTOLIC PAP & PEP/AT

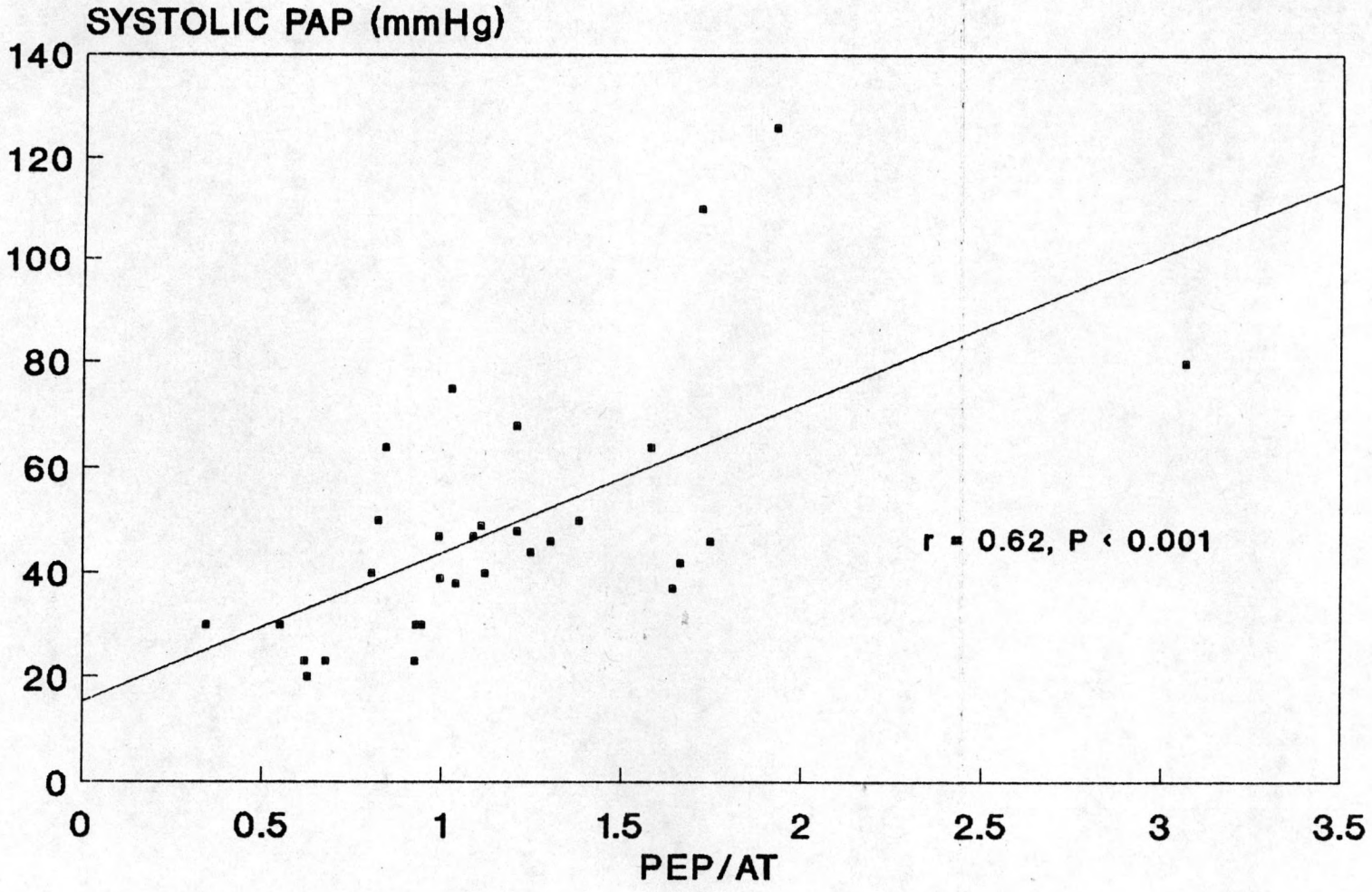

Fig.21 DIAGRAM SHOWING CORRELATION BETWEEN DIASTOLIC PAP & PEP/AT

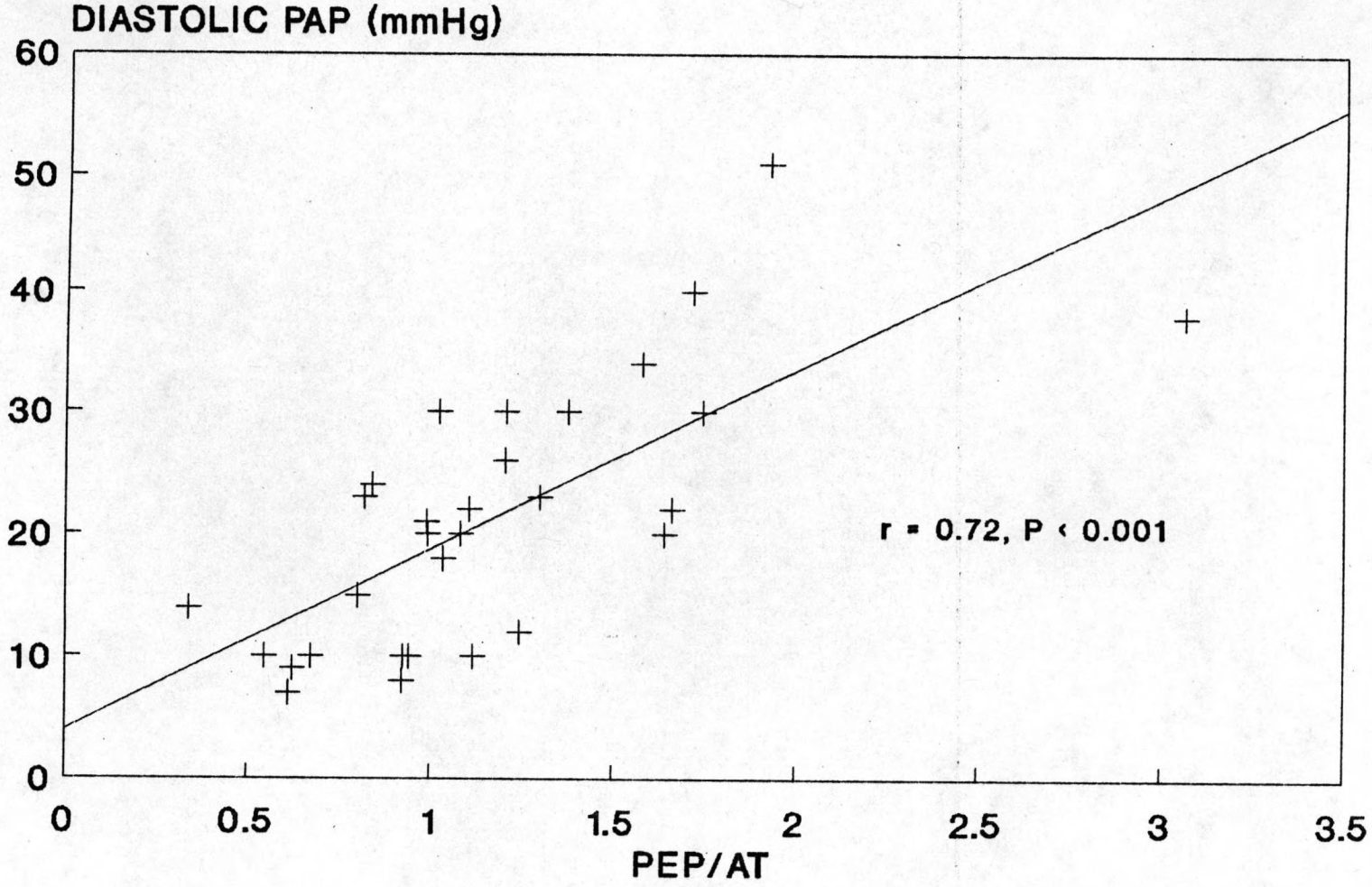

Fig.22 DIAGRAM SHOWING CORRELATION BETWEEN MEAN PAP & PEP/AT

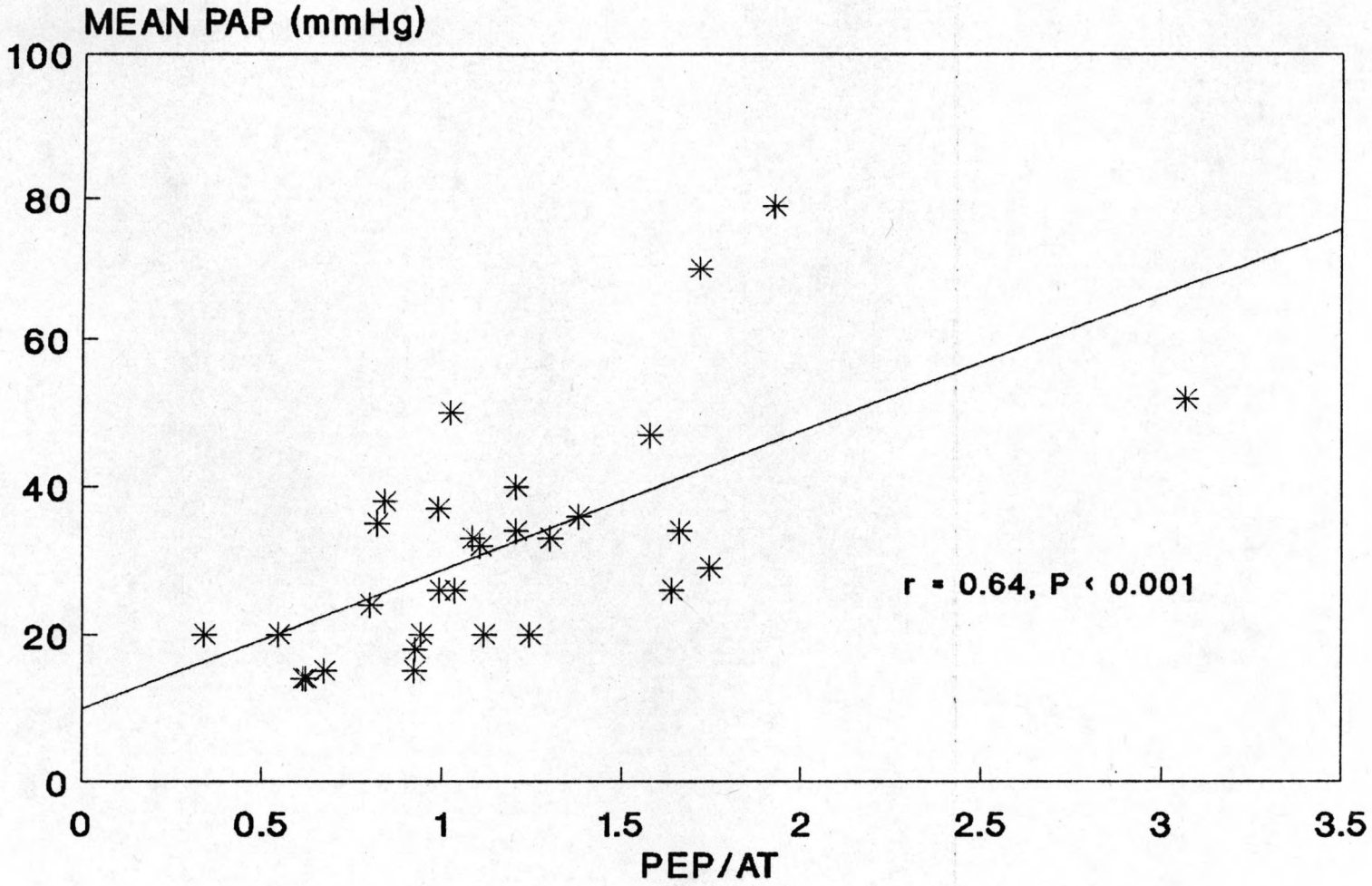

Fig.23 DIAGRAM SHOWING CORRELATION BETWEEN SYSTOLIC PAP & PEP/ET

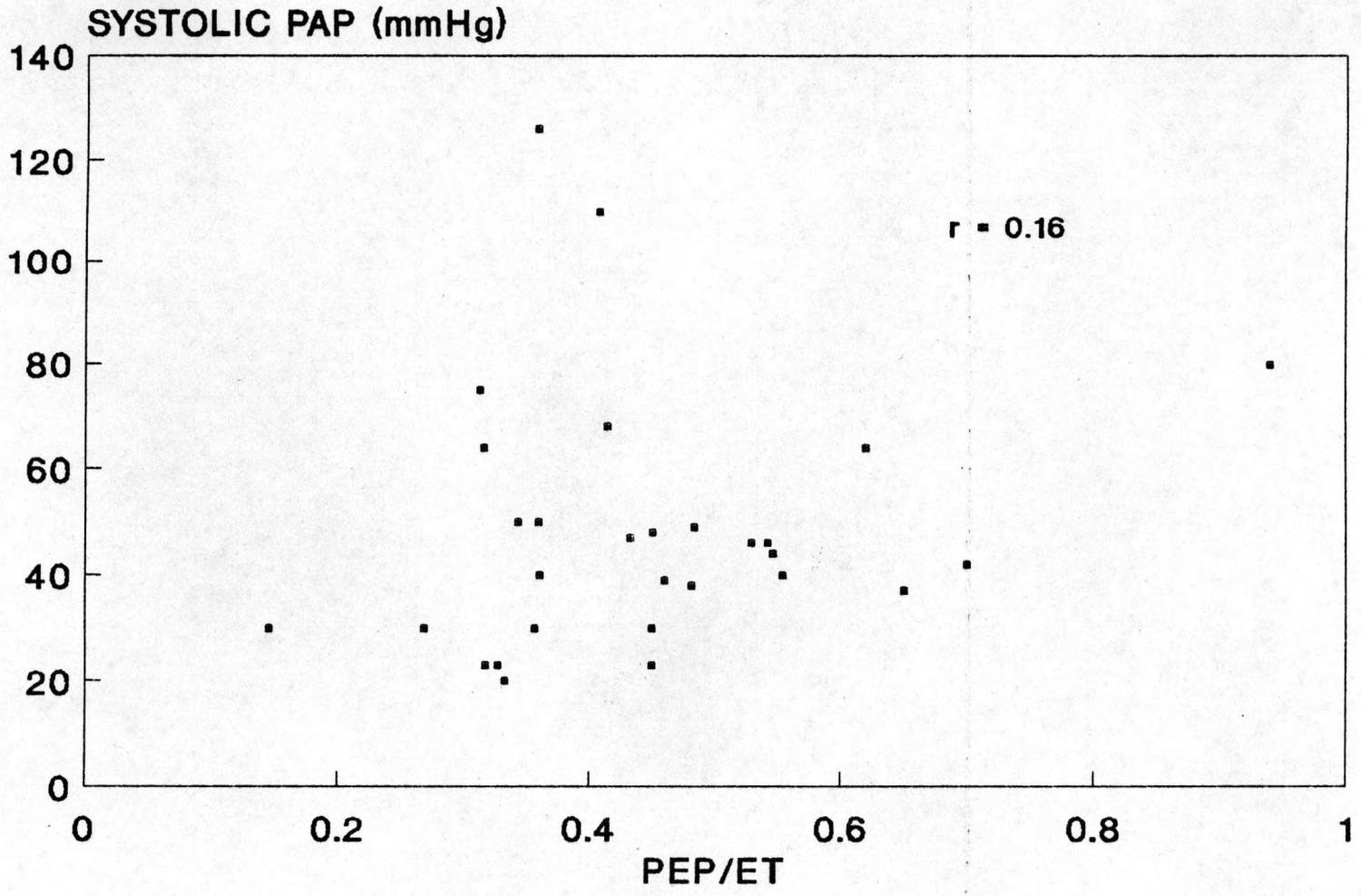

Fig.24 DIAGRAM SHOWING CORRELATION BETWEEN DIASTOLIC PAP & PEP/ET

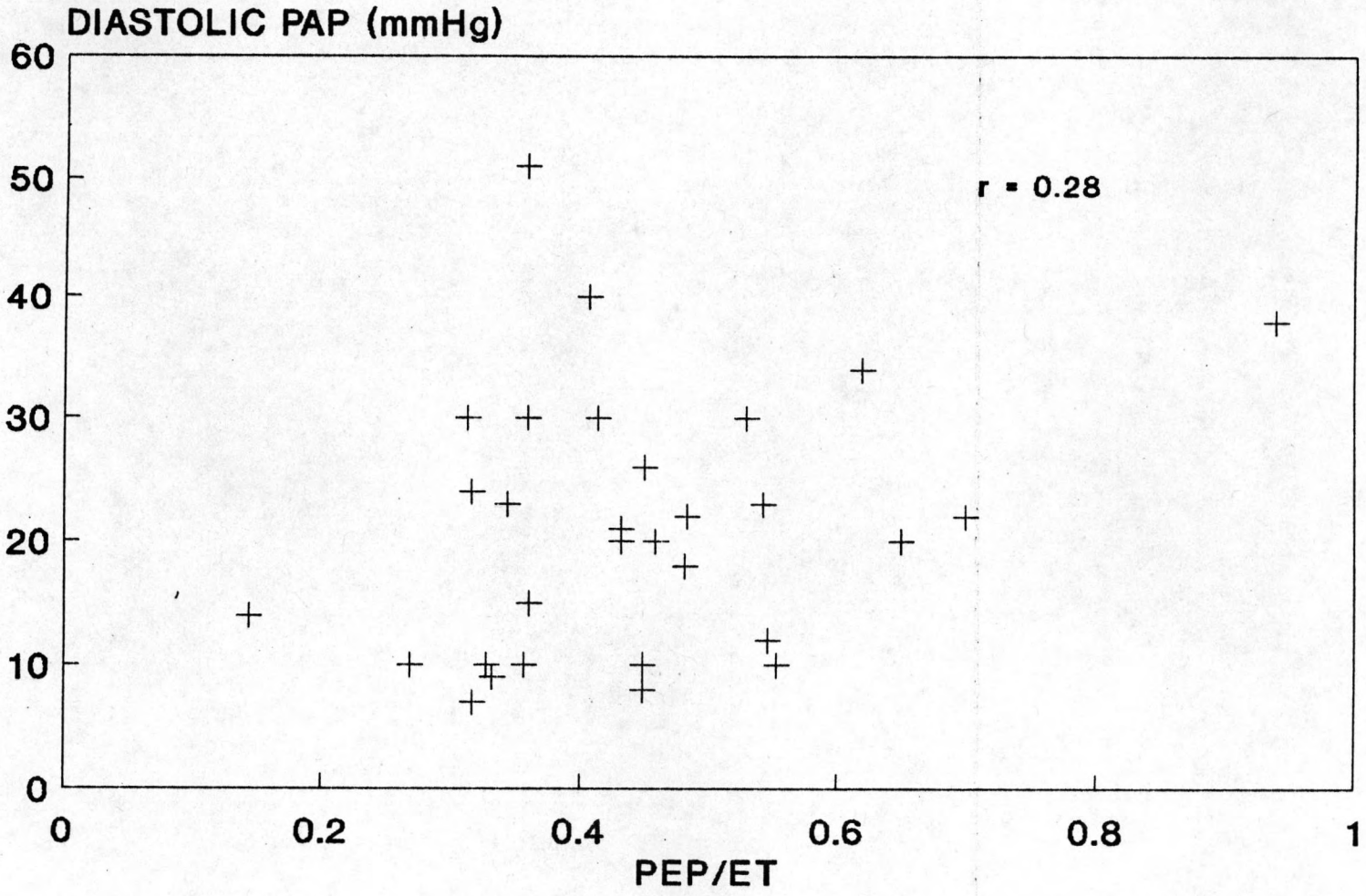

Fig.25 DIAGRAM SHOWING CORRELATION BETWEEN MEAN PAP & PEP/ET

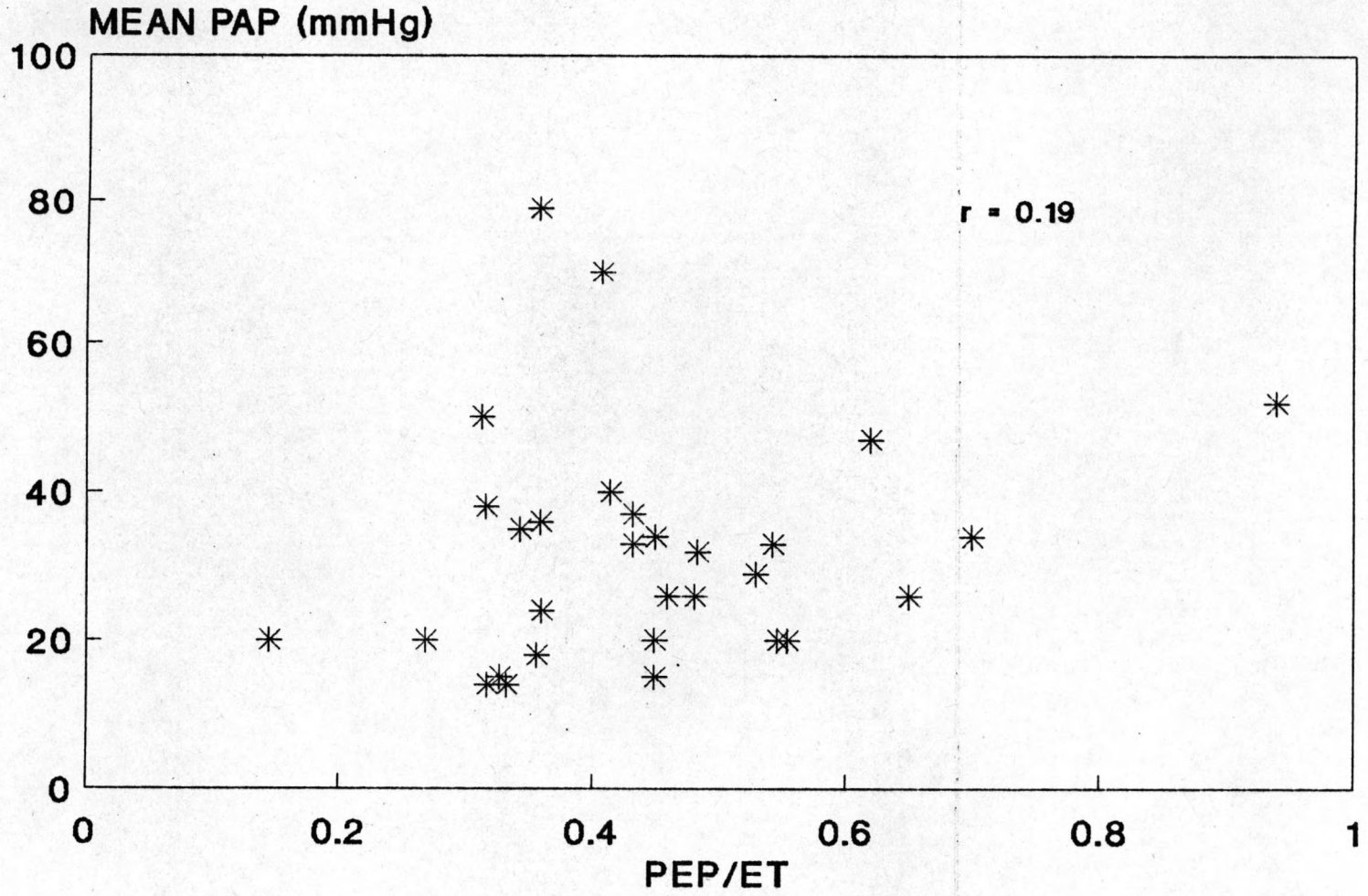

Fig.26 DIAGRAM SHOWING CORRELATION BETWEEN SYSTOLIC PAP & AT/DT

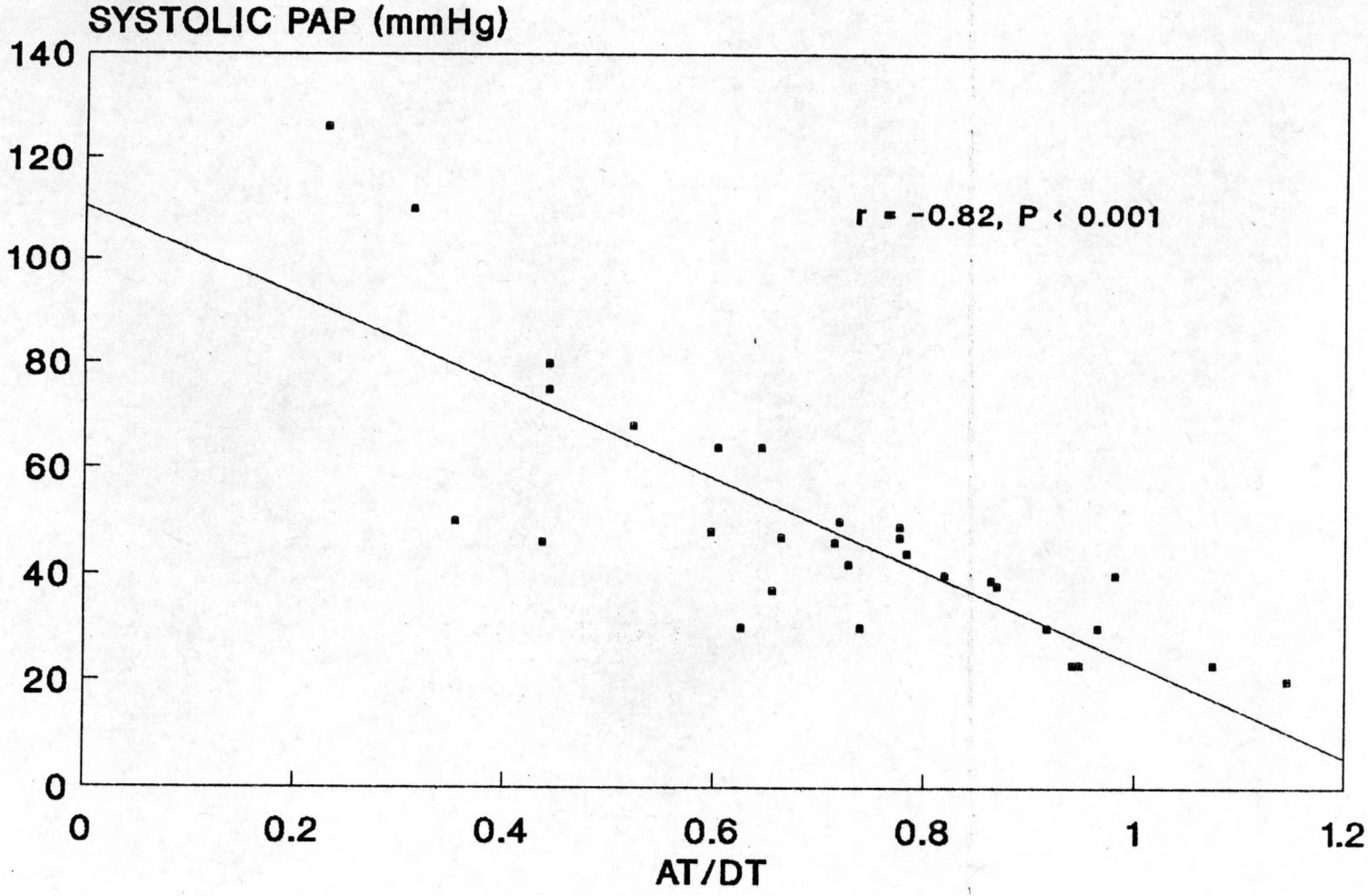

Fig.27 DIAGRAM SHOWING CORRELATION BETWEEN DIASTOLIC PAP & AT/DT

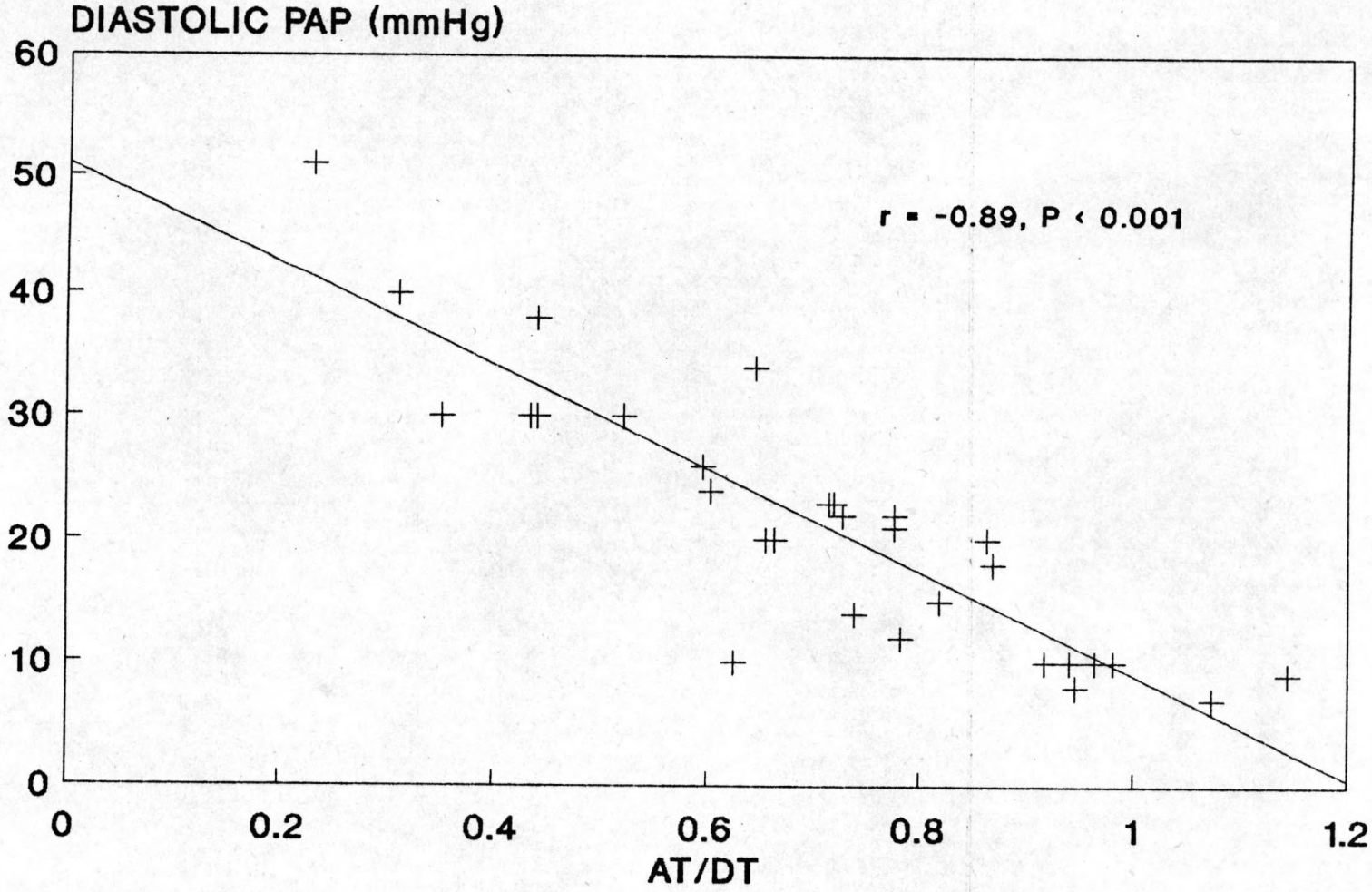

Fig.28 DIAGRAM SHOWING CORRELATION BETWEEN MEAN PAP & AT/DT

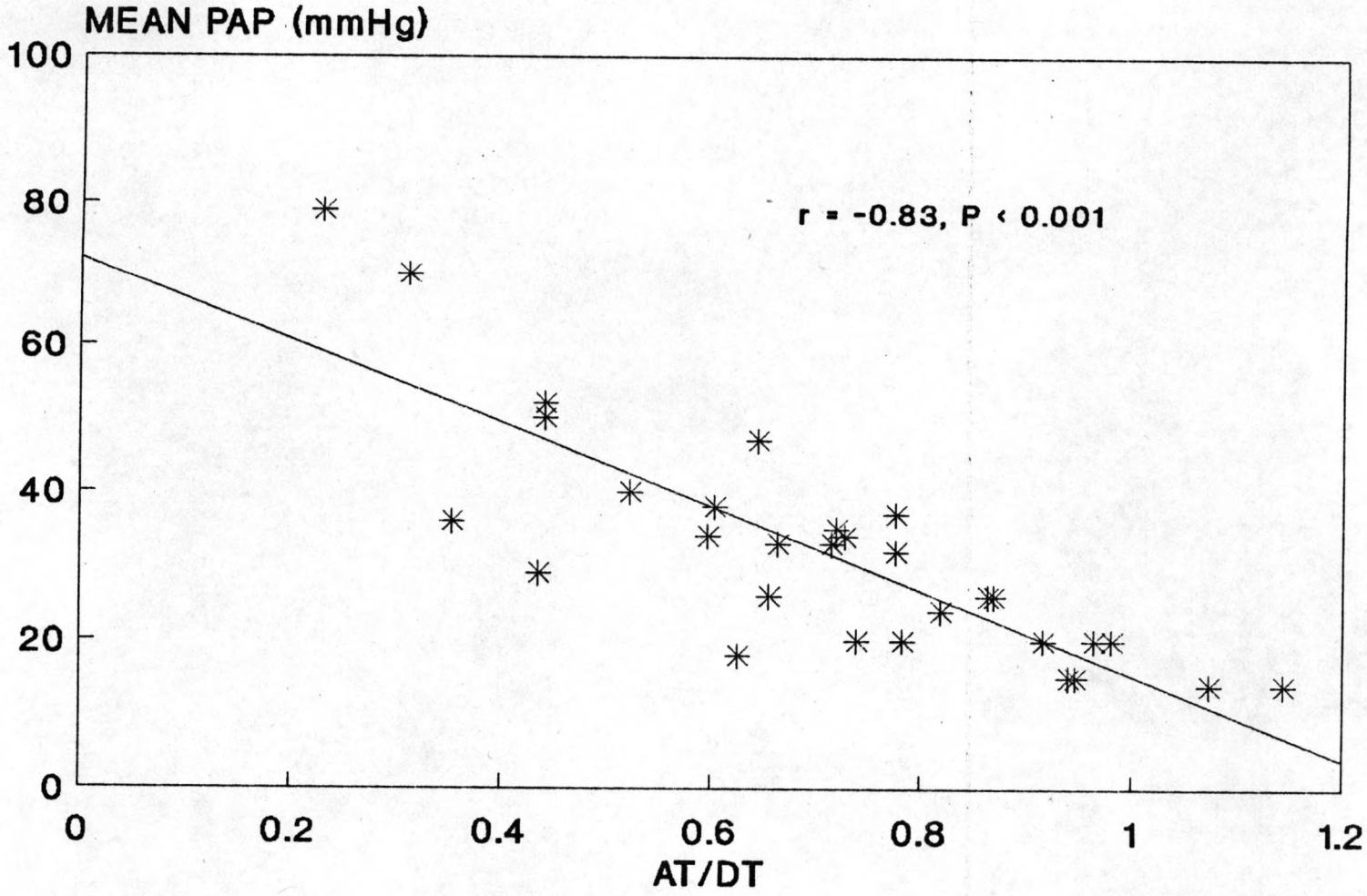

Fig.29 DIAGRAM SHOWING CORRELATION BETWEEN SYSTOLIC PAP & AT/ET

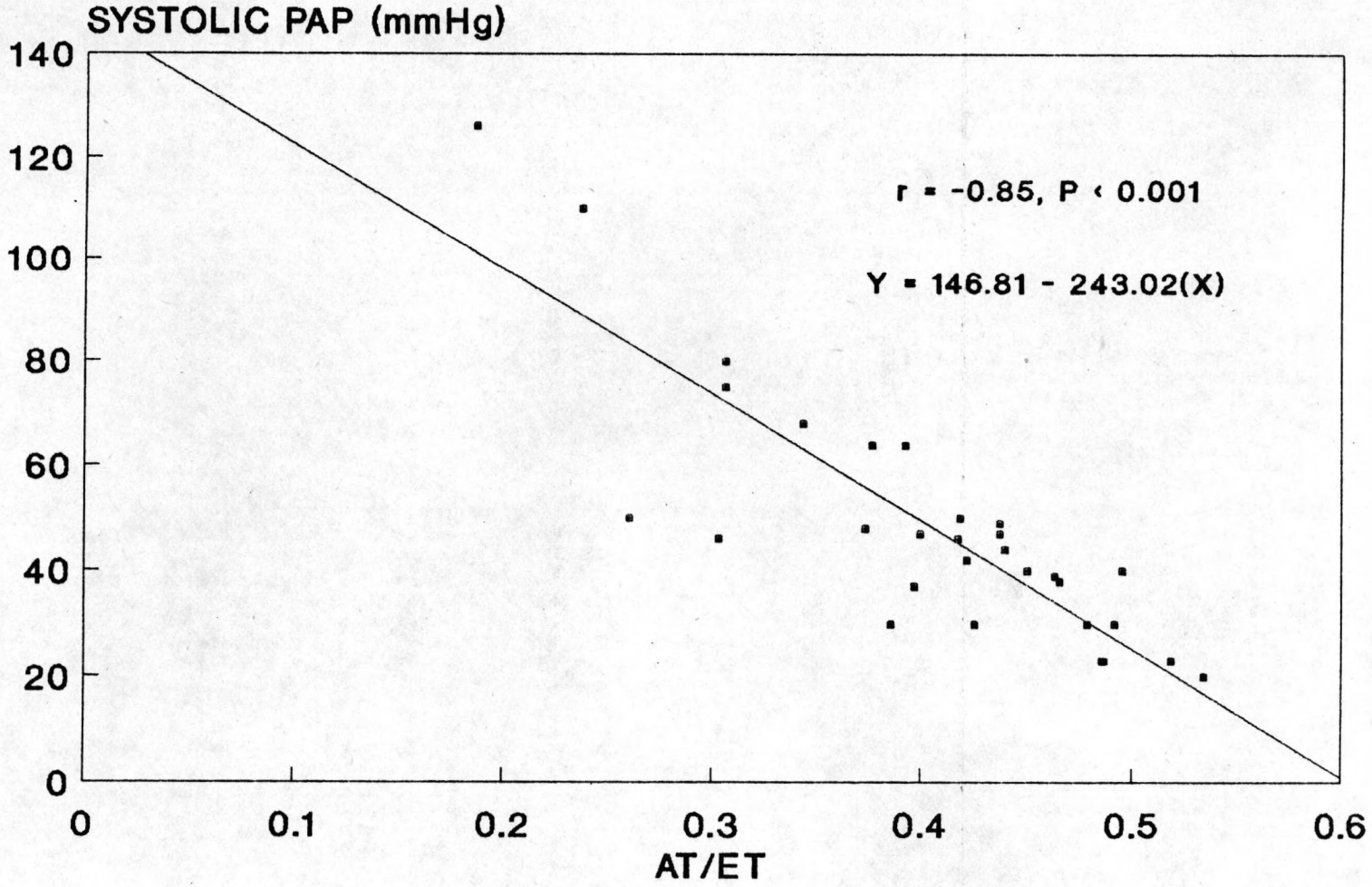

Fig.30 DIAGRAM SHOWING CORRELATION BETWEEN DIASTOLIC PAP & AT/ET

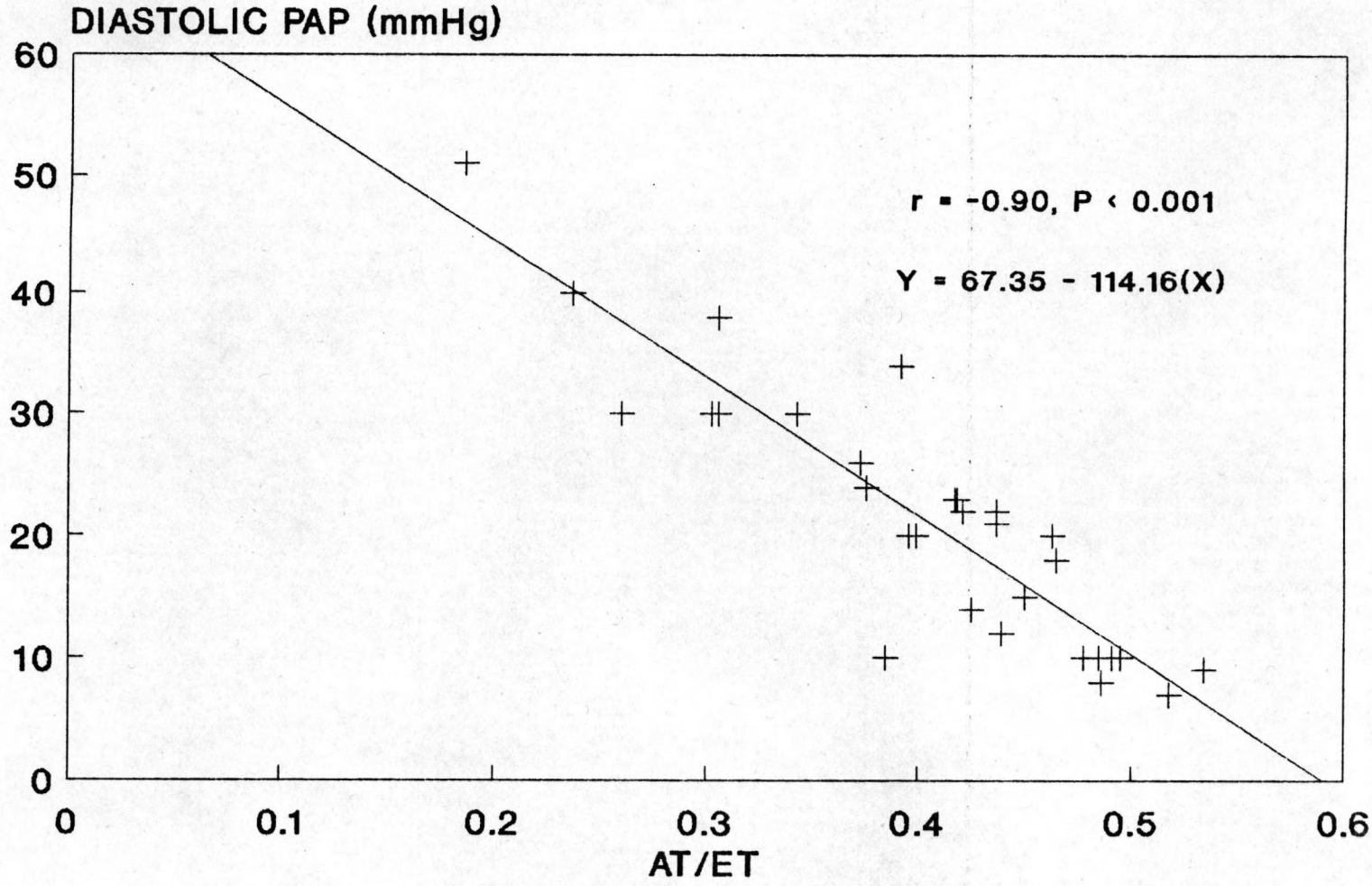

Fig.31 DIAGRAM SHOWING CORRELATION BETWEEN MEAN PAP & AT/ET