

Work with the drug is continuing, and, if our present results are confirmed, chlorthenoxazin should prove a most useful addition to the present range of mild analgesics.

We are grateful to Messrs. C. H. Boehringer Sohn, Ingelheim am Rhein, for supplies of chlorthenoxazin and valtorin.

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Practical Experience with the Peak Flow Meter

Many elaborate instruments are available for measuring expiratory flow rates, but few are suitable for use in the consulting-room, in the factory, or at the patient's own bedside. The peak flow meter whose workings were described by Wright and McKerrow (1959) has been used by us both in clinical practice and in epidemiological surveys, and has proved itself to be a practical aid in the investigation of chest conditions.

RESULTS IN NORMAL PERSONS

The mean reading for 105 males was 53.7 (equivalent to 537 litres per minute) and for 74 females the reading was 38.0. These normal values were based upon 69 staff at Queen's College, Dundee, 30 staff at Ashludie Chest Hospital, and 80 symptom-free flax-workers.

In men the blowing power was found to decline 0.29 unit (S.E. 0.10) for each year's increase in age, and for every extra inch of height the blow increased by 1.44 units (S.E. 0.23). Weight had no significant effect, and the values for women did not change significantly with age, height, or weight.

The peak flow readings were compared with expiratory flow rates (3/4 second forced expiratory volumes) measured either on a spirometer of the type described by Bernstein, D'Silva, and Mendel (1952) or on the modified Gaensler (1951) apparatus. In order to mitigate the effect of age, sex, and body-build, it was found convenient to use the ratio of 40 times this volume—that is, the E.F.R. 40 of Kennedy (1953)—to the predicted value of the maximum breathing capacity (M.B.C.) of Needham, Rogan, and McDonald (1954).

COMPARISONS WITH OTHER INSTRUMENTS

During a survey in a flax factory and flax mill, measurements were obtained on both the peak flow meter and the Mendel spirometer for 65 subjects. For 41 men the coefficient of correlation between the two instruments was 0.81, and for 23 women 0.62. These can

be compared with the coefficient of 0.86 obtained by Higgins (1957). The mean values of various categories for the two instruments are shown in the Table.

Mean Values for the Two Instruments

	No.	Peak Flow Meter (As % of 60 for Men or 40 for Women)		Spirometer E.F.R.40 Pred. M.B.C. × 100	
		Best of 3 (%)	Average (%)	Best of 3 (%)	Average (%)
Symptom-free ..	13	95	91	96	89
Byssinosis (alone) ..	9	89	84	91	99
Simple bronchitis ..	19	79	75	83	81
Complicated ..	5	73	69	78	74
Emphysema ..	4	36	35	36	34
Miscellaneous conditions* ..	15	74	71	82	79

\* These include bronchospasm (9), upper respiratory catarrh (4), bronchiectasis (1), and hypertension (1).

The coefficient of variation (standard deviation/mean as a percentage) was approximately 30% for both instruments, whether the best or the average reading was used. This represents the variation between subjects. The variation between tests on the peak flow meter at different times in the same subject was 10%, and the variation between blows at the same test in the same subject was only 6% ; this last was only one-half of the corresponding variation for the spirometer (11.5%).

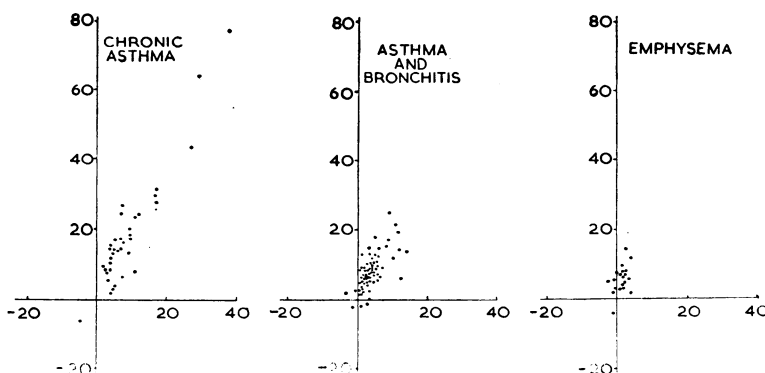
RESPONSE TO BRONCHODILATOR DRUGS

Forty-five hospital patients with bronchospasm were tested with each of four drugs (subcutaneous adrenaline, intravenous aminophylline, and prednisolone and isoprenaline by insufflation) as a guide to maintenance therapy. Their improvement, shown on the Graphs, was estimated by measurements before and after the administration of the drugs, using both the peak flow meter (horizontal axis) and a Mendel or Gaensler spirometer (vertical axis). The patients have been divided into three categories in order to demonstrate the differences in response that may occur.

Those diagnosed as chronic asthma show the best correlation between the two measurements. Those in the asthmatic bronchitis group show less spectacular improvement and the scatter is wider. The correlation is least in the emphysema group, who show little response to the drugs used.

DISCUSSION

The only occasion when the peak flow meter failed to reproduce the results obtained with other spirometers



Response to bronchodilator drugs as measured by peak flow meter and by spirometer. Vertical axis represents change in spirometer readings after administration of drugs. Horizontal axis represents change in peak flow readings.

was in a study designed to show the effect of byssinosis in flax-workers during the course of the working day, as had been previously demonstrated by Schilling (1956) in cotton-workers. Otherwise the instrument has been found to give results comparable to those obtained using more sophisticated apparatus. It is fully portable, and can be used without lengthy preparations. It is speedy in operation, the time needed to take three readings and explain the use of the instrument being only three minutes, as contrasted with five minutes for the Gaensler apparatus, its nearest rival.

The peak flow meter measures a component of respiration slightly different from that measured by the spirometers. It measures the initial peak, lasting about one-hundredth of a second, compared with the three-quarter second measured on the spirometer, and it is more sensitive to the muscular element in respiration. It does, however, separate respiratory conditions with an efficiency equal to that of other instruments in common use.

#### SUMMARY

Wright's flow meter has been compared with other spirometers in normal persons on the staff of Queen's College, Dundee, and Ashludie Chest Hospital, in flax-workers, and in hospital patients undergoing treatment with bronchodilator drugs.

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## Medical Memoranda

### Long-acting Glyceryl Trinitrate in Angina Pectoris of Out-patients

"Nitroglyn," the preparation used, contains specially coated granules of glyceryl trinitrate which are released slowly from the gastrointestinal tract. Each tablet contains 1/10 gr. (6.5 mg.) of glyceryl trinitrate, which causes peripheral vasodilatation, measured in fingers, lasting for about five hours (Mann, 1956). It has therefore been proposed as a form of treatment for angina pectoris, but so far there have been no controlled trials of the preparation during daily activity. Consequently, we decided to try the effect of nitroglyn on out-patients suffering from typical angina of effort.

*Methods.*—The trial was conducted on 10 patients suffering from angina pectoris of effort lasting not more

than one minute; all showed electrocardiographic changes and were regular users of glyceryl trinitrate. Nitroglyn tablets and an indistinguishable dummy tablet were used. The tablets were taken first thing in the morning and after lunch for two periods of a fortnight each. The fortnightly sequence was randomly determined and was not known to any of us. The patients were also given unlimited numbers of ordinary glyceryl trinitrate tablets (1/130 gr.; 0.5 mg.) to chew only when required and not as a prevention for expected attacks. They were asked merely to record the number used. They were not warned of side-effects, and during the trial none were noticed.

*Results.*—Only seven patients completed the course satisfactorily. Two abandoned it after the first fortnight, during which they had received the active tablet thinking it of no value, and the third patient could not tell us how many ordinary tablets she had taken. As the Table

Average Number of Tablets Per Patient Taken During a Fortnight

	Nitroglyn (1/10 gr.; 6.5 mg.) Twice Daily	Dummy Tablet Twice Daily
No. of glyceryl trinitrate tablets (1/130 gr.; 0.5 mg.) taken during a fortnight .. .. .	43	43.6

shows, there is no striking difference in the amount of ordinary glyceryl trinitrate used by the patients during a fortnight, whether they were on nitroglyn or on the dummy tablet.

The nitroglyn tablets used were fully active in that they produced, in volunteers, typical headache lasting three and a half to four hours. This long action, however, was not an effective prophylaxis in our patients suffering from typical short attacks of angina of effort.

The trial was not designed to test nitroglyn in patients with severe angina occurring at rest, or lasting for longer than a minute; its value in such patients must therefore remain an open question.

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