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CLINICAL TRIALS OF ANTIHISTAMINIC DRUGS IN THE PREVENTION AND TREATMENT OF THE COMMON COLD

REPORT BY A SPECIAL COMMITTEE OF THE MEDICAL RESEARCH COUNCIL*

The investigations of Brewster (1947, 1949), Gordon (1948), Murray (1949), Arminio and Sweet (1949), Phillips and Fishbein (1949, 1950), and Tebrock (1950) suggested that antihistaminic drugs had beneficial effects in the prophylaxis and treatment of the common cold. On the other hand, these observations could not be confirmed by Paton, Fulton, and Andrewes (1949), Hoagland, Deitz, Myers, and Cosand (1950), Feller, Badger, Hodges, Jordan, Rammelkamp, and Dingle (1950), and Cowan and Diehl (1950). A critical review by the Council on Pharmacy and Chemistry of the American Medical Association (1950) cast serious doubt on the validity of the conclusions and the interpretation of the results of some of the earlier investigations, referred to above, which had seemingly shown favourable effects.

In view of the great practical importance of the favourable findings, if confirmed, the Medical Research Council undertook, at the request of the Ministry of Health, to investigate in this country the value of the treatment. A special committee was appointed early in 1950, and the results of the tests arranged by the committee are reported here.

The trials have been of two kinds : (1) small-scale tests of two powerful antihistaminic drugs—promethazine hydrochloride (" phenergan," May & Baker, Ltd.) and chlorocyclizine hydrochloride (" histantin," Burroughs Wellcome & Co.)—in the prevention of inoculated colds in volunteers at the Common Cold Research Unit, Harvard Hospital, Salisbury ; and (2) large-scale trials of the much weaker antihistaminic thonzylamine (also known in America as " neohetramine " or " anahist ") for the treatment of colds occurring naturally among volunteers drawn from the general adult population—workers in the Civil Service, industrial establishments, universities, and the like (see Appendix).

I. THE PROPHYLACTIC EXPERIMENT AT SALISBURY†

The object of this experiment was to see whether antihistaminics given before, and for a few days after, nasal instillation of common-cold washings to human volunteers would prevent the development of a cold. Histantin and phenergan were selected as the drugs for test, as the antihistaminic activity of both was known to be high. The volunteers were isolated in pairs throughout the trial—in the same way as has previously been described by Andrewes (1949). Half the subjects received the drug under test, the other half received dummies indistinguishable from it and containing $\frac{1}{4}$ gr. (16 mg.) of phenobarbitone. It was felt that the latter would, in the dosage employed, have a mild sedative effect and so be acceptable as a control medication against which the efficacy of the antihistamine could be measured. Tablets were given at approximately 10 a.m. and 7 p.m., swallowing being supervised by the matron. Two members of a pair were given the same substance. Whether they were to be given the drug or the dummy was decided randomly, and neither the patient nor the clinical observer knew which any particular patient had received.

Trial 1 : Histantin (January 18–28, 1950)

A 50-mg. tablet of histantin (or of the dummy) was given twice daily, beginning 48 hours before the cold inoculation and continuing until 72 hours after it. The virus inoculum was a 1 in 3 dilution of an unfiltered washing from patient G., who had developed a cold after receiving passage material from one of the Common Cold Research Unit's " pedigree " strains, Harrow. The results are shown in Table I. The incidence of colds is seen to be the same in the treated and control groups ; there was no clinical difference from the usual course of experimental colds. One spontaneous cold developed in a subject who had been taking histantin for 24 hours ; a similar case occurred in the control group.

TABLE I.—*Results of Trial 1*

Drug Administered	Cold	No Cold
Histantin	4*	4
Control tablet	4*	4
Total	8	8

* Includes one spontaneous cold developing during quarantine period before inoculation.

Trial 2 : Phenergan (February 1–11, 1950)

A 20-mg. dose of phenergan (or of the dummy) was given twice daily, beginning 60 hours before virus inoculation and continuing for 72 hours after. Two test viruses were used —unfiltered G diluted 1 in 3, as in Trial 1, and a filtrate

*The membership of the committee was as follows: Dr. F. H. K. Green (chairman), Dr. C. H. Andrewes, Professor W. A. Bain, Professor A. Bradford Hill, Dr. W. C. Cockburn, Dr. P. D'Arcy Hart, Dr. J. Faulkner, Dr. N. L. Lloyd, Group Captain T. C. MacDonald, Dr. L. G. Norman, Dr. J. P. Sparkes, Dr. T. Sommerville, and Dr. J. A. Harrington (who was appointed secretary and co-ordinated the trials).

†Members of the staff concerned with this investigation were C. H. Andrewes, T. Sommerville, K. R. Dumbell, and J. S. Porterfield.

TABLE II.—*Results of Trial 2**

Drug Administered	Cold Washing	Cold	No Cold
Phenergan	G	5	0
	Pool 82	2	2
Control	G	3	4
	Pool 82	1	3

* In the phenergan experiment two volunteers of opposite sex were unpaired; these were treated as singletons, one getting the drug and one not. In addition one volunteer and her partner inoculated with the G virus have been excluded since she developed influenza in the course of the experiment.

of pool 82 (also virus of Harrow passage series). Table II shows the results. As in Trial 1 there is no evidence of prevention with the antihistaminic drug.

Side-effects

Subjects were not warned that some side-effects of the drugs might be apparent, but may well have read of this possibility in the lay press. In the first trial, of the eight persons taking the drug only one complained of "fuzziness in the head" half an hour after her fourth dose of histantin; it lasted ten minutes. In the second trial four patients complained of drowsiness; two were in the phenergan and two in the control group. In assessing the significance of this low incidence of side-effects it must be remembered that the volunteers in this trial were leading a very leisurely existence and were under no kind of strain.

Discussion

Some claims to a beneficial effect of antihistaminics in curing colds have emphasized the need for beginning treatment within a few hours of onset. It is thus particularly noteworthy that the results at Salisbury with experimental colds showed no effect even when the drugs were given for two to three days *before* infection. Clinical observation of the volunteers revealed no difference in the nature and duration of experimental colds in those who received antihistaminic treatment and those who did not. The results with the two antihistaminics tested were clear cut, and there seemed to be no good reason for repeating the experiment with other drugs of a similar kind.

II. LARGE-SCALE THERAPEUTIC FIELD TRIAL

Plan of Investigation

To assess the value of antihistaminic drugs in the treatment of the common cold it was necessary to compare the experience of treated individuals with that of a similar group not treated; for this purpose it was decided to plan the inquiry on similar lines to those adopted by a committee of the Council in investigating the value of patulin for the same purpose during the war (*Lancet*, 1944, **2**, 373).

Choice of an Antihistaminic for Test.—The antihistaminic drugs vary considerably in their properties, potency, and toxicity, but it clearly was impracticable to carry out field tests of more than one product if sufficiently large groups for statistical analysis were to be obtained within a reasonable period. The available evidence indicated that thonzylamine would be the most appropriate choice in the first instance, as it was generally accepted as having a low toxicity (Friedlaender and Friedlaender, 1948; Criep and Aaron, 1948; Schwartz, 1949) and had been claimed as very effective against the common cold by Arminio and Sweet (1949) and Tebrock (1950).

Organization of Trials at Individual Centres.—The supervision and conduct of the investigation at the individual centres were carried out by medical officers who had been visited by the secretary of the committee and instructed in the standard procedure proposed; at some centres the conduct of the test was delegated to a trained industrial nurse working under the supervision of a medical officer. The existence of the trial was brought to the notice of potential volunteers by means of posters, notices, etc., the details of publicizing the scheme being left to the medical officer in charge. Volunteers were told of the experimental nature of the inquiry and the desirability of attending for treatment as soon as possible after the onset of symptoms of a cold.

Selection of Cases.—Admission to the trial was limited to volunteers over the age of 15 years in whom there was good evidence of the presence of the common cold. As it was important to obtain uniformity in different areas, the following definition of a common cold was given as a guide to the observers: "A catarrhal inflammation of the upper respiratory passages usually without pyrexia but with a watery or mucous discharge from the nose and associated with sneezing, fullness in the head and nose, and sometimes with cough, headache, sore throat, hoarseness, and running eyes." Reliance was placed mainly on the subjective diagnosis, and cases were accepted on the basis of the patient's description of his symptoms; clinical examination, other than the recording of temperatures, was carried out only to exclude other conditions. All volunteers whose conditions fell into any of the following categories were excluded: chronic catarrh or sinusitis; acute tonsillitis; suspected influenza; any person whose temperature was found to exceed 100° F. (37.8° C.); those who, on inquiry, seemed likely to have taken an antihistaminic drug for any purpose within the previous week; those with a *present attack* of hay-fever or allergic rhinitis. Persons with a *previous history* of allergic states were included, but a note to this effect was made in the appropriate column of the record sheet.

Design of Trial

To ensure that no bias could enter into the assessment of results it was essential that neither the patient nor the investigator should be aware whether antihistaminic tablets or control tablets had been given in a particular case. For this purpose, those who were to be treated and those who were to be "controls" were prearranged in random order by the use of random sampling numbers, with the one restriction that each batch of 50 volunteers should include 25 treated (T) and 25 controls (C) (a restriction not known at the centres).

These lists were numbered consecutively, so that, for example, a series might run as follows: 1T, 2T, 3C, 4T, 5C, 6C, and so on, randomly. Such lists were constructed, in the Council's Statistical Research Unit, for each centre. Record sheets and cartons containing the appropriate tablets were then marked (in the Statistical Research Unit) with the serial number—namely, 1, 2, 3, 4, 5, 6, etc., but with no reference to (T) or (C)—and sent to the local centres; thus at the local centre one carton and one record sheet, *the serial numbers of which corresponded*, were used for each patient. They were used in strict order of serial number; thus if the last patient on one day was recorded on record sheet "15" and received tablets from carton "15," the first patient on the next day was recorded on record sheet "16" and received tablets from carton "16." The key to the identity of the serial numbers was kept centrally and secret until the end of the investigation.

This somewhat novel method was adopted in place of the more usual one of merely labelling one product X and the other Y and giving them in random order, in view of the side-effects to be expected with the antihistaminic drug. If decisive side-effects were observed with even one patient then the nature of X (and Y) would ever after be known (or suspected). With the method chosen the identity of one carton might well be suspected in the patient with

side-effects, but no evidence would thereby be given regarding the treatment of any other patient.

Course of Treatment

At the first attendance the medical officer, having satisfied himself that the patient was suffering from a common cold and was not within one of the excluded categories previously defined, completed Part A of the record sheet (reproduced here) and then proceeded to dispense the tablets.

Each patient, it was laid down, should receive one tablet three times a day for three days—that is, a total of nine tablets. The individual and numbered carton for each patient held three envelopes, each containing three tablets : one envelope was issued each day—that is, on reporting, on the next day, and on the day following that. Antihistaminic tablets contained 50 mg. of thonzylamine ; control tablets contained 5 mg. of quinine sulphate in a lactose base. All tablets were sugar-coated, and those which contained the antihistaminic were indistinguishable in appearance from those which did not. Volunteers were told to swallow the tablets whole, to remove the possibility of detection by taste if they were bitten or chewed. Each patient was given an instruction leaflet (explaining the details of the treatment and follow-up) and a note to hand to his family doctor if the latter was consulted during the period of the test.

Follow-up and Assessment of Progress

Patients were instructed to report progress at the end of 24 hours, 48 hours, and after a week. At these attendances the volunteers were requested to state quite frankly whether they thought the treatment given had been effective ; assessments of progress were recorded by ringing the words "cured," "improved," "unchanged," "worse," or "re-

Trial Centre

RECORD SHEET

Trials of Antihistaminic Drugs in the Treatment of the Common Cold

(MEDICAL RESEARCH COUNCIL)

Serial Number

Surname (BLOCK CAPS) Initials:	Mr. Mrs. Miss	Age (years)	Clock No.	Department	Occupation

A — FIRST EXAMINATION (*To be filled in by a doctor : please put a ring round the appropriate items*)

Has patient been previously treated in these trials? Yes No

Is there any previous history of: Hay-fever Allergic Rhinitis Asthma

Other Allergic Manifestations (*State nature*):

Date of first examination | Time

Duration in days of Head Cold before first examination ¼ ½ 1 2 3 4 5 6 7 or more days

Blocked Nose Fullness in Head Sneezing Sore Throat Hoarseness Cough Headache Feeling Ill

Nasal Discharge: Watery Mucoid Purulent Temperature (if taken).....

Are you satisfied that this is a case of Common Cold ? Yes No Uncertain

B (Enter progress at 24 hours, 48 hours, and after a week) PROGRESS RECORD (*Please put a ring round appropriate items*)

Date	Time	Number of Tablets Since Previous Recordings	Progress	Temperature (if taken)	Doctor's Comments
			Cured Improved Unchanged Worse		
			Cured Improved Unchanged Worse Recurred		
			Cured Improved Unchanged Worse Recurred		
			Cured Improved Unchanged Worse Recurred		
			Cured Improved Unchanged Worse Recurred		

[SEE OVER

Reverse Side of Record Sheet

SIDE-EFFECTS

(*Please do not ask* DIRECT QUESTIONS *about specific side-effects as this may give misleading results*)

1. Has the treatment agreed with the patient? Yes No
2. If "No," what symptoms does the patient attribute to the tablets? (*State nature and severity as "mild," "moderate," or "severe" ; and date of occurrence*)

Off work* from.....to..... Reason:

* (*Delete if not off work during trial*)

ANY FURTHER COMMENTS

curred" as appropriate. The definitions of these categories had been laid down as follows:

"*Cured.*"—Only those persons who, after questioning, are found to be *completely* free from symptoms and who, on examination, are found to be without objective signs.

"*Improved.*"—Persons who, on questioning and examination, are found to be improved but not cured since the previous examination.

"*Unchanged.*"—Persons in whom, on questioning, the symptoms and signs are found to be unchanged since the previous examination. (*All cases in which there was doubt regarding progress were included in this category.*)

"*Worse.*"—Persons in whom, on questioning and examination, the symptoms and signs are found to have increased since the previous examination.

"*Recurred.*"—Patients, previously classified as "cured," and who report with another cold within 14 days of recovery from the previous one.

Assessment of Side-effects.—Direct questions about side-effects were avoided during treatment lest the investigator

might surmise from the answers whether the patients were on the antihistaminic or the control treatment. Where, however, side-effects were spontaneously complained of, details were noted, including the nature, date of onset, and severity. In all cases the patient was asked at his *last* attendance, and after the assessment of progress, whether the tablets had affected him adversely in any way; if the answer was in the affirmative the symptoms attributed by the patient to the tablets were noted.

Results

These therapeutic trials were set up at 19 widely distributed centres with a total population of approximately 58,000. They were carried out in each area between the middle of March and the middle of May, 1950, though not invariably over the whole of that period.

In total, 1,550 volunteers at the various centres were treated in the investigation—775 with the drug and an equal number with the control tablets. However, 394 record sheets had subsequently to be rejected from the analysis for such reasons as failure to complete the treatment or to report progress on the required days. These rejects came about equally from the treated and control groups (196 and 198 respectively), and thus show no differential bias. Deducting the rejects, 1,156 record sheets were available for analysis—579 for patients who received antihistaminic treatment and 577 for patients who had the alternative treatment. Since analysis of the results from each centre revealed no significant difference between them, only the combined results from all centres need be given here. It may also be noted that a special analysis was made according to the number of records that had to be rejected. The centres were grouped in three categories: under 10% of records rejected, 10–19% rejected, 20% or more rejected. No differences in results were revealed, showing again that the lapses did not bias the inquiry.

TABLE III.—*Duration of Cold Before Treatment was Begun*

Duration of Symptoms Before Treatment (in Days)	Persons Given Antihistaminic Treatment		Persons Given Alternative Treatment	
	No.	%	No.	%
½	64	11·1	60	10·4
1	137	23·7	113	19·6
2	180	31·1	213	36·9
3	96	16·6	84	14·6
4	49	8·5	42	7·3
5	22	3·8	25	4·3
6	7	1·2	10	1·7
7+	8	1·4	1	0·2
Total	16	2·8	29	5·0
	579	100·2	577	100·0

TABLE IV.—*Frequency of Presenting Symptoms at First Visit*

Symptoms	Persons Given Antihistaminic Treatment		Persons Given Alternative Treatment	
	No.	%	No.	%
Watery nasal discharge ..	359	62·0	337	58·4
Mucoid nasal discharge ..	114	19·7	118	20·5
Purulent nasal discharge ..	49	8·5	42	7·3
Blocked nose	321	55·4	307	53·2
Fullness in the head ..	385	66·5	390	67·6
Sneezing	413	71·3	408	70·7
Sore throat	217	37·5	231	40·0
Hoarseness	183	31·6	177	30·7
Cough	242	41·8	226	39·2
Headache	196	33·9	207	35·9
Feeling ill	44	7·6	46	8·0

The comparable nature in regard to initial symptoms of the volunteers who received antihistaminic treatment and those who did not is shown in Tables III and IV. It will be seen that the method of random allocation used resulted in two groups which were closely alike in relevant respects.

The results at the end of the first day, second day, and one week for different durations of colds before treatment are given in Table V. None of the differences is individually statistically significant for each duration of cold before treatment, and indeed the similarity in response of the two groups seems more remarkable than any dissimilarity. For instance, of those who came for treatment within the first day of their onset of symptoms, 13.4 and 13.9% of the treated and controls, respectively, reported a cure on the second day; 48.8 and 46.8% were cured at the end of the week. It may, however, be noted that the treated group had consistently a slightly higher proportion of cured and improved on the first day of treatment than had the controls.

By combining all results, irrespective of duration of cold before treatment, 48.0% of the treated and 42.1% of the control group were found to be improved (including nine treated and five control cases who were cured) at the end of the first day's treatment. The difference, 5.9 ± 2.9, is just significant in a technical sense, but even if it be real it is so small that it clearly has no practical importance. Also, this small difference, it will be seen, vanished on the second day, when, taking all the group together, the proportions of cured and improved were respectively 8.8% and 53.0% in the treated and 8.5% and 51.3% in the control group. Possibly the apparent small difference at the end of the first day's treatment can be accounted for by a slight sedative effect in some few subjects who received thonzylamine or by the unwitting inclusion of some individuals who were suffering from hay-fever or an allergic rhinitis and not from the common cold.

It has been mentioned that volunteers with a present attack of hay-fever or allergic rhinitis were, so far as possible, excluded, but persons with a previous history of allergic conditions were included provided they were believed to be suffering from a cold. From Table VI it will be seen that a previous history of hay-fever, allergic

TABLE V.—*Percentage Cured or Improved at the End of the First Day, Second Day, and One Week for Different Durations of Cold Before Treatment*

Day of Observation	Duration of Cold Before Treatment											
	Under 1 Day			1 Day			2 Days			3 Days or More		
	T (201 Obs.)	C (173 Obs.)	Difference	T (180 Obs.)	C (213 Obs.)	Difference	T (96 Obs.)	C (84 Obs.)	Difference	T (102 Obs.)	C (107 Obs.)	Difference
First day—improved*	47·8	45·1	$2·7 \pm 5·2$	47·2	38·5	$8·7 \pm 5·0$	50·0	40·5	$9·5 \pm 7·4$	48·0	45·8	$2·2 \pm 6·9$
Second day—Cured ..	13·4	13·9	$-0·5 \pm 3·6$	7·8	6·6	$1·2 \pm 2·6$	3·1	4·8	$-1·7 \pm 2·9$	6·9	6·5	$+0·4 \pm 3·5$
Second day—Cured or improved	68·2	64·7	$3·5 \pm 4·9$	58·3	55·4	$2·9 \pm 5·0$	59·4	57·1	$2·3 \pm 7·4$	57·8	62·6	$-4·8 \pm 6·8$
One week—Cured ..	48·8	46·8	$2·0 \pm 5·2$	42·2	37·1	$5·1 \pm 5·0$	31·3	33·3	$-2·0 \pm 7·0$	29·4	36·4	$-7·0 \pm 6·5$
One week—Cured or improved	80·6	74·6	$6·0 \pm 4·3$	77·8	77·5	$0·3 \pm 4·5$	70·8	79·8	$-9·0 \pm 6·5$	70·6	78·5	$-7·9 \pm 6·0$

T = Antihistaminic treatment. C = Alternative treatment. Obs. = Number of patients observed.
* Including the few patients (9 T and 5 C) who said they were cured on the first day.

TABLE VI.—*Distribution of Results at the End of the First Day, Second Day, and One Week for Persons with a Previous History of Allergic Conditions*

	1st Day		2nd Day		Week	
	T	C	T	C	T	C
Previous history of hay-fever						
Cured	2	—	4	3	6	13
Improved	13	13	13	14	12	12
Unchanged	10	16	8	14	8	6
Worse	3	5	3	3	1	1
Recurred	—	—	—	—	1	2
	28	34	28	34	28	34
Previous history of allergic rhinitis						
Cured	1	—	3	3	3	7
Improved	12	7	10	12	12	8
Unchanged	9	10	10	6	7	4
Worse	3	6	2	2	2	1
Recurred	—	—	—	—	1	3
	25	23	25	23	25	23
*Previous history of other allergic manifestations**						
Cured	—	—	4	5	15	13
Improved	25	17	22	17	20	12
Unchanged	17	10	12	9	8	5
Worse	2	7	6	3	1	3
Recurred	—	—	—	—	—	1
	44	34	44	34	44	34

T = Antihistaminic treatment. C = Alternative treatment.
* Including asthma, urticaria, and other conditions believed to have an allergic basis.

rhinitis, and other allergic manifestations had no striking influence on the results obtained with the treatment, but the numbers in each of the treated and control groups are small. By combining all these allergic manifestations the figures shown in Table VII are obtained.

TABLE VII.—*Percentages Cured or Improved*

	1st Day	2nd Day	One Week
Treated	54·6	57·7	70·1
Controls	40·7	59·3	71·4
Difference	13·9±7·3	−1·6±7·2	−1·3±6·6

There is a suggestion that the antihistaminic drug gave some relief to these subjects during the first day of treatment, but later results do not differ at all.

Side-effects.—Side-effects attributed to the treatment were reported by 121 (20.9%) subjects receiving the test drug, while the comparable figure for those receiving the alternative treatment was 111 (19.2%); details are given in Table VIII. It is most unlikely that the large number

TABLE VIII.—*Side-effects Attributed to Treatment*

Main Symptoms	Persons Given Antihistaminic Treatment	Persons Given Alternative Treatment
Drowsiness, lassitude, listlessness	26	35
Dizziness, giddiness, vertigo	21	13
Headache	21	16
Headache and other nervous symptoms	11	6
Depression with or without other nervous symptoms	2	5
Insomnia	3	1
Gastro-intestinal	13	12
Combined gastro-intestinal and nervous symptoms	8	7
Miscellaneous	16	16
Total	121	111

of side-effects attributed to the alternative treatment can have been due to the small doses of quinine given in the control tablets. It seems much more probable that many of the symptoms described as side-effects were, in fact, symptoms of the cold itself. On the other hand, when, as here, efforts were made to avoid direct questions about specific side-effects, prior knowledge of the possibility of reactions may have led to a spurious increase in their incidence through psychogenic factors.

CONCLUSIONS

In a small but carefully controlled experiment two antihistaminic drugs—promethazine hydrochloride and chlorocyclizine hydrochloride—showed no evidence of having any value in the prevention of experimentally induced colds.

A large-scale clinical trial of thonzylamine in widely separated areas in Great Britain and Northern Ireland, carried out between the middle of March and the middle of May, 1950, showed that, in the dosage employed, this antihistaminic drug had little if any value in the treatment of the common cold.

The committee is greatly indebted to Dr. W. J. Martin, of the Medical Research Council's Statistical Research Unit, for carrying out the statistical analysis of the results, and to the managements, medical staffs, and volunteers in the industrial and Civil Service establishments, universities, and elsewhere for their co-operation and assistance in carrying out the trials. Thanks are also due to Dr. W. E. Chiesman, Treasury Medical Adviser, for much help, and to the Director-General of Medical Services, Royal Air Force, for permitting the inclusion of R.A.F. personnel in the trial. The antihistaminic drugs and control tablets for the experiment at Salisbury were kindly supplied by May & Baker Ltd., and Burroughs Wellcome & Co., and the supplies of thonzylamine used in the therapeutic field trials were specially made for the purpose by May & Baker Ltd., who also kindly provided the control tablets.

APPENDIX

Trials were carried out at the following establishments:

Trial Centres	Medical Officer in charge
Treasury, London	Dr. V. C. Medvei
G.P.O., London	Dr. E. M. Anderson; Dr. O. May
Ministry of National Insurance, Newcastle-upon-Tyne	Dr. S. E. McConnell
University of Leeds, School of Medicine	Dr. J. L. Broadbent
London School of Hygiene and Tropical Medicine	Dr. J. P. W. Hughes
Belfast Corporation	Dr. J. C. Stutt
Lever Brothers and Unilever Limited	Dr. D. S. F. Robertson
Anglo-American Oil Company Limited	Dr. G. J. Murray.
Richard Hodgson and Sons Limited	Dr. E. H. Thierry
Monsanto Chemicals Limited	Dr. H. R. Newman
Marks and Spencer Limited	Dr. Marjory Oldershaw
Harrods Limited	Dr. Margaret Dobbie-Bateman
Stanton Ironworks Company Limited	Dr. D. K. Cowan
I.C.I. Ltd. Metals Division, Birmingham	Dr. N. G. Marr
London Transport Executive	Dr. L. G. Norman
R.A.F. Centres (3)	Group Captain T. C. MacDonald
Central Public Health Laboratory	Dr. J. A. Harrington

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