ASSOCIATION OF RESPIRATORY TECHNICIANS AND PHYSIOLOGISTS

ISSUE NO 12 FEBRUARY 1981

BREATH

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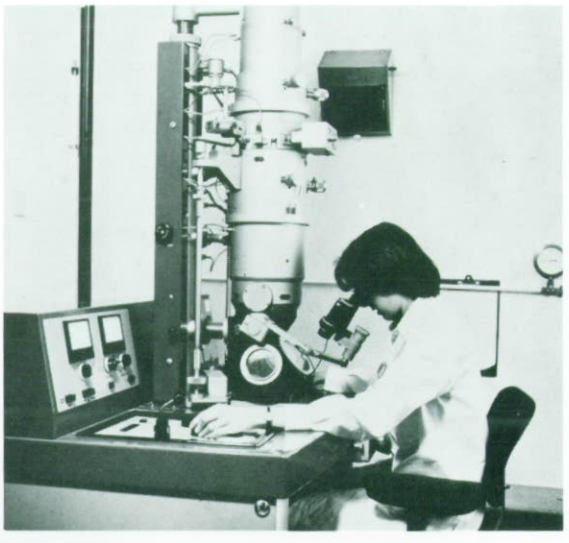

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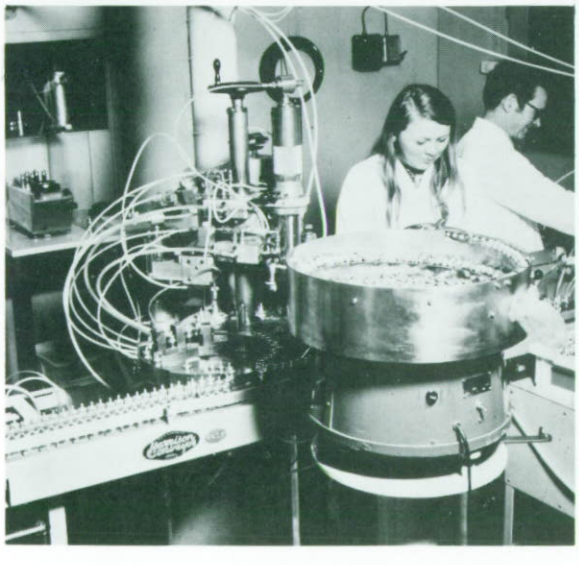

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EDITORIAL

The National Fag

Cigarette smoking is one of the major epidemics of our time. Its effects upon the health of this nation remain severe and once the major smoking-related diseases are established, medical science may have little to offer the patients. The treatment of lung cancer remains a disappointing enterprise for reasons already clearly spelt out in this journal[1] and the treatment of emphysema is seldom other than palliative.

It follows that the only practical ways of improving this state of affairs are to dissuade children from ever taking up the habit and to persuade established smokers to give it up or at least to curtail their consumption. There is no doubt that, for the forseeable future, we will be faced with a hard core of smokers unwilling or unable to change their habits and any large-scale ban on smoking would be worse than useless bearing in mind the American experience in the Prohibition era.

Children and teenagers are notoriously impervious to well-meaning efforts to make them mend their ways and anti-smoking propaganda in schools has so far had only a limited effect. The incorporation of health education within the general curriculum offers a better hope, but the sad fact is that 85% of children who start, even in a small way, end up as regular dependant smokers.

Among adults some reduction in the proportion of smokers has been achieved; the medical profession understood the message at a fairly early stage but the bulk of the population was less easily impressed. The overall percentage of smokers has indeed fallen slightly over the last ten years (to 45% in males and 37% in females — 1978 figures)[2] though this was brought about largely by a reduction in the proportion of lighter smokers so that the average number of cigarettes smoked per day by each smoker actually showed a rise.

The means by which further reduction in tobacco consumption could best be achieved have aroused much controversy. For some time, the tobacco companies have kept to a voluntary agreement to exclude tobacco advertising on TV, though very effective publicity has appeared on the 'non-advertising' channels in the guise of sponsored sport. The question was debated again in Parliament in November of last year, to the accompaniment of passionate arguments both for and against any legislation to limit tobacco advertising. There is persistent pressure from a group of MPs against restrictions of this kind, backed up by a section of the press which regards such ill-mannered attempts to improve the health of the nation as 'part of the Nanny-State which does more harm than good'[3].

Cigarette advertising on hoardings and in newspapers will continue but it is a matter of argument just how much this contributes to the overall national tobacco consumption; some claim that it merely influences the choice of brand. For the keen-sighted a 'Government Health Warning' is also provided and again the effectiveness of this has been questioned. Nevertheless, the main body of many advertisements (ie the manufacturer's contribution) may now contain a message such as 'Low Tar' in large letters and whether in response to this or not, there has been a very marked shift towards lower-tar brands on the part of the smoking public.

With Budget day approaching the Chancellor of the Exchequer (who recently kicked a habit of 60 per day) must now be trying to decide the least unpopular way of increasing Government Revenue — and what better policy than to hit the nation right in the addictions? The Tobacco Tax Revenue now stands at over £2,000 million per year, but the retail price of a cigarette is actually less in relation to earnings than it was twenty years ago (allowing for the effect of inflation). So the Chancellor could well find reasons for putting up the tobacco tax provided that in so doing he did not depress tobacco consumption so much as to negate the effect. Which is where the economists come in — and it has been calculated[4] that although an increase in tax would result in a fall in consumption, there would still be a net gain to the Revenue; in addition the Treasury would pay out less in sickness and widows' benefits, which would admittedly be partially off-set by the need to pay more in retirement pensions!

Any campaign for the total abolition of smoking is likely to fail because the majority of cigarette smokers are already heavily dependant on nicotine. In this respect, nicotine is quite unlike alcohol. The majority of alcohol users are not alcoholics but occasional drinkers who seldom become addicted. With cigarette smokers it is quite the opposite and almost all become dependant on nicotine though they are spared the social disruption which the alcoholic almost inevitably incurs. Although many smokers wish to stop, few actually achieve it in time to avoid serious lung disease.

Nevertheless a very profound change has taken place in national smoking habits over the last 20 years. About 1950, filter-tipped cigarettes were introduced and today over 90% of cigarettes are of this type. In addition, the average amount of tar (which contains most of the cancer-producing agents) in each cigarette has over the ten years from 1966 to 1976 steadily fallen from 30 mg to 17 mg[5]. This trend has been accompanied by a striking decline in the incidence of precancerous histological changes in the bronchial epithelium of smokers[6]. The incidence of lung cancer, which has been increasing at an alarming rate is now starting to level off and may even be declining, a most encouraging change which can reasonably be attributed to the tar reduction.

There is some evidence however that the reduction in tar consumption is itself levelling off. This is very probably due to the fact that the ratio of tar to nicotine varies little from one brand of cigarette to another so that in changing from a 'High Tar' to a 'Low Tar' brand, the smoker has to accept a lower nicotine content which may well be unsatisfying[7]; it has been shown that many smokers will compensate for a reduction in the availability of nicotine by increasing the puffing frequency and the depth of inhalation[8].

Various strategies could be employed to overcome this problem. Smokers can undoubtedly adapt to a lower daily nicotine intake, but there is clearly a limit below which the established smokers cannot be pushed — otherwise they would stop smoking! Accepting this, one's task is to administer the drug in as harmless a manner as pos-

sible. So far as cancer is concerned, this would mean a minimal tar level and the nicotine level, if too low, could be enhanced by 'spiking' each cigarette with a small extra quantity of the drug. The Chancellor could give further encouragement by increasing the existing tax on the higher tar brands. The technology of tobacco processing is continually advancing and it should be perfectly possible to minimise the undesirable components by genetic selection of the tobacco plants, improvements in filters and by promoting the absorption of nicotine in the mouth (as happens with pipe smoke) instead of the alveoli. Flavouring agents can be added to compensate for the inadequate taste characteristics which are another reason for rejection of the very low-tar brands.

For those unable to give up smoking, a low-risk smoking policy could therefore be advocated[9] and it might be possible to formulate a 'maximal permissible daily tar load', analogous to the permitted levels of toxic chemicals in industry. Individual smokers, however, would have to treat such a figure with the greatest caution as some may well have a predisposition towards smoking-related diseases such as cancer, emphysema or heart disease; such predispositions are seldom recognised (if at all) until the disease is already causing symptoms.

In spite of the reservations which we have outlined, it seems clear that the risks of smoking could be substantially reduced, though the smokers' dream of a universally 'safe' cigarette is far from realisation at the present time. The only rational smoking policy which can be advocated today therefore, is never to start and the only safe cigarette is the one that stays in the packet.

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THE USE OF A MASS SPECTROMETER FOR MEASURING METABOLIC GAS EXCHANGE

Derek Cramer
Lung Function Unit, Brompton Hospital

The traditional Douglas bag method of measuring metabolic gas exchange is very time-consuming for a busy laboratory. In this unit, for exercise and resting studies, we have therefore introduced a more efficient method for measuring minute ventilation and metabolic gas exchange which involves mass spectrometry alone.

The principle which is illustrated by fig. 1 is that a known mass flow of a marker gas is injected into the expirate upstream of a mixing box, and the resulting gas composition downstream used to deduce the mass flows of all its components. The size of the mixing box can be varied according to the size of the patient's lungs.

If a tracer gas Tr is injected at a constant rate M_{Tr} (ml STPD/min) into a stream of expired air and mixing is perfect then the flow of any component x in the mixture m so produced can be determined simply since:

$$\frac{M_x}{M_{Tr}} = \frac{Mm_x}{Mm_{Tr}} = \frac{Pm_x}{Pm_{Tr}} = \frac{Fm_x}{Fm_{Tr}} \qquad (1)$$

where the subscripts x and Tr refer to the gases in question, m indicates the gas mixture and M, P and F have their usual meanings, *i.e.* quantity per unit time, partial pressure and fractional concentration. It follows that metabolic gas exchange and minute ventilation can be calculated from the composition of the mixture alone, so:

$$M_{CO_2} = \frac{M_{Tr}}{Fm_{Tr}} \cdot Fm_{CO_2} (\text{ml STPD/min}) \qquad (2)$$

$$M_{O_2} = \frac{M_{Tr}}{Fm_{Tr}} \cdot \left(FI_{O_2} \frac{Fm_{N_2}}{FI_{N_2}} - Fm_{O_2} \right) (\text{ml STPD/min}) \qquad (3)$$

$$VE = \frac{M_{Tr}}{Fm_{Tr}} \cdot (1 - Fm_{Tr}) \cdot \frac{0.863}{P_B - 47} (\text{L BTPS/min}) \qquad (4)$$

Where FI is inspired concentration, P_B is barometric pressure in mm Hg and the term $(1 - Fm_{Tr})$ is the sum of all the concentrations but for the added tracer.

If the tracer gas chosen is already present in inspired air as is true, for example, of Argon, then allowance has to be made for the contribution of the respired tracer to the total concentration of the tracer in the mixture downstream, remembering that the injected tracer dilutes all components of the expired air; thus Fm_{Tr} in equations (2), (3) and (4) must be replaced by the term:

$$Fm_{Tr} - FE_{Tr} \left(\frac{1 - Fm_{Tr}}{1 - FE_{Tr}} \right)$$

where FE_{Tr} is the concentration of tracer in the expirate upstream of the injection site. In practice this can be taken to be equal to FI_{Tr}.

To test this, we have constructed a mixing box containing hemi-cylindrical baffles, as shown in fig. 1.

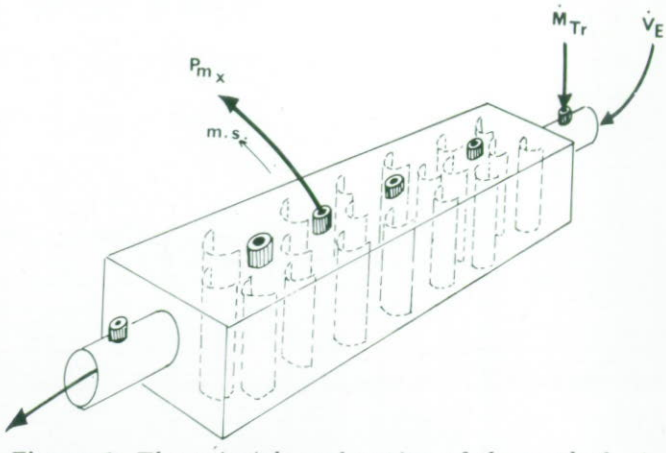

Figure 1: *The principle and testing of the method. A constant flow of tracer, M_{Tr}, is injected into a stream of expired gas, VE. Analysis of partial pressures, Pm_x, in the mixture is by mass spectrometry (m.s.).*

Respired gas flows are determined from this composition alone using the relationships shown in equation (1).

From: Davies and Denison (1979). Reproduced by courtesy of the authors & the editor, Respiration Physiology.

The mixing box is a rectangular perspex chamber of roughly 5 litres capacity, divided internally into four narrow compartments through which gas passes sequentially. This pathway contains about 50 baffles arranged with their concave surfaces facing the oncoming gas stream. The gas within can be sampled from any of 10 ports placed at intervals between the inlet and outlet of the box. This allows the effective size of the box to be matched to the patient's ventilation. If the box is too large it is slow to reflect changes in respiration; if, on the other hand, it is too small, then mixing is incomplete. The latter can be recognized by respiratory ripples in the composition of 'mixed' expired air. If these are seen, it is a simple matter to move the sampling probes to one of the ports further downstream.

Argon is injected into the expired stream, at the inlet of the box, at known flows, sufficient to achieve concentrations of 3-5% in the mixture downstream. Constant flows are maintained by delivering the Argon from a high-pressure cylinder via a constant-pressure reducing valve. At the beginning and end of the test the Argon flows are measured by water displacement.

The composition of gas in the mixing box can be determined by a respiratory mass spectrometer. The spectrometer needs to be calibrated with known gas mixtures before and after each test and an automatic summing circuit should be used to compensate for variations in probe resistance and water vapour pressure between times.

The partial pressures of nitrogen, oxygen, carbon dioxide and argon in the gas within the mixing box should be averaged and the calculations can then be carried out. The calculations are a little unwieldy, thus we have programmed a Hewlett Packard calculator to do the sums for us. Our results compare favourably with the traditional Douglas bag technique and expired gas may be collected from a mouthpiece, face mask or an endotracheal tube using a valve box.

Reference

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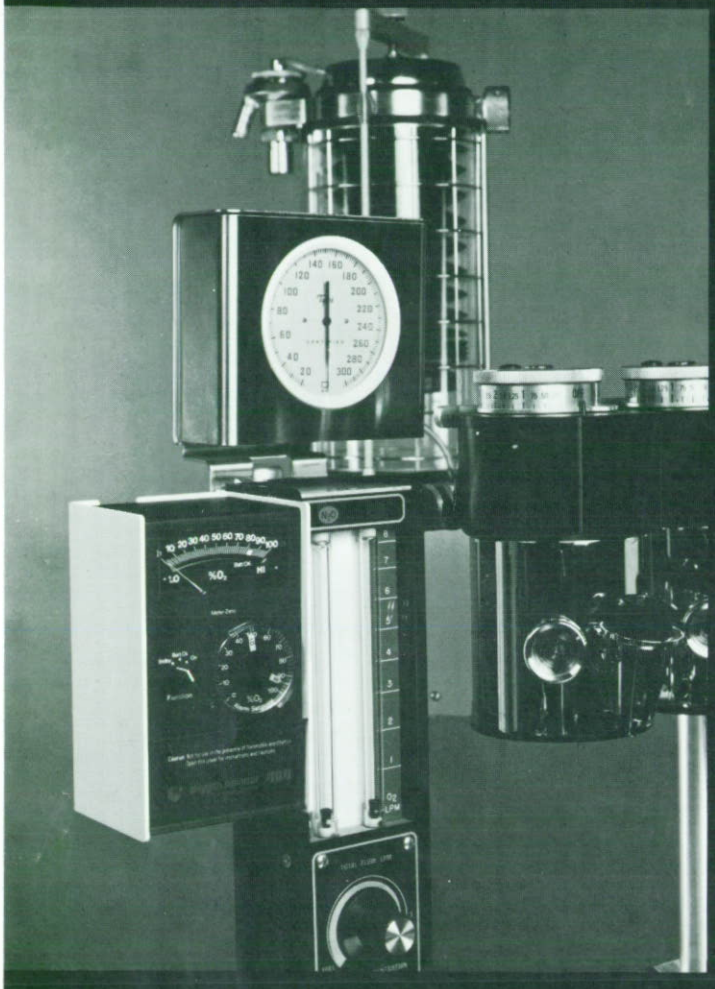

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THE FEDERATED ASSOCIATIONS OF MEDICAL TECHNOLOGY

Dear Colleague,

The Central Council of the FAMT at its Annual Business Meeting last November re-elected me to the post of Honorary Secretary.

I feel that a large part of the *full* membership of the Federation is not always kept fully informed through their own Association or Society of the direction the Federation is taking over various issues, and by writing this letter I hope to make matters clearer and to stimulate some interest in the Federation.

By full membership of the Federation, I mean all of you who are members of one of the eight disciplines represented by the Federation:

The Association of Medical Physics Technology
The Association of Renal Technicians
The Association of Respiratory Technicians and Physiologists
Central Council for Health Authority and Dental Technology
The Electrophysiological Technologists' Association
The Society of Anaesthetic Laboratory Technicians
The Society of Perfusionists (of Great Britain and Ireland)

You may not have been aware that as a member of your own Association or Society you are a member of the FAMT. The FAMT is *not* just the sixteen representatives that make up the Central Council — these are your spokesmen, two from each discipline, and it is through these representatives that your thoughts, ideas and suggestions can reach the Central Council. Too few of you are making any effort to feed your opinions through the system. It is your education and careers that are being discussed and, to those of you who are already at the top of the grading structure, the future expertise of the technicians you employ.

Slow but steady progress is being made in a number of directions. Education, both 'O' Tec and 'H' Tec takes up a great deal of the Central Council time, and fills up a considerable amount of space in the filing cabinets of those concerned with it.

Major changes do not take place in a few months, and many more hours of work will be required before 'O' Tec and 'H' Tec are finalised.

During the last few months, the Federation has been consulted on education and careers by members of the DHSS, as the professional body for Medical Physics/Physiological Measurement Technicians in the NHS. Now is the time to make your representatives aware of how you would like to see the future develop, not when final discussions have taken place with the DHSS and the Technician Education Council.

It is my own view that there is a general apathy amongst the membership and perhaps some concern that, by expressing an opinion, you will become involved with the workings of your own Executive Committee which will eventually spiral until your free time is taken up with total involvement in your discipline. This is not what is needed. Ideally, I would like some of you to express more than just a passing interest in what is now occurring in education, careers and your own Association or Society.

One example of lack of interest in the Federation was apparent in the planned Scientific Meeting for September 1980. At least 1500 technicians within the eight disciplines were, to my knowledge, circulated with the programme. The response to this was 57 replies. *That this result was a disappointment is a considerable understatement!*

I believed that the programme would appeal to most technicians — did I read it wrong? Were you all committed to other pursuits on that day? Some feedback would be of help to the Central Council to decide on future policies for meetings. It is written into the FAMT Constitution that general meetings should be held for the membership. Do we take the lack of response to the September meeting to be that the membership is not interested, and that the FAMT Constitution must again be altered?

It has been suggested that the Federation should produce a Journal. I know that it is difficult for the Editors of the Journals of each Association or Society to find articles on a regular basis, and I feel that another Journal will make their task even more difficult. Also, as the Federation has a yearly income of only £160 and would have to rely on advertising to cover printing costs, this could possibly effect the production of some of the Journals already in existence. Your representatives on the Central Council and the Secretaries of each discipline receive the minutes of Central Council meetings (which take place at about two-monthly intervals), and copies of all relevant documents under discussion, therefore information with reference to the Federation should be reaching you via your own Journals.

What do you, the membership, feel about another Journal? Please let us have some feedback from you.

Correspondence can be addressed to me and will reach the Central Council by this route.

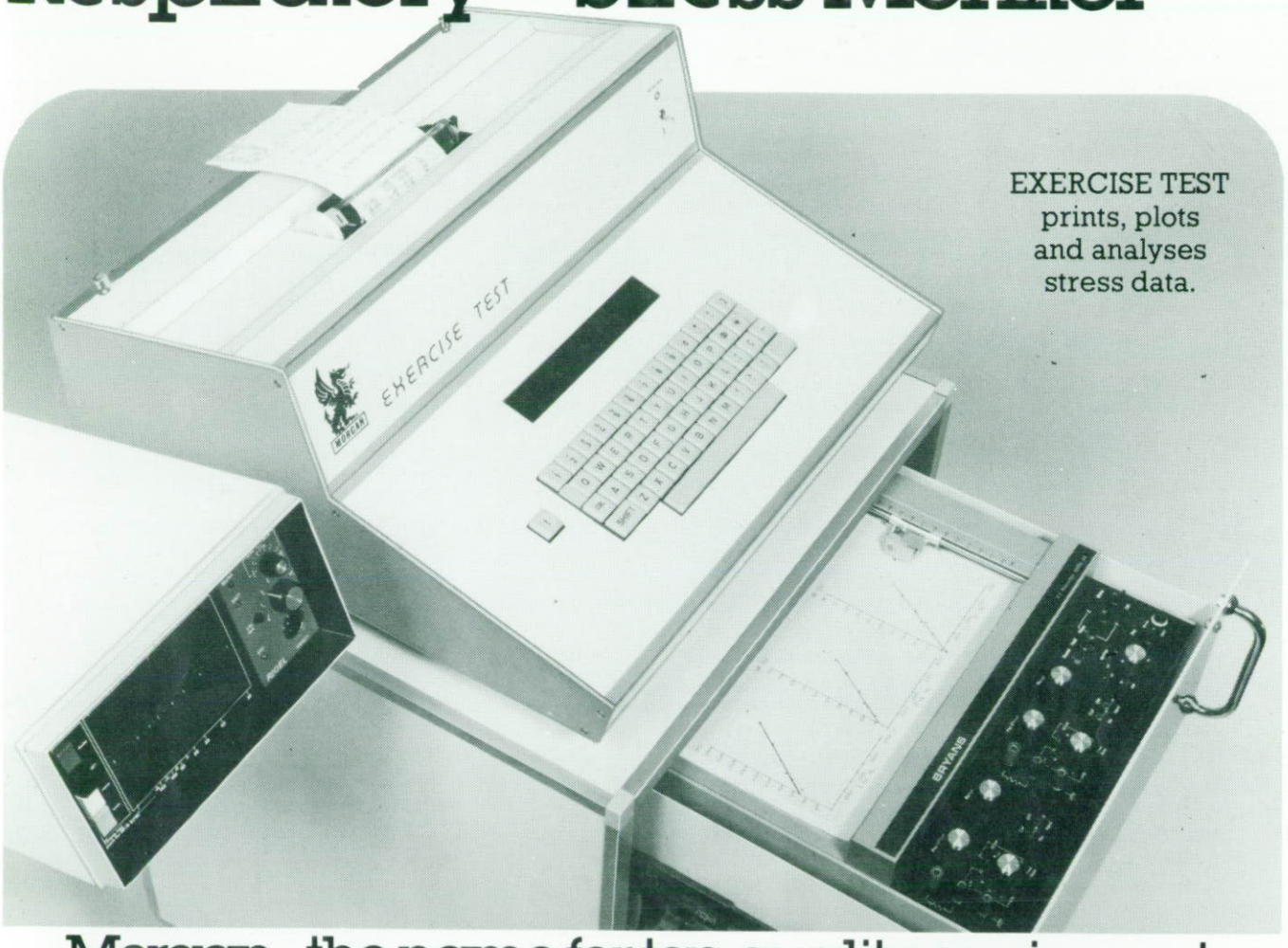
With best wishes for 1981

S. E. Gough,
Hon. Secretary of the FAMT,
Papworth Hospital,
Papworth Everard,
CAMBRIDGE. CB3 8RE

N.B. All views expressed in this letter are the personal opinions of the correspondent.

Morgan

Respiratory Stress Monitor



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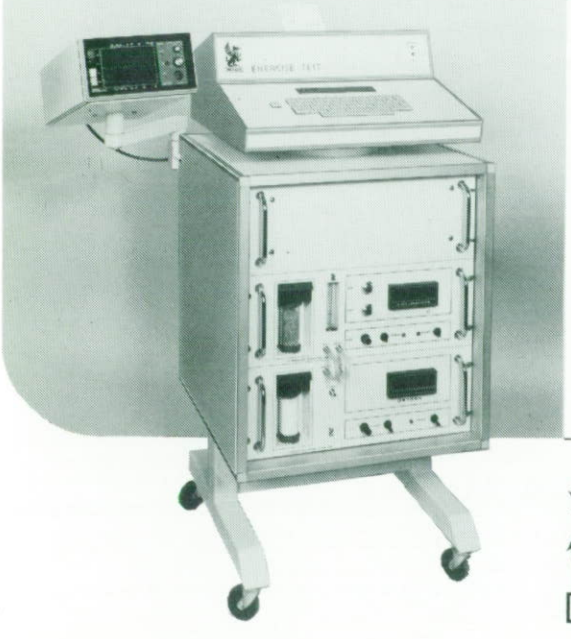

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HAVE YOU LOOKED INTO YOUR SPIROMETER RECENTLY?

K. Houston, P. Parry, A. P. Smith
Llandough Hospital, Penarth

Summary
One thousand patients each performed three forced expiratory manoeuvres into a Vitalograph which was not disinfected during the period of testing; swabs were taken from six sites within the Vitalograph tube and the micro-organisms isolated were identified. The risk of infection to patients was estimated and a suitable disinfection policy was determined to eliminate it.

Introduction
Although the risks of patients infecting each other with respiratory pathogens from lung function testing equipment has never been fully assessed, the possible risks of cross infection are widely recognised. Disinfection and sterilisation of equipment is therefore recommended on a regular basis and special precautions are advised when dealing with patients likely to be suffering from open pulmonary tuberculosis. Frequently though, lung function equipment such as spirometers and peak flow gauges located on the wards or in out-patient departments for example, may escape such attention. The objects of this investigation were to identify the bacterial pathogens likely to occur in unsterilised equipment, and to determine a suitable disinfection policy which would eliminate any risk to patients.

Methods
Patients referred to the Respiratory Physiology Department from a busy Thoracic Out-Patients Department and who were experienced in spirometry were asked to exhale into a Vitalograph which had not been disinfected since a known date. Mouthpieces fitted with a one-way valve were used to prevent inhalation from the Vitalograph tube. One thousand patients exhaled into the tube three times each giving a total of three thousand exhalations into the Vitalograph tube over a period of four weeks. The tube was sampled at the end of weeks 1, 2, 3 and 4 by means of moist swabs from both mouthpiece and bellows end (fig. 1), which were cultured on blood and McConkey agar. The API 2OE identification system (1, 2, 3, 4) was utilised where the isolates were found to be gram negative bacilli. Swabs from the same sites were also cultured and examined for mycobacteria.

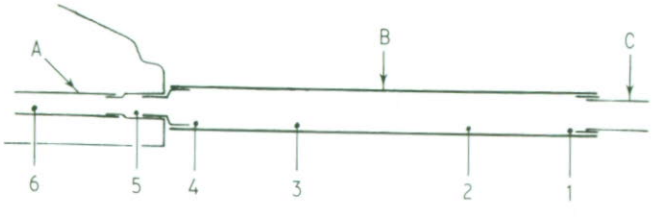

Figure 1: *Diagram of Vitalograph and tubing showing the 6 sampling sites.*
A Tube leading to bellows.
B Corrugated tubing.
C Mouthpiece with one-way valve.

The concentration of organisms present at the end of weeks 1, 2, 3 and 4 was established by means of sealing the Vitalograph tube under examination with a sterile rubber bung at one end and then pouring 50 ml of sterile ¼-strength Ringer's solution into the other end which was then also sealed off with a sterile bung. The tube was then shaken to and fro for two minutes and the fluid then carefully poured back into its original container before being tested by means of the Miles and Misra technique (5). The number of organisms present per cm^3 were calculated after a forty-eight-hour incubation period at 37°C.

From the end of week 4 the Vitalograph tubing was disinfected at the end of each working day by means of immersion in chlorhexidine gluconate (hibitane) 1 in 200 in 70% spirit (colourless) for two minutes (the minimum time recommended by the manufacturers for a 99.39% kill).

A further one thousand patients were subsequently tested over weeks 5, 6, 7 and 8 and the procedure described above for identification and concentration of micro-organisms was repeated at the end of each week.

Results
A wide variety of organisms was isolated during the period when disinfection was not carried out (Table 1). No organisms were isolated during the weeks when equipment was disinfected.

Discussion
The method described was effective in disinfecting the tubing of the Vitalograph spirometer. Although a few potential respiratory pathogens such as Klebsiella pneumoniae were isolated, the majority of cultures yielded saprophytic organisms present in the environment, in soil, in water and on the body surfaces.

The latter do not present a risk of infection except rarely in patients with impairment of the immunological response and there is no evidence at present to suggest that it has resulted from use of unsterilised respiratory function testing equipment. The common respiratory commensals and pathogens such as Strep. pneumoniae and H. influenzae are notable by their absence, probably due to their inability to survive for long outside their normal habitat.

The mouthpiece end of the tubing yielded a significantly lower rate of cultures than those sites further into the apparatus. This is probably due to the fact that the better ventilation at the mouthpiece prevents condensation, which would otherwise encourage bacterial growth.

Conclusion
Pathogenic bacteria are rarely obtained from the tubing of the Vitalograph spirometer and the simple disinfection procedures described are sufficient to disinfect such equipment. The types of organism isolated and their site of deposition in the tubing render cross infection risks extremely small.

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TABLE 1

MICRO-ORGANISMS ISOLATED DURING WEEKS ONE, TWO, THREE AND FOUR	VITALOGRAPH SWAB SITES						
	1	2	3	4	5	6	Total
ACINETOBACTER CALCOACETICUS VAR ANITRATUS	0	0	2	1	2	2	7
ACINETOBACTER CALCOACETICUS VAR LWOFFI	0	1	3	3	1	1	9
ACHROMOBACTER XYLOSOXIDANS	0	0	0	0	1	1	2
ALKALIGENES DENITRIFICANS	0	1	1	0	0	1	3
ALKALIGENES SPP	0	0	0	1	0	0	1
AEROBIC SPORE BEARING BACILLUS	0	2	2	2	2	1	9
CITROBACTER FREUNDII	0	2	0	0	0	0	2
"COLIFORM" GRAM NEGATIVE BACILLI (Unidentified SPP)	0	1	2	1	1	1	6
ENTEROBACTER AGGLOMERRANS	0	1	2	2	1	1	7
FLAVO BACTERIUM	1	4	4	4	3	3	19
KLEBSIELLA PNEUMONIAE	0	1	2	1	1	1	6
PSEUDOMONAS FLUORESCENS	0	0	1	1	1	1	4
PSEUDOMONAS SPP (NON-OXIDASE PRODUCERS)	0	0	1	1	1	0	3
STAPH. AUREUS	0	0	0	0	1	0	1
STAPH. ALBUS	2	4	2	2	2	2	14
STREPTOCOCCUS SP (HAEMOLYTIC)	2	2	1	2	2	1	10
XANTHOMONAS SP	1	2	3	3	3	3	15
FUNGI: ASPERGILLUS SP	—	—	—	—	—	—	—
FUNGI: MUCOR SP	—	—	—	—	—	—	—
FUNGI: PENICILLIUM SP	4	4	4	4	4	4	24
FUNGI: CANDIDA SP (YEASTS)	—	—	—	—	—	—	—
MYCOBACTERIUM	0	0	0	0	0	0	0
TOTALS	10	25	30	28	26	23	

The figures in each column represent the number of times the corresponding micro-organism was isolated at the swab site, i.e. The maximum number would be 4 as the tube was examined four times, once at the end of each week. Thus the "total column" gives an indication of the incidence of that organism at particular sites — the higher the number, the greater the frequency of isolation in this study.

The "total row" indicates the distribution of organisms isolated throughout the tube. The average total count of micro-organisms at the end of each week was $2.42 \times 10^8/cm^3$.

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THE ASSOCIATION OF RESPIRATORY TECHNICIANS AND PHYSIOLOGISTS

SPRING SCIENTIFIC MEETING

on

SATURDAY, 4th APRIL, 1981

at

The Clinical Sciences Building, Hope Hospital, Eccles Old Road, Salford, MANCHESTER.

10.30 a.m.	COFFEE and REGISTRATION (Common Room, Clinical Sciences Building)	
MORNING SESSION	Chairman: Mr. J. Bancewicz	Senior Lecturer, Consultant Surgeon
11.00 a.m.	The Relationship Between Gastro-oesophageal Reflux and Asthma	Dr. D. Cooper, Clinical Tutor, Dept. Thoracic Medicine
11.45 a.m.	Arterial Oxygenation During One-lung Anaesthesia	Dr. E. Bradshaw, Senior Lecturer, Consultant Anaesthetist
12.30 p.m.	LUNCH and DEMONSTRATIONS (Functions Room, Staff Restaurant)	
AFTERNOON SESSION	Chairman: Ms. M. Marples	Chief Physiological Measurement Technician
2.15 p.m.	Film: "Airways Control", Courtesy of Boehringer Ingelheim	
3.00 p.m.	Education Update	Dr. J. Reed, Lecturer, Newcastle University
3.30 p.m.	TEA (Common Room, Clinical Sciences Building)	

Demonstrations will be given by:

Gould Medical
Instrumentation Laboratories

Council Members — At 1.30 p.m. there will be a Council Meeting in the Common Room, Clinical Sciences Building.

REGISTRATION

Non-Members will be charged a registration fee of £4.50 to be included with the application form. Please make the cheques payable to "The Association of Respiratory Technicians and Physiologists".

Directions to Hope Hospital will be sent to members who wish to attend.

Please return slip *as soon as possible* to:
Ms. M. Marples, Dept. Anaesthetics, Clinical Sciences Building, Hope Hospital, Eccles Old Road, SALFORD M6 8HD.

I shall/shall not be able to attend the Spring Scientific Meeting on Saturday 4th April, 1981.

Name: .....

Address: .....

.....

.....

DYFED HEALTH AUTHORITY
PRESELI/SOUTH PEMBROKESHIRE DISTRICT

Senior Physiological Measurement Technician

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Salary scale: £5241 (at age 18) — £6138.

Candidates should have two years' experience as a Technician.

Application forms and job descriptions available from:—

Personnel Department,
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Merlins Hill, Haverfordwest, Dyfed.

Closing date for receipt of applications: 20th March, 1981

ARTP NEWS

Jane Jones
Editor's Assistant

MEMBERS — PLEASE NOTE!

In spite of my plea in the last issue of BREATH, which some of you may have noticed was even repeated, I still have not received any material from members. Surely I do not have to stress the fact that the journal will cease to exist if I do not have any articles to publish?

I would like to receive technical papers, medical articles, letters, case histories, and anything of general interest or even non-general interest.

One of our members has written and her letter is printed below.

Since I wrote to you in September (see BREATH October 1980 Issue 11) there have been some further developments on the subject of Pulmonary Function Technicians in Ireland.

A representative of one of the unions concerned with medical personnel, informed me that the Department of Health, together with the Health Boards, is in the process of organising a committee to investigate the present situation of medical technicians like myself in the various specialised fields.

There is a definite increase in the number of people entering fields like Respiratory Physiology, where qualification is on experience alone, and training is received on the job, with no recognised course to follow.

Pay, education, and other related points will be studied by the committee. It is hoped that their recommendations will bring all technicians a few steps forward, towards a better recognised and more secure career structure.

P.S. To add a touch of humour, I thought you would like to know that you addressed your last letter to "Gillian", which just happens to be my daughter's name, however she is only three, and definitely a junior member!

Geraldine Lawless, St. Vincent's Hospital, Dublin

I look forward to seeing you at the Spring Meeting which is being held at Hope Hospital on Saturday April 4th which Margaret Marples is very kindly organising.

Breath is the journal of the Association of Respiratory Technicians and Physiologists. Original articles, reviews, correspondence or comment on subjects of scientific or general interest may be submitted to the Editor: D C S Hutchison, Chest Unit, King's College Hospital, London SE5 8RX. Material should preferably be typed on one side of the paper only, in treble spacing throughout. Photographs should be of good contrast, printed on glossy paper and unmounted. Tables and legends to figures should be typed on separate sheets.

Applications for advertisement space and for rates should be addressed to: Jane Jones, Respiratory Laboratory, London Chest Hospital, Bonner Road, London E2.

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