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Below are short overviews of the articles that appeared in this issue of VOLUME:

### Guidelines for Contributors

These guidelines provided information to contributors on the type of articles that would be considered for publication and how these should be put together and submitted. "*Articles, reviews and letters of general scientific interest relating to the theory and practice of respiratory technology or to respiratory physiology and medicine are most welcome. This includes contributions relating to equipment evaluation, new techniques, methodology, or reading lists of key published articles pertinent to the above fields. There are no formal limits to the length of contributions. All manuscripts must be accompanied by a letter clearly stating the work is original and has not been submitted, in part or in full, for publication elsewhere.*"

We had to be fairly prescriptive about the quality and style of the typed manuscript as the printer used the final versions directly to manually set-up the printing machine, letter-by-letter. Similarly, the illustrations had to be of good quality (all hand prepared - no PowerPoint etc back then) as the published versions were a faithful reproduction, warts and all, of those submitted: "*The number of illustrations should be kept to a minimum. They must be of good quality, with a width of either 8 cm (single column) or 17 cm (double column). Freehand lettering is not acceptable. Glossy unmounted black and white prints are preferred and must be clearly but lightly labelled on the back with the number of the figure.*"

All manuscripts were subjected to editorial revision, initially by the Editor and where necessary, also reviewed by usually two appointed referees. Independent referees where always used to assess manuscripts in which the Editor and Sub-editor where authors. It is important to understand that our aim was to facilitate the publication of all submitted works and the Editorial team often worked closely with the authors to produce the final copy, provided of course that the basic science was sound. Quality was very important as the reputation of the Society depended on it. From memory about 80% of submitted manuscripts were published.

### Normal Lung Function Values in an Australian Adult Population (Geraldine Hanna)

It is hard enough for a laboratory to produce its own set of lung function reference equations for a single lung function test, let alone a whole range of them. This excellent paper by Geraldine Hanna described reference equations for males and females for: spirometry breathing air (VC, $FEV_1$, $FEV_1$/VC, $FEF_{25\text{-}75\%}$, PEF $FEF_{50\%}$) and breathing the low density gas mixture (see notes below) 80% helium/20% oxygen (volume of iso-flow, $\Delta FEF_{50\%}$), lung volumes by closed circuit helium dilution (TLC, FRC, RV, RV/TLC), lung resistance ($R_L$), elastic properties of the lung obtained from the pressure-volume curve (compliance and bulk elastic constant, $P_{st}60\%$, $P_{st}90\%$, $P_{st}max$), and indices derived from the single breath nitrogen washout (slope of phase III and CV/VC). Unfortunately DLCO was not included. Eighty-two "normal" subjects (48 male) of European decent aged 20 to 81 years were studied. The study was conducted at the Concord Hospital, Sydney, in association with Dr (now Professor) Norbert Berend as part of his MD thesis. The aim was to study a small cross-section of the local population and compare the results against published reference equations. The regression equations reported were subsequently used routinely at the Concord Hospital.

*[For our younger members the following may be of interest:*

*1) Between the 1950s and 1980s there was considerable interest in the measurement of the expiratory flow-volume curve using gases of different density (and viscosity) to detect early peripheral airway disease and to determine the main site of airflow limitation. Classically, the flow-volume curves were measured breathing air and compared with the curve obtained after the subject had inhaled a mixture consisting of 80% helium / 20% oxygen. The He/O2 mixture has a considerably lower density but slightly higher viscosity than air. An increase in expiratory flows when breathing the He/O2 mixture compared with air indicates that the velocity profile within the airways limiting flow is predominately turbulent (ie flow is density dependent, large/central airways). However, at the points where expiratory flows are equal (or less) when breathing He/O2 indicates that the velocity profile is non-turbulent ie streamline (ie flow is density independent, peripheral airways). Thus, comparison of air and* $He/O_2$ *flow volume curves provide information about the velocity profile at the flow limiting sites within the airways. In healthy people flow is density dependent at high lung volumes and density independent at low lung volumes near RV. Superimposition of the air and He/O2 curves usually shows that expiratory flows are increased with the* $He/O_2$ *mixture but the flows become identical at low lung volumes as RV is approached, indicating that the flow profile over this lung volume is dominated by streamline flow. Since streamline flow is more likely to be present in the smaller and more numerous peripheral airways, the earlier the He/O2 and air flows become similar the greater the degree of small airway narrowing. The expired volume over which the He/O2 and air flows are similar is referred to as the volume of iso-flow and provides an index of small airway function. A large volume of iso-flow suggests excessive and early narrowing of the small airways.*

*2) Density of a gas mixture: The density of a gas is a function of its molecular weight. Thus, a litre of helium will "weigh" less than a litre of, say, oxygen. The density of any gas mixture containing several component gases is simply computed from the molar concentration weighed mean density of the components.*

*3) Viscosity of a gas mixture: Although the density of helium is substantially lower than that of "air", its viscosity is about 12% higher. It can be a lot more complex to calculate the viscosity of a gas mixture when one or more of the gas molecules has a low molecular weight - as is the case for the* $He/O_2$ *mixture. A reasonable rule for calculating the viscosity of a mixture is:*

> *i) if the component gas molecules are of similar molecular size (eg* $N_2$, $O_2$, $CO_2$*) then the overall viscosity of the mixture can be calculated as the molar concentration weighed mean viscosity;*
>
> *ii) if the gas mixture contains gases with wide ranging molecular size, as is the case for the* $He/O_2$ *mixture, then a complex formulae has to be used that takes into account complex atomic interactions. For example, take the mixture* $He/O_2$*. The viscosity of pure helium (at given temperature) is about 196 and oxygen about 206. One might expect that a mixture of* $80\%He/20\%O_2$ *would have a viscosity of around 200 but, in fact, it is about 216. That is, the viscosity of the mixture is higher that either component! Coincidently, the maximum viscosity occurs at almost exactly 80%He!*

*Needless to say, the measurement of flow and volume using a pneumotachograph is sensitive to gas viscosity (streamline flow, Poiseuille's Law) and special precautions need to be taken – the most effective being to use a bag-box system (can you see why?). Incidentally, although the density of the* $He/O_2$ *mixture is very low compared with air, it does not directly affect the accuracy of measurements made by a pneumotachograph. However, gas density does affect the pneumotach's linear range (Reynolds Number) – can you see why? One more point, the viscosity of a liquid decreases with temperature whereas it increases for gases (why?).]*

## Exercise, Cold Air and Asthma (Richard Heaton)

One of the successes of VOLUME was to secure reciprocal publishing rights with a several overseas journals. This well written paper by Richard Heaton from the Chest Unit, Kings College Hospital Medical School, UK, was reprinted from BREATH, the journal of the Association of Respiratory Technicians and Physiologists (UK). It is well worth reading this review as much of it is still relevant and I note that the first reference listed is a paper by Dr Sandra Anderson on exercise-induced asthma (British Journal Diseases of the Chest, 69:1-39, 1975).

**Mouth-Piece**

Included in this section is a letter from our first President, Alan Crockett, in which he stated: *"During the last two years this Society has realised a number of noteworthy milestones: (1) the formation of the Society, (2) the registration of the Society, (3) the publication of VOLUME, (4) two excellent scientific meetings, (5) establishment of dialogue with the Thoracic Society of Australia. I feel that the Society is growing up and maturing into an organisation willing and able to represent the profession of respiratory technology. Serving as your President has been an honour and a privilege."*

There is also a reminder to members that annual fees are due. It is interesting to note that in 1983 the annual fee for Ordinary membership was $25 and has only recently been increased to $50!

The *Reference of Interest* was the paper by Pratter et al (Am Rev Resp Dis 126:717-719, 1982) who reported that methacholine chloride prepared in 0.9% NaCl showed no significant decomposition after storage for a period of four months at 4 °C or room temperature.

Please contact me if you are interested in a copy of this or any other issue of VOLUME.

David P. Johns PhD, CRFS, FANZSRS

david.johns@utas.edu.au

Tel: (03) 6226 2663