Interim Report of the Committee on Auscultatory Phenomena of the Scientific Council of the American Heart Association

THE recording on magnetic tape of the sounds produced by the heart and lungs has reached a fairly high degree of perfection as used at several centers throughout the country. It has advantages over other methods, but there are many problems still to be overcome before magnetic tape recordings can be used as universally as electrocardiography, for example.

Instrumentation. The greatest handicap to the general application of tape recording of heart and lung sounds at the present time is that very few instruments are made especially for the recording of these sounds. The vibrations produced by the heart and lungs are low in the auditory spectrum and occur mainly in the range of 40 to 1000 cycles per second. This is well below the average range of both music and the spoken voice and requires that the equipment faithfully record and reproduce in this low frequency range.

Currently, the only available and satisfactory equipment is very expensive. No tape recorder, retailing for less than about five hundred dollars, has been found to be satisfactory. In addition to the tape recording instrument, a special microphone and some form of loudspeaker or stethophones must be used and this further increases the cost of a satisfactory instrument. All of the component parts of the system must be properly matched and integrated from an electrical standpoint, often with the addition of preamplifiers or power amplifiers. These considerations indicate special difficulties for those without considerable experience in this field.

This Committee is now undertaking a study of the response characteristics of various available instruments. It is hoped that it will soon be possible to set up minimum specifications which must be exceeded by any equipment used for the recording and playback of heart sounds.

It is hoped that in the near future, instruments, designed specifically for this purpose, and at a reasonable price, will become available. Until then, caution is indicated since reproduction of heart sounds is a different problem from the reproduction of music or speech. An instrument may reproduce voice or music satisfactorily and still be totally inadequate for the reproduction of heart sounds.

Tape Speed. This Committee has voted to standardize, for the present, on two speeds: 7.5 and 17.5 inches per second. Because of the low frequencies of the heart sounds and murmurs, fast tape speed is not essential. It is hoped that with the development of appropriate instruments, the use of the slower speed may become generally available. This would provide a considerable saving in tape and the tape loops used for teaching can be shortened. For proper fidelity the tape must always be played back at exactly the same speed at which it is recorded.

Loudspeaker and Stethophone Reproduction. The electrical output of the tape recorder may be put either into a loudspeaker or electronic stethophones. If a loudspeaker is used, it must be an instrument which is adequately designed to handle these low frequencies. The less expensive speakers are unsatisfactory for this purpose. Some degree of sound-conditioning of the room in which the speaker is used is advisable for the most satisfactory results. If desired, the physician may place his own stethoscope in his ears and listen with the bell held toward the speaker. Loudspeakers are advantageous in handling large groups, but there is more difficulty in demonstrating directly from patients due to the “feedback.”
Sounds from adjacent rooms may be distracting.

Some physicians prefer the use of individual electronic stethophones whereby the sound is led directly to the ears through earpieces similar to the acoustic stethoscope. While this does not require any sound-conditioning of the room and gets around "feedback" and distracting sounds, it does require that an individual electronic stethoscope be available for each person.

Loudspeaker or stethophonic reproduction may be used according to the preference of the individual. The system used should be the one that seems to give the most faithful reproduction under conditions of use.

Reels vs. Loops. Tape may be used either on reels or as continuous loops. In learning auscultation, the continuous loop is more satisfactory since one can listen to any single example for as long, or as short a period as desired before going on to another example. For best reproduction, additional idling and tension pulleys should be available to hold the loops taut. Loops may be of various lengths and there is now no accepted standard length.

If a standard speed and length of loop is adopted, the additional tension pulleys must also be standardized.

Tape Library. As soon as the necessary technical arrangements can be made this committee will set up a tape library under the auspices of the American Heart Association. This library will have facilities for the reproduction of tape recordings of auscultatory phenomena, which will then become available on a purchase basis.

Simultaneous Visualization of the Stethogram. By combining a special type of oscilloscope with the tape recorder, it is possible to visualize the sound (stethogram) at the same time that it is heard. Some teachers feel this audiovisual combination greatly enhances the value of tape recordings.

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