A NEW APPARATUS FOR STEREOMETRY: MOIRÉ CONTOUROGRAPH

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In addition to traditional caliper-and-tape anthropometry, other techniques that provide data for the quantitative analysis of body composition have been explored as morphological approaches to the assessment of nutritional status. These techniques should contribute to widening the scope of somatology and its practical usefulness.

A value for body volume is needed for calculations of body density; these allow inferences about body composition. Many methods have been used for volumetry of the living man:

1. The hydrostatic or water displacement method which utilizes the principle of Archimedes. This method is relatively simple but cannot be applied to young children or seriously ill patients.

2. The air displacement method in which the physical relationship among ambient air pressure, temperature, volume, water vapor, and mass is utilized to estimate body volume. In this method, technical difficulties arise from chamber pressure changes due to respiratory gas exchange, vaporization, and increasing air temperature.
3. The helium dilution method, in which a known quantity of helium is injected into the air space of the occupied subject chamber and density is computed from the resultant concentration of helium which is proportional to the size of the subject. This method is not only complex and expensive, but also has limitations in accuracy such as the precision of the helium analyzer and the uncertainties of reading temperature and relative humidity.

4. The underwater weighing method in which a subject with a nose-clip and snorkel mouthpiece is weighed on a platform completely immersed in a water tank. The subjects have to be completely accustomed to the procedure before measurements are taken, because there is a danger that the subjects may drown.

None of the above-mentioned volumetric techniques is feasible for routine clinical application. Accordingly, the prediction of body density from other measurements, such as fatfold, height-weight and girths, has been substituted.

Body surface area has been measured directly using coating techniques. The main requirements are to affix the tape, flat and smooth, onto the entire surface of the skin and to remove this mould without altering the area. This operation requires tremendous time and patience as well as practice and skill. Accordingly, it has been customary to use height and weight to calculate the assumed surface area of the body with the aid of various height-weight formulae or nomograms based on limited direct measurements. Therefore, in practice, surface area was not a measurement, but a numerical estimation based on a formula. This is one reason why Durnin objected to its use as a standard reference for basal metabolism.

A photographic technique to determine body volume and surface area is more feasible in surveys of large numbers of subjects. Several methods of photogrammetry have been reported: stereophotogrammetry; multiplex