Chest Measurements as an Aid in the Diagnosis of Cystic Fibrosis*

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SINCE THE RECOGNITION OF CYSTIC FIBROSIS as an entity in the late 1930's, the early detection and management of this disease has presented an ever-increasing challenge to the physician.1

As more patients are identified, the probability of a mild or latent form, not demonstrable until adolescence or early adult life, becomes more apparent. The early diag-

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nosis and medical management of this asymptomatic pulmonary form is of paramount importance if one expects to deal adequately with this disease.

At the Cystic Fibrosis Center, Children's Orthopedic Hospital and Medical Center, Seattle, Washington, we have been aware of an obvious but variable relationship between the nutritional status of the patient and his pulmonary complications. In attempting to identify the results of these complications, we began to measure the relationship between the total body growth and the chest circumference of the emphysematous cystic fibrosis chest. It soon be-

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To determine the surface area of the patient draw a straight line between the points representing his height on the left vertical scale to the point representing his weight on the right vertical scale.

The point at which this line intersects the middle vertical scale represents the patient's surface area in square meters.


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**Figure 1: Surface area determination.**

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came apparent that we possibly had a simple screening test for detection of this disease: namely, a consistent relationship between total surface area and the chest circumference (hereafter referred to as the SA/C ratio).

In correlating the accepted norms\(^5\) for height, weight and chest circumference, we observed that surface area plotted against chest circumference showed a straight line relationship (SA/C).

**METHOD OF STUDY**

Height, weight and chest circumference of 4,000 local school children from five to 14 years of age were accumulated and compared to the measurements of 65 children diagnosed and treated for cystic fibrosis at our center during 1962-63. The school measurements (height, weight, chest circumference) were all done by lay personnel, under medical guidance. Surface area was determined by the DuBois formula and nomograms\(^6\) (Fig. 1). Each subject's height, weight and chest circumference were fed into an IBM 709 computer with a read-out in graphic form of the SA/C ratio (Fig. 2).

**RESULTS**

A close relationship between our observations and SA/C ratio determined from height, weight and chest circumference from the studies of child health and development, Harvard School of Public Health,\(^7\) was found in all groups (Fig. 2).

The diagnosis of cystic fibrosis was based on an exhaustive system history and physical, chest x-ray film and a positive pilocarpine iontophoresis sweat test of a minimum of 60 m.Eq./L.Cl. Those children with pulmonary involvement, as evidenced by emphysema or fibrotic changes on x-ray examination, are shown by a + symbol. Those without evidence of pulmonary involvement are indicated by an 0 symbol. Examples of the resultant SA/C graphs at age seven years are shown in Figs. 3 and 4.

It was observed that all cystic fibrosis patients (42 with pulmonary involvement and 23 without pulmonary involvement)

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**Figure 2:** SA/C ratio. Graph produced by IBM 709 computer with data from school survey with superimposed norms by Harvard School of Public Health.
Discussion

The consistent quadrant of all cystic fibrosis patients plotted in comparative study demonstrates a significant measurable finding and it appears that our SA/C ratio study provides an accurate indication of pulmonary involvement.

Further studies (history, physical and sweat testing) of children who fall into this cystic fibrosis quadrant will be undertaken in the future. It is possible children with other respiratory or digestive problems might well fall in this group.

Conclusions

Surface area and chest relationship (SA/C ratio) appears to have definite merit as a screening device for cystic fibrosis; its

Figure 3: Example of SA/C ratio with demonstration of cystic fibrosis in the seven-year-old age group.

Figure 4: Example of SA/C ratio with demonstration of cystic fibrosis in the seven-year-old age group.
possibilities as a prognostic guide may need further evaluation.

The comparative study by computer emphasizes the ability of nonmedical personnel to parallel measurements with those done under professional supervision. This diagnostic aid can then be used in routine school measurements to find potential cystic fibrosis patients for further evaluation by the family physician or school health physician.

SUMMARY

Surface area and chest circumference of 4,000 school children from five to 14 years of age have been surveyed and compared with a group of 65 known cystic fibrotic children. A direct (SA/C) ratio demonstrated a consistency of placement of all cystic fibrosis patients irrespective of presence or absence of pulmonary involvement.

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PROLONGED USE OF ALPHA METHYLDOPA IN HYPERTENSION

The results of this long-term trial indicate that alpha methyldopa is of considerable value in the treatment of hypertension of all grades—half the patients in a group of predominantly severely hypertensive subjects being well controlled for a period of from six months to two years. The blood pressure reduction produced by alpha methyldopa is greater in the standing than in the supine position and is ordinarily well tolerated, but orthostatic hypotension may occur, especially early in the course of treatment. Dosage must be adjusted for the individual, but management is relatively easy. Some degree of tolerance develops in many cases, but most often this can be countered by a further increase in the dose and by the addition of a diuretic to the treatment regime. No significant toxic effect on the liver, bone marrow or kidneys has been found. Side effects frequently occur, the most troublesome being fatigue and depression, although in most cases these are of minor degree and transient.


MEDIASTINAL GANGLIONEUROBLASTOMA

A rare case of ganglioneuroblastoma of the mediastinum in an elderly man has masqueraded as bronchogenic carcinoma. The nature of the tumor was detected on scalene lymph node biopsy; the tumor had metastasized widely, including the brain. Therapy with radiation and nitrogen mustard was ineffective. The patient died two years after the onset of back pain. The mediastinal mass was composed of an admixture of undifferentiated neural cells and moderately anaplastic ganglion cells.