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Principal Inorganic Constituents of Diseased Cardiac Muscle.

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Analyses have been made on 57 hearts. The muscle segment for analysis was taken from the left ventricle except in the case where the heart was too small. Unfortunately fresh material was not available in the great majority of instances, but was obtained only from hearts that had been preserved in formalin for varying periods of time. Determinations of moisture, ash, P_2O_5 , Fe_2O_3 , CaO, MgO, K_2O , and Na_2O were made on muscle dried to relatively constant weight at $100^\circ C$. The clinical and anatomical diagnosis, as well as the age, sex and color was obtained in every instance and the usual run of cardiac maladies together with complicating diseases is well represented.

The determinations show wide variations between maxima and minima. The highest moisture percentage was found to be 83.23%, the lowest 69.94%. Ash varied between 4.666% and 1.016%; P_2O_5 between 2.130% and 0.315%; Fe_2O_3 between 0.320% and 0.008%; MgO between 0.212% and 0.012%; CaO between 0.463% and 0.005%; K_2O between 0.904% and 0.065%, and Na_2O between 1.871% and 0.200%.

One would expect the CaO to be high in the aged and in those presenting sclerotic changes. That this is not always the case is shown by the fact that in an instance of a person 81 years old with

generalized A.S. and coronary sclerosis the CaO was only 0.140%, while in another individual of 49 years with coronary sclerosis and an obviously degenerated heart muscle the CaO reached 0.463%. In general, persons dying of tuberculosis had hearts with relatively low calcium content. However, this is not invariably the rule, for one heart from a tuberculosis patient suffering also from luetic infection and aneurysm of the aorta showed 0.116% CaO.

There is also marked variability in the K₂O content. The highest percentage obtained was in the heart from a boy of 14 who died of acute nephritis with anasarca. The K₂O was 0.904% while the calcium was 0.032%. The same determinations on the heart of a child 1½ years old gave 0.285% potassium oxide and 0.027% calcium oxide.

With the large variety of diseases represented and the relatively small number of hearts analyzed an arrangement of the percentages in accordance with disease is hardly justified at present.

So far it has been impossible to draw any definite conclusions, and while there is no correlation between any series of the constituents determined and the ages, there appears to be a tendency to grouping, within fairly narrow limits. It is clear that with so many variables, only a large number of analyses will yield results which will permit conclusions being drawn. Nevertheless there is some indication that a variation in both the calcium and potassium content of heart muscle at different ages as well as in different diseases exists.

Fresh hearts are now obtained with increasing ease, and the analytic method has been greatly improved while the errors incident to the numerous manipulations have been reduced or eliminated. It is hoped that with a larger series of analyses of normal as well as pathological hearts some relation between the alkaline earth and the alkali metals to age and disease, which is the object of this work, will become evident.