

98 (1276)

# **The non-protein nitrogenous constituents of normal human muscle.**

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The material for these analyses was obtained at operations for severe lacerations, carcinoma of the breast, or gangrene of the extremities. Only such specimens were utilized as were not involved by the pathological process. This seemed to be the only available source from which muscle tissue that might be regarded as normal could be procured. In every case the blood of these subjects was analyzed for its non-protein nitrogen as well as urea content. Any patients in whom these were above the normal would not have been utilized in this series. As a matter of fact, no abnormal bloods were encountered among these cases.

The maximal, minimal and average figures, as well as the number of determinations for each substance, are given in the appended table.

THE NON-PROTEIN NITROGENOUS CONSTITUENTS OF NORMAL HUMAN MUSCLE.

Substance.	No. of Determinations.	Mgms. per 100 Gms. Muscle.			Remarks on Methods.
		Maximal.	Minimal.	Average.	
Non-protein nitrogen..	19	234	100	166	Alcoholic extract.
Non-protein nitrogen..	7	346	265	292	Extraction with heat and acetic acid, evaporation to small volume and extraction with trichloroacetic acid.
Urea nitrogen .....	19	25	8	13	Alcoholic extract.
Kreatin .....	12	404	212	350	Folin's method.
Kreatinin .....	13	12	2	5	Folin's method.
Amino acid nitrogen...	12	42	16	32	Van Slyke's method.

The results for the non-protein nitrogen are much lower than they should be. These data were obtained by extracting the muscle tissue by alcohol. Alcohol does not dissolve the kreatin. Since this substance forms such a large portion of the non-protein

nitrogen of muscle, a considerable error is introduced. It is our aim in completing this series of determinations to employ trichloroacetic acid or some other fluid for extraction which will approximate the true values more closely.

It is hoped that these studies may form a basis for comparison with pathological muscle tissue.

99 (1277)

### The rôle of autolysis in infarction.

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*Are the conditions which are believed to be necessary for autolysis realized in infarction?* A true acidity is known to be necessary in some critical cases for autolysis,<sup>1</sup> that is,  $P_H < 7.0$ . Infarction was made by kidney vessel ligation. The  $C_H$  was determined for the control blood and for that of the blood from the kidney after various periods of time elapsing after ligation.

Time.	$P_H$ . <sup>2</sup>
Control from the normal kidney vein.....	7.2
45 minutes after ligation.....	6.0
Control minutes after ligation.....	7.2
After four hours' ligation.....	6.0

Again, in a guinea-pig liver, excised and frozen by  $CO_2$  within 50 seconds after excision, ground up and suspended in 0.9 per cent. NaCl solution and introduced into a Clark (W. M.) shaking hydrogen electrode  $C_H$  gave  $P_H$  6, 5, the blood control giving 7, 2. After 35 minutes,  $P_H = 6, 3$ .<sup>3</sup> This rapid rise in  $C_H$  is in harmony with the observations of Hopkins, Moore and Roaf, concerning the origin of lactic acid immediately after the death of the tissue. It is likewise compatible with the determinations which Taschiro<sup>4</sup> has made on  $CO_2$  evolution after injury. The conclu-

<sup>1</sup> Morse, Max, "Enzyme and reaction of medium in autolysis," *Journ. Biol. Chem.*, 1917, XXX, 197.

<sup>2</sup> By the Sørensen colorimetric method.

<sup>3</sup> By the potentiometer method.

<sup>4</sup> Taschiro, S., "Chemical Sign of Life," Chicago, 1917.