

PROTEIN AND MINERAL METABOLISM IN LIMITED PROFOUND BURNS

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Protein and mineral metabolism both undergo essential changes in burns (1—7, 11, 12). The course and outcome of the disease depend in a great extent on them. In this sense, protein and mineral metabolism correction are very important in the treatment of this disease.

In the present study we are indebted to investigate the changes of both protein and mineral metabolism in burns and to try to influence them.

Material and methods

The experiments were carried out on 26 rabbits breed "Velican" with b. w. 2600—3200 g. Burning was caused by using an apparatus for heat convection on 5—7 per cent of total body surface at IIIrd-b till IVth degree. The animals were divided into two groups: 1st — burned untreated — 14 ones, and IInd — burned and treated with protein hydrolysate 5 ml/kg each immediately after burning — 12 ones. The preparation was injected in the marginal auricular vein. The following indices were followed up: total protein, urea, sodium and potassium in serum of the animals. Total protein was determined after the biurette method, urea — after the diacytilmonoximic method by using tests from "LAHEMA" (CSSR) while both sodium and potassium — after the flame-photometrical method. The estimations were performed before burnings after the 1st, 6th and 24th hour, as well as on the 3th, 7th, 14th and 28th day after burning. The data obtained were statistically analysed after the method of variational analysis.

Results and discussion

On table 1 one can see that after burning total protein diminishes in any terms of determination and then in single estimations (at the 1st hour, on the 3rd and 28th day) increases unreliably. Protein hydrolysate enhances the total protein in any terms excepting at the 6th and 24th hour as compared with that of untreated animals. It is to be noted that the rates are over the normal ones at the 1st hour as well as on the 3rd and 28th day after burning.

Urea increment as shown on table 2 in treated animals excepting the 1st hour and the 3rd day is lower and closer to the norm as compared with that of the untreated animals. Concerning the indexes of mineral metabolism, namely of sodium and potassium there are no significant abnormalities. There is only a slightly expressed tendency towards potassium increase in the treated animals.

Our results obtained confirm the literature data cited concerning hyponatremia, uremia, hyperkalemia and hypoproteinemia in burning (1, 2, 5, 11, 12). The hypoproteinemia is due to protein loss from burned surface, the increased vascular permeability because of hemodynamic disorders and resulting hypo-

Table 1
Total protein levels

Groups	Healthy	Burned untreated	Burned and Prot. hydrol.
1 st h	6,55±0,13 (26)	6,82±0,17 (13)	6,85±0,45* (12)
6 th h	"	6,22±0,27 (14)	5,88±0,14 (11)
24 th h	"	6,12±0,22 (12)	6,04±0,28 (11)
3 rd day	"	6,71±0,21 (6)	6,91±0,42 (7)
7 th day	"	6,29±0,22 (8)	6,49±0,20 (10)
14 th day	"	6,32±0,20 (8)	6,45±0,32 (10)
28 th day	"	6,61±0,14 (8)	6,69±0,20 (11)

* The number of animals studied is given in parenthesis. The sign means statistically reliable difference, $p < 0,05$.

Table 2
Increment of urea

Groups	Burned untreated	Burned and Prot. hydrolysate
1 th h	5,44±1,27 (13)	9,15±4,19 (12)
6 th h	16,88±2,81 (14)	15,27±2,71 (11)
24 th h	18,20±4,07 (12)	13,65±3,45 (11)
3 rd day	5,77±8,51 (7)	6,83±4,54 (7)
7 th day	-3,06±2,03 (8)	1,84±2,61 (11)
14 th day	-8,51±1,04 (8)	-1,15±1,67 (10)
28 th day	-0,18±0,87 (8)	-0,19±1,67 (10)

xemia, as well as to the direct damage of the vascular wall by the heat, the generalized protein destruction in blood and tissues, the disturbed protein-synthesis function of the liver and to the disturbed assimilation of proteins by the gastrointestinal tract (1, 3, 4, 5, 12). Total protein increase at the 1st hour after burning concerning the untreated animals (insignificantly) and the treated with protein hydrolysate ones (significantly) could be due in our opinion to increased degradation of tissue proteins and resulted haemoconcentration (1, 9). The decrease of the same index in untreated and protein hydrolysate treated at the 6th and 24th

hour after burning can be related to predominance of catabolic processes of protein metabolism in the acute post-burning period. The lower total protein rates in rest terms of untreated animals can be explained with disturbed protein metabolism which is described widely enough in the literature available. The metabolism normalized on the 28th day and total protein reaches the normal value. The higher level of total protein in treated animals could be explained with the favourable influence of protein hydrolysate upon disturbed protein metabolism as well as upon protein-synthesis function of the liver (1, 4, 8). According to Yu. H. Kremer et al. (10) urea increment reflects more precisely the degree of protein assimilation as compared with urea itself because the latter varies very much in single individuals. The increased urea increment at the 1st hour and on the 3rd day after burning in treated animals can be due to catabolism predominance and to the amino acids introduced with the protein hydrolysate which are unable to undergo a complete metabolism and one part of them is a source of urea formation.

The closer to the norm increment levels of treated animals in any other terms can be related to the favourable influence by the hydrolysate upon protein metabolism, haemodynamics, protein-synthesis and urea-formation function of the liver.

Potassium insignificant increase and sodium decrease, in our opinion can be due to the small in surface burning and, consequently, to the less expressed tissue destruction and membrane permeability increase.

It can be concluded that profound burns with limited surface (5—7 per cent) do not cause any significant changes of protein and mineral metabolism and that protein hydrolysate used shows a tendency towards their normalization.

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БЕЛКОВЫЙ И МИНЕРАЛЬНЫЙ ОБМЕН ПРИ ОГРАНИЧЕННЫХ И ГЛУБОКИХ ОЖОГАХ

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Р Е З Ю М Е

Произведен ожог IIIБ — IV степени 5—7 % поверхности тела 26 кроликов, разделенных на две группы: обожженные, которых лечили белковым гидролизатом, и обожженные, без применения этого лечения. При исследовании прослеживался уровень общего белка, мочевины, натрия и калия в установленных интервалах: через час, через 6 часов, через 24 часа, а также на третий, седьмой, четырнадцатый и двадцать восьмой день после произведенного ожога. Было установлено понижение уровня общего белка во все указанные сроки, за исключением первого часа, третьего и двадцать восьмого дня после ожога. Введение белкового гидролизата приводит к повышению общего белка, за исключением результатов шестого и двадцать четвертого часов. У животных, которым не вводили белковый гидролизат, такое повышение общего белка не устанавливается. У животных, получавших белковый гидролизат, инкремент мочевины более низкий и ближе к норме, за исключением результатов первого и третьего дней. Уровень калия и натрия показывают незначительное отклонение от нормы, причем устанавливается тенденция к более слабому повышению уровня калия.

Авторами сделан вывод, что белковый гидролизат можно с успехом использовать для регуляции белкового и минерального обмена после ожога.