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Automation Cancer Immunotherapy on the Basis for Medical Technology Advance

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Abstract: *It has been proposed a simple, rapid, automation redox potentiometric method of the product intermediate control (NAD) in the cancer immunotherapy on the basis of niacin pharmaceuticals.*
Keywords: *cancer immunotherapy, niacin pharmaceuticals, redox potentiometric method, genomic stability, cage defense and prevention, product intermediate, advanced medical technology.*

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I. INTRODUCTION

The use of pharmaceutical drugs improving immune system in oncology (cancer immunotherapy) is a medical technology advance. One from such drugs (niacin, vitamin B3, nicotinic aced) has been considered in our work. Niacin has been used in the immunotherapy of different cancer forms: bone marrow, upper digestive tract, skin [1-3]. The tasks of our work include: 1) the development of analytical reactions with estimationof the product intermediate content, 2) the automation of the used redox potentiometric method in the cancer immunotherapy.

II. DESCRIPTION OF NIACIN

In present work is considered tablet pharmaceutical niacin receiving orally in divided doses. Niacin desirably to use in the pure form without addition eliminating flash. For flash decrease niacin, receiving is taken after food. In whole blood niacin with particip ationlymphocytes is converted to nicotinamide, adenine dinucleotid (NAD). For optimum genomic stability general quantity receiving niacin must by > 300 mg per day [1-3] at interval tablet 500-1500 mg.

III. DESCRIPTION OF NAD

Concentration of NAD in blood is a basic parameter influencing on the genomic stability or on the ability cancer damaged cells to regeneration. At niacin and NAD deficit genomic stability is decrease. Therefore, the niacin concentration necessary to support indicated high level > 300 mg per day [1-3] by way developed here the regular control of NAD concentration in blood. High genomic stability provides for defense health cells at cancer chemotherapy and radiation therapy and also possibility to general cancer prophylaxis.

IV. AUTOMATION OF THE NAD CONCENTRATION DETERMINING IN WHOLE BLOOD

It is proposed simple and rapid method determination of NAD concentration in blood. Determining of the NAD concentration allows compare indicated above niacin optimum quantity > 300 mg per day with optimum interval NAD concentration. The method of NAD concentration determining is based on the use of high reducible properties of NAD, that follows from high antioxidant properties of niacin in wholeblood [4].It allows to use indirect redox potentiometric method to determine reducers [5].
For electrochemical reversible half reaction was chosen redox couple:

$$\{Fe(CN)_6\}^{3-}\{Fe(III)\}+e^- \leftrightarrow \{Fe(CN)_6\}^{4-}\{Fe(II)\} \quad (1)$$

Corresponding analytical reaction was:

$$NAD_{(r)} + mFe(III) \rightarrow NAD_{(o)} + mFe(II), \quad (2)$$

where m is equivalent value.

For optimum of the analytical reaction the solution reagents mixture contained [6]:
$K_3Fe(CN)_6$ + $K_4Fe(CN)_6$ + buffer phosphate (pH=7.2). Two measurements of the redox potential in the solution of the reaction mixture up to blood simple addition (H_1) and after blood sample addition (H_2) carry out with help Pt indicator electrode and Ag, AgCl, KCl reference electrode.
For estimation of the NAD concentration in blood or its equivalent value – AN we proposed [5] to express AN as the quantity mg $K_3Fe(CN)_6$ per oxidation 1 cm^3 of sample blood.
This calculation carried out on the basis (1), (2) Nernst equation that gives:

$$AN = \frac{(f-1)[Fe(III)]_0[Fe(II)]_0 329.2 V_R}{\{f[Fe(II)]_0 + [Fe(III)]_0\}V_S} \quad (3)$$

Where $f = \exp\{F(H_1-H_2)/RT\}$ (4)

329.2 g – molecular mass of $K_3Fe(CV)_6$; V_R – volume of reagent cm^3 for one analysis; V_S – volume of sample blood cm^3 for one analysis; index "0" for Fe indicates on the initial concentration in reagent. Equations (3) and (4) were also used in work [5], but without NAD formation.
Automation examples of the indirect redox potentiometrick method reductives determining and corresponding adjustment have been given in [6, 7]. In our case automation in concerned to following operation: hemolisation of blood; elimination of coagulation ; measurement V_R and V_S, H_1, H_2; calculation of AN; washing of system.

V. CONCLUSIONS

The evolution of electrochemical redox analysis in cancer immunotherapy on the basis of niacin causes advances in medical technology and the cancer prophylaxis in radioactive in atomic industry.

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