

**МАТЕМАТИЧЕСКАЯ МОДЕЛЬ  
ФИЗИОЛОГИИ ОБЕСПЕЧЕНИЯ  
НОРМАТИВНЫХ ПАРАМЕТРОВ  
ГАЗООБМЕНА  
В ГОЛОВНОМ МОЗГЕ ЧЕЛОВЕКА**

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 [2]. 1,  
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 p1(A 2,...,A 12), p1 –  
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 2. p2( ), p2 –  
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 3. p3( , , , ), p3 –  
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 4. p4( , , ), p4 –  
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 5. p5( , , , O<sub>2</sub>, CO<sub>2</sub>), p5 –  
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 6. p6( , , O<sub>2</sub>, , Fe, ), p6 –  
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 7. p7( ), p7 –  
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 8. p8( ), p8 –  
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 .

9.  $p_9(\dots), p_9 -$  -  
 10.  $p_{10}(\dots), p_{10} -$  -  
 11.  $p_{11}(\dots), p_{11} -$  -  
 12.  $p_{12}(\dots), p_{12} -$  -  
 1 - 12

$$\begin{aligned}
 & (\forall A_2) \dots (\forall A_{12}) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) \\
 & (\forall \dots) (\forall \dots) (\forall O_2) (\forall CO_2) (\forall \dots) (\forall \dots) (\forall \dots) (\forall Fe) (\forall \dots) (\forall \dots) \\
 & (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) \\
 & (p_2(\dots) \wedge p_3(\dots, \dots, \dots) \wedge p_4(\dots, \dots, \dots) \wedge p_5(\dots, \dots, \dots, O_2, CO_2) \\
 & \wedge p_6(\dots, \dots, O_2, Fe, \dots) \wedge p_7(\dots) \wedge p_8(\dots) \wedge p_9(\dots) \\
 & \wedge p_{10}(\dots) \wedge p_{11}(\dots) \wedge p_{12}(\dots, \dots, \dots)) \Rightarrow p_1(A_2, \dots, A_{12}) \\
 & \Rightarrow \\
 & (\exists A_2) \dots (\exists A_{12}) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) \\
 & (\exists \dots) (\exists O_2) (\exists CO_2) (\exists \dots) (\exists \dots) (\exists \dots) (\exists Fe) (\exists \dots) (\exists \dots) (\exists \dots) \\
 & (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) \\
 & (p_2(\dots) \wedge p_3(\dots, \dots, \dots) \wedge p_4(\dots, \dots, \dots) \wedge p_5(\dots, \dots, \dots, O_2, CO_2) \\
 & \wedge p_6(\dots, \dots, O_2, Fe, \dots) \wedge p_7(\dots) \wedge p_8(\dots) \wedge p_9(\dots) \\
 & \wedge p_{10}(\dots) \wedge p_{11}(\dots) \wedge p_{12}(\dots, \dots, \dots)) \Rightarrow \\
 & \Rightarrow p_1(A_2, \dots, A_{12}). \tag{1}
 \end{aligned}$$

(1) :

- F1 :

$$\begin{aligned}
 & (p_2(\dots) \wedge p_3(\dots, \dots, \dots) \wedge p_4(\dots, \dots, \dots) \wedge p_5(\dots, \dots, \dots, O_2, CO_2) \\
 & \wedge p_6(\dots, \dots, O_2, Fe, \dots) \wedge p_7(\dots) \wedge p_8(\dots) \wedge p_9(\dots) \\
 & \wedge p_{10}(\dots) \wedge p_{11}(\dots) \wedge p_{12}(\dots, \dots, \dots)) \Rightarrow p_1(A_2, \dots, A_{12}) \\
 & (\forall \Sigma) : \\
 & (\forall A_2) \dots (\forall A_{12}) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) \\
 & (\forall \dots) (\forall \dots) (\forall O_2) (\forall CO_2) (\forall \dots) (\forall \dots) (\forall \dots) (\forall Fe) (\forall \dots) (\forall \dots) \\
 & (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots) (\forall \dots).
 \end{aligned}$$

$$\begin{aligned}
 & (\exists A_2) \dots (\exists A_{12}) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) \\
 & (\exists \dots) (\exists O_2) (\exists CO_2) (\exists \dots) (\exists \dots) (\exists \dots) (\exists Fe) (\exists \dots) (\exists \dots) (\exists \dots) \\
 & (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots) (\exists \dots). \\
 & (1) \quad : \\
 & [(\forall \Sigma)(F1 \vee p1(A_2, \dots, A_{10}))] \Rightarrow [(\exists \Sigma)(F1 \vee p1(A_2, \dots, A_{10}))] \quad (2) \\
 & (2) \quad , \\
 & : \\
 & F1(X) \equiv [(\forall \Sigma)(F1 \vee p1(A_2, \dots, A_{10}))]; \\
 & F2(X) \equiv [(\exists \Sigma)(F1 \vee p1(A_2, \dots, A_{10}))].
 \end{aligned}$$

$$\begin{aligned}
 & ( \quad , \quad ) \\
 & 27 \quad \quad \quad : \\
 & (F1(X) \Rightarrow F2(X)) \equiv (F1(X) \vee F2(X)), \\
 & (F1(X) \Rightarrow F2(X)) \equiv (F1(X) \wedge F2(X)). \\
 & \exists \equiv \forall.
 \end{aligned}$$

$$\begin{aligned}
 & (2) \quad : \\
 & [F1 \vee p1(A_2, \dots, A_{10})] \wedge [ [F1 \vee p1(A_2, \dots, A_{10})] ] \quad (3) \\
 & (3)
 \end{aligned}$$

V.A. Kondratenko

MATHEMATECAL MODELING OF STANDARDIZATION OF GAS EXCHANGE PROCESSES IN HUMAN BRAIN

A problem of understanding the mechanisms of human brain supply with oxygen and removing carbon dioxide from it and cleaning its cells and tissue fluids from metabolic waste products contained in them has always been and remains to this day the most important issue related to the safety of vital functions of the brain. The authors present a mathematical model of physiological processes of standard gas exchange and removal of brain metabolic waste products, harmful substances, and pathogenic microorganisms designed for prediction of facts of pathological onsets in the brain.

1. . . . . : , 1998. 400 c.
2. . . . . : , 2010. 267 .
3. . . . . : , 2006. 100 .
4. ( . . . . . ), . . . . . : , 2003. 408 .

07.09.2016

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