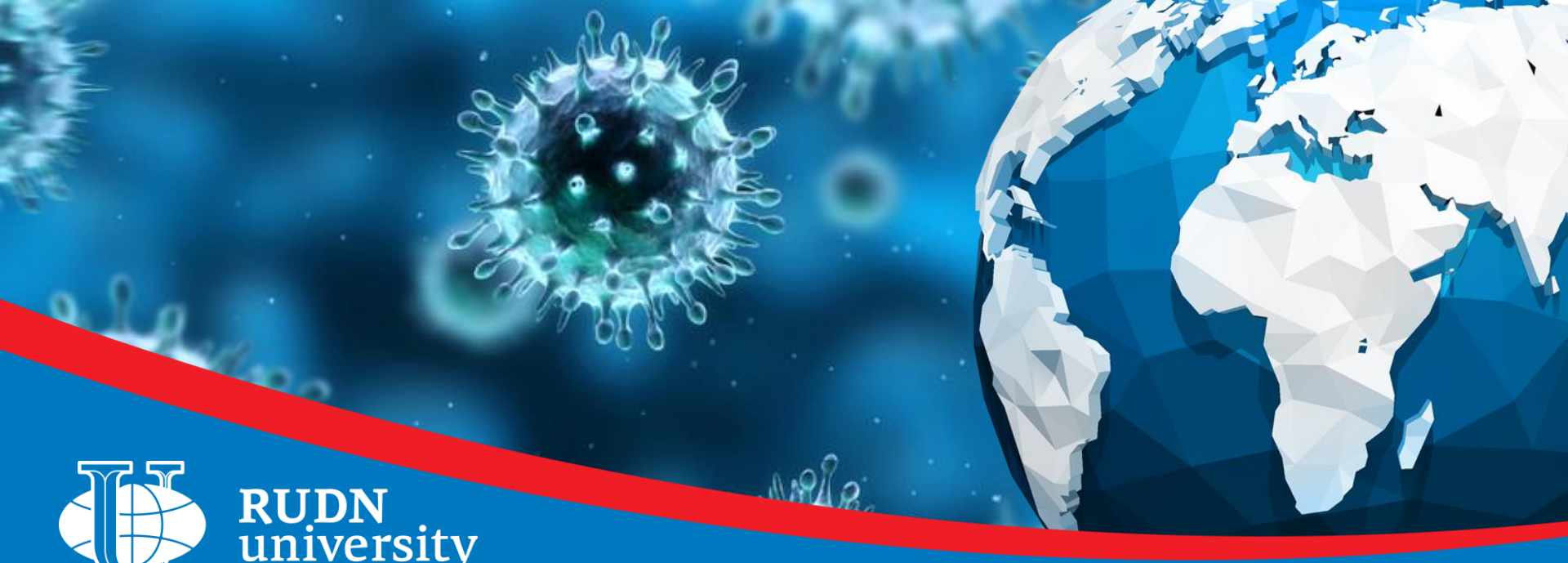

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Математическое моделирование вирусной динамики.

Леон Кристина

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Вирус. Мутация.

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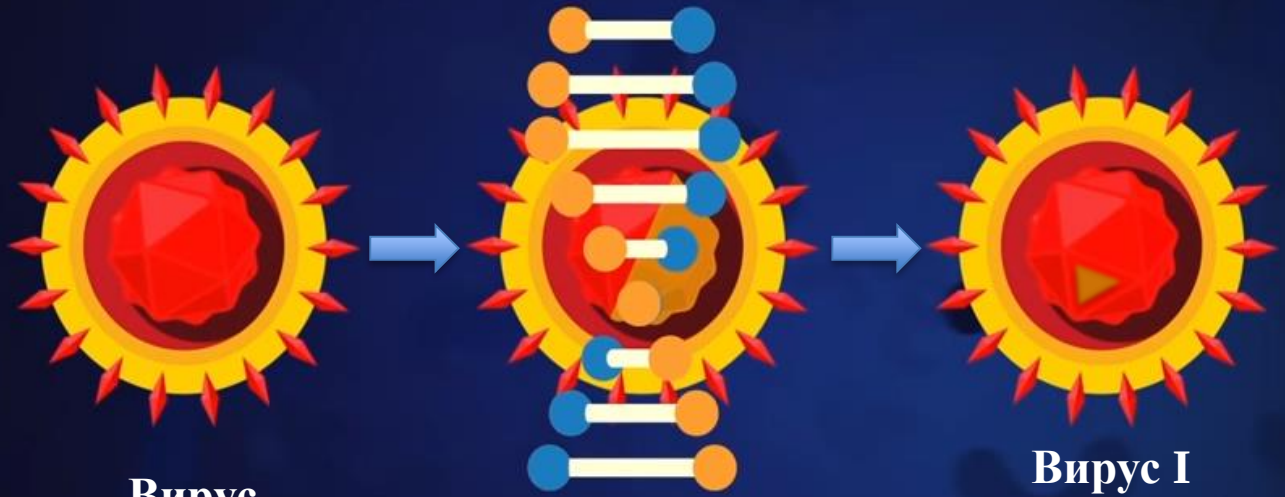

ПостНаука: Вирусы.

Разнообразие мутации.

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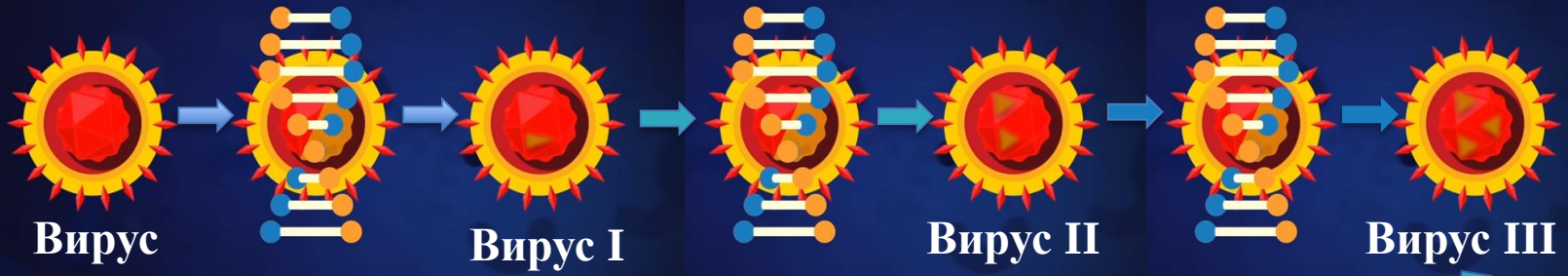

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Заражение клеток.

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РЕПЛИКАЦИЯ

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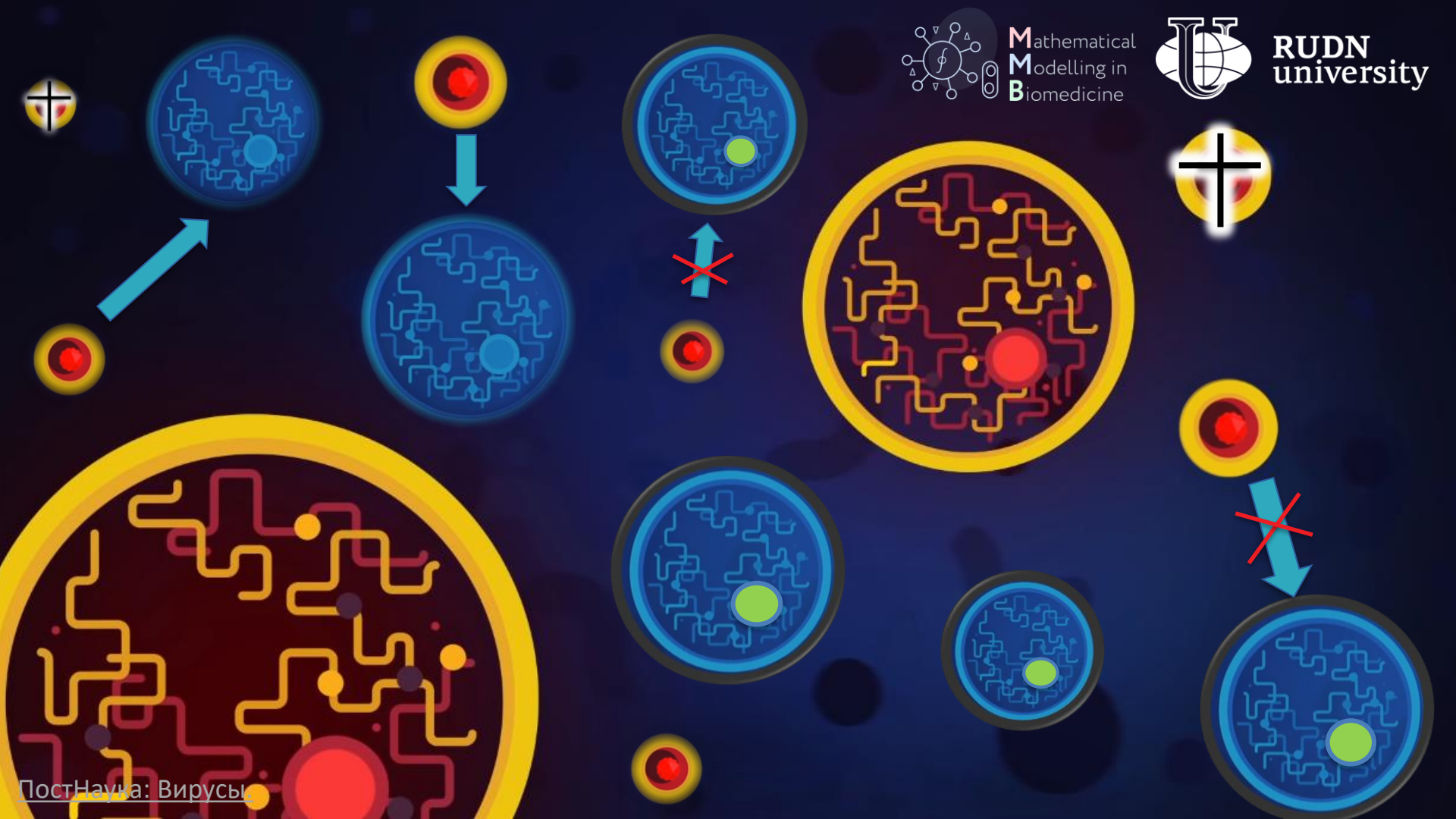
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ПостНаука: Вирусы

Построенная модель вирусной инфекции

$$\frac{\partial u}{\partial t} = D\frac{\partial^2 u}{\partial x^2} + au(1 - bI(u)) - uf(u) - \sigma(x)u$$

$u(x,t)$ - virus density distribution

x - virus genotype

t - time

$I(u) = \int_{-\infty}^{\infty} u(x,t)dx$ - total quantity virus.

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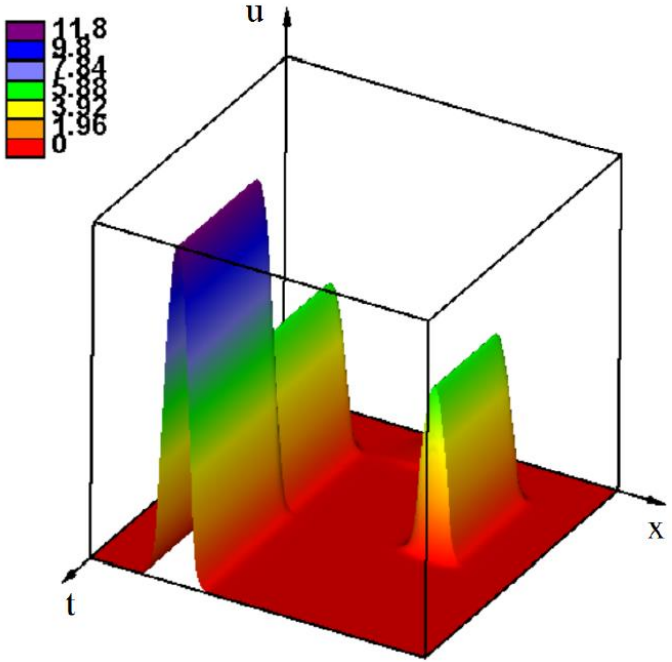
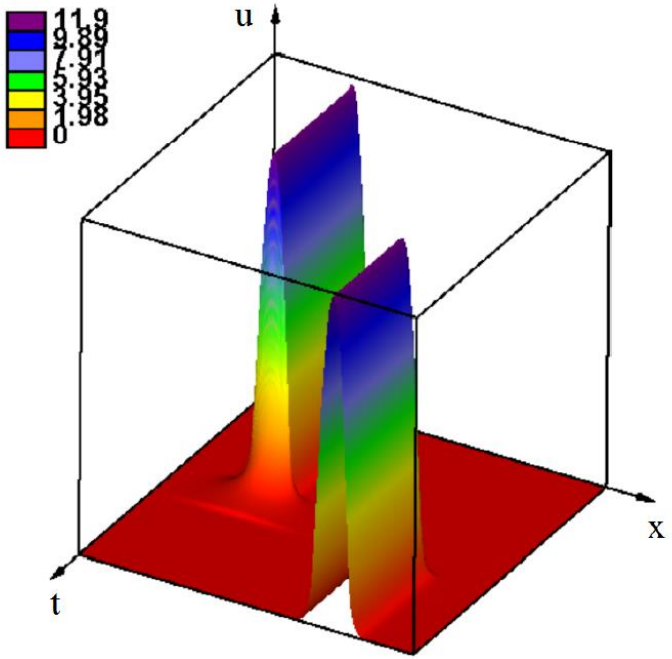
Влияние лечения





Сосуществования два вируса

Reaction-diffusion model of viruses' competition

$$\begin{cases} \dfrac{\partial u}{\partial t} = D_1 \dfrac{\partial^2 u}{\partial x^2} + \alpha_1 u(1 - \beta_1 I(u) - \gamma_1 I(v)) - \sigma_1(x)u, \\ \dfrac{\partial v}{\partial t} = D_2 \dfrac{\partial^2 v}{\partial y^2} + \alpha_2 v(1 - \beta_2 I(u) - \gamma_2 I(v)) - \sigma_2(y)v. \end{cases}$$

$u(x,t),\ v(y,t)$ - virus density distribution

x, y - virus genotypes

t - time

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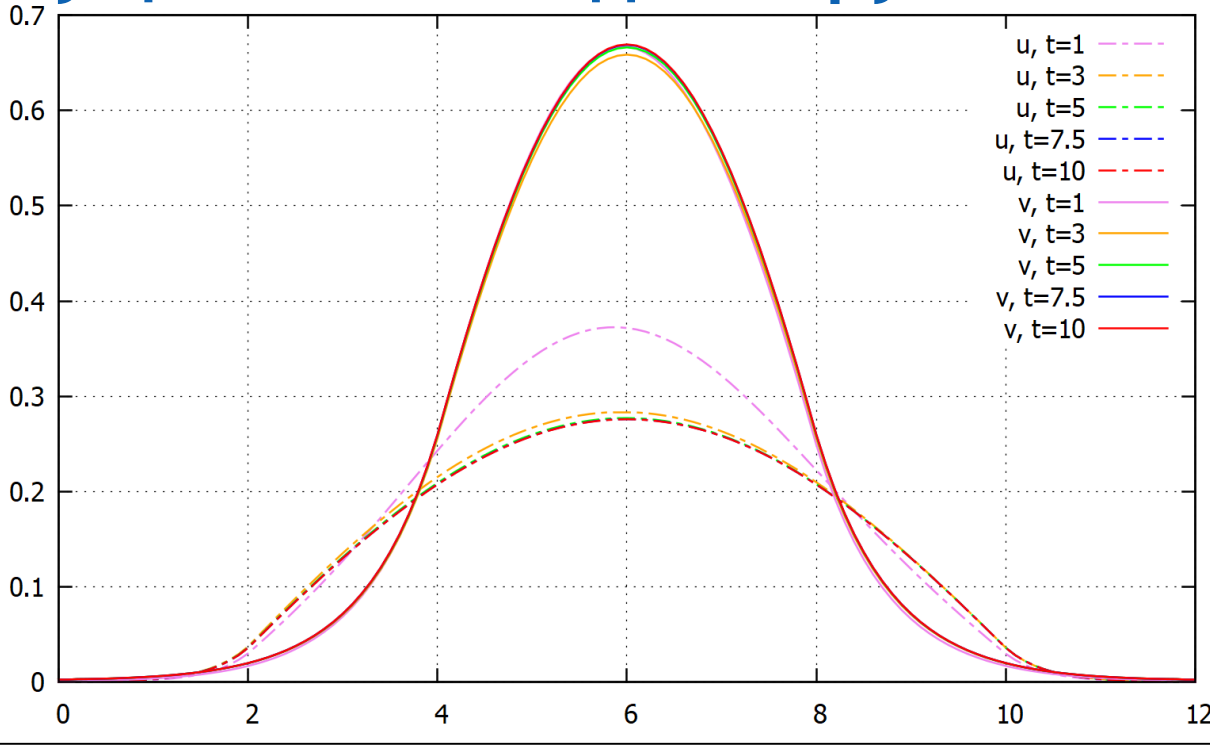
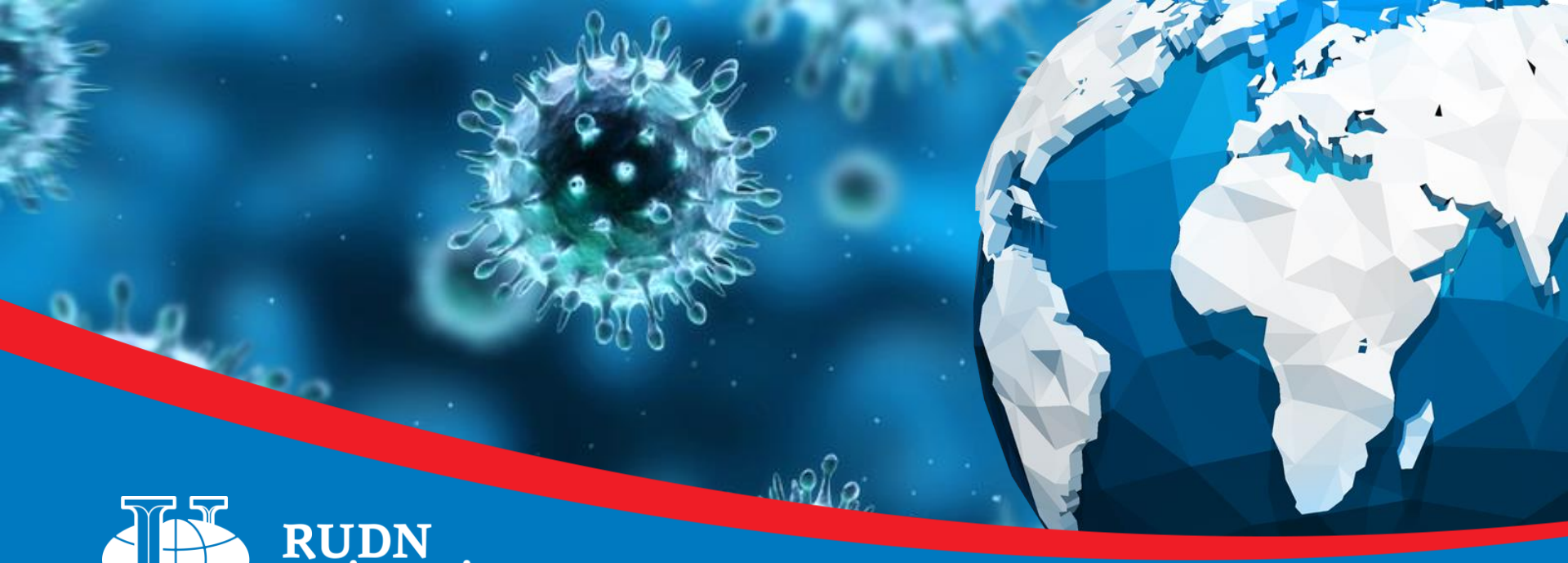
Сосуществования два вируса



$D_1 = D_2 = \alpha_1 = \alpha_2 = 1$; u: $\beta_1 = 0.2, \gamma_1 = 0.4, \sigma_1 = 2, x_1 = 2, k_1 = 0.576$

v: $\beta_2 = 0.1, \gamma_2 = 0.1, \sigma_2 = 6, y_1 = 4, k_2 = 0.356.$



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Спасибо!

05.03.2020

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