LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH

JudulJurnal Ilmiah (Artikel)	:	Modeling CD4+ T cells and CTL response in HIV-1 infection with antiretroviral therapy (Penulis : Sutimin, **Sunarsih**, R. Heru Tjahjana			
JumlahPenulis	:	3 orang			
Status Pengusul :	:	~~Penulis pertama~~/penulis kedua/~~penulis korespondensi~~			
IdentitasJurnalIlmiah	:	a.	NamaJurnal	:	COMMUN. BIOMATH. SCI.
		b.	Nomor ISSN	:	e-ISSN: 2549-2896
		c.	Volume,nomor, bulan tahun	:	VOL. 1, NO. 2, PP. 100-109/Desember 2018.
		d.	Penerbit	:	Published by Bio Mathematical Society
		e.	DOI artikel (jika ada)	:	10.5614/cbms.2018.1.2.3
		f.	Alamat web jurnal	:	
URL JURNAL : http://journals.itb.ac.id/index.php/cbms/article/view/9586 URL ARTIKEL : http://journals.itb.ac.id/index.php/cbms/article/view/9586/3802					
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Kategori Publikasi Jurnal Ilmiah : (beri ✓pada kategori yang tepat)
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Hasil Penilaian *Peer Review* :

Komponen Yang Dinilai	**Nilai Reviewer**		**Nilai Rata-rata**
	Reviewer I	**Reviewer II**	
a. Kelengkapan unsur isi jurnal (10%)	1,9	2	1,95
b. Ruang lingkup dan kedalaman pembahasan (30%)	5,5	6	5,75
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	5,6	5	5,3
d. Kelengkapan unsur dan kualitas penerbit (30%)	5,8	6	5,9
Total = (100%)	18,8	19	18,9

Semarang, 19 September 2019

Reviewer II

Prof. Dr. Heri Sutanto, SSi., MSi
NIP. 197502151998021001
Unit kerja : Departemen Fisika, FSM UNDIP

Reviewer I

Prof. Dr. Widowati, MSi
NIP. 196902141994032002
Unit kerja : Departemen Matematika , FSM UNDIP

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b. Ruang lingkup dan kedalaman pembahasan (30%)	6,00			5,5
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	6,00			5,6
d. Kelengkapan unsur dan kualitas terbitan/jurnal (30%)	6,00			5,8
Total = (100%)	20,00			18,8
NilaiPengusul =20%*....... =				

CatatanPenilaianartikeloleh Reviewer :

1. **Kesesuaian dan kelengkapan unsur isi jurnal:**

   Kesesuaian dan kelengkapan isi jurnal baik mulai dari abstrak, pendahuluan, hasil/pembahasan termasuk simulasi numerik dan kesimpulan sudah sesuai dengan jurnal COMMUN. BIOMATH. SCI.

2. **Ruang lingkup dan kedalaman pembahasan:**
   Kedalaman pembahasan cukup baik ada analisis kestabilan titik dari ketimbangan model matematika yang dikemukakan dikaji juga eksistensi dan keunikan titik kesetimbangan.

3. **Kecukupan dan kemutakhiran data/informasi dan metodologi :**
   Data parameter yang digunakan dalam simulasi numerik berupa dat sekunder dari referensi yang disitasi. Dari 26 referensi, 12 referensi out of date (lebih dari 10 tahun terakhir).

4. **Kelengkapan unsur dan kualitas terbitan:**
   Sudah baik tercantum juga histori artikel mulai dari submit, revisi sampai diterbitkan, ditampilkan juga DOI nya.

Semarang, 6 September 2019

Reviewer I

Prof. Dr. Widowati, MSi
NIP. 196902141994032002
Unit kerja : Departemen Matematika , FSM UNDIP

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Hasil Penilaian *Peer Review* :

Komponen Yang Dinilai	**Nilai Maksimal Jurnal Ilmiah**			**Nilai Akhir Yang Diperoleh**
	Internasional [√]	**Nasional Terakreditasi** [ ]	**Nasional Tidak Terakreditasi** [ ]	
a. Kelengkapan unsur isi jurnal (10%)	2,00			2
b. Ruang lingkup dan kedalaman pembahasan (30%)	6,00			6
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	6,00			5
d. Kelengkapan unsur dan kualitas terbitan/jurnal (30%)	6,00			6
Total = (100%)	20,00			19
NilaiPengusul =20%*....... =				

Catatan Penilaian artikel oleh Reviewer :

1. **Kesesuaian dan kelengkapan unsur isi jurnal:**

Artikel sudah disusun secara lengkap mengikuti template jurnal COMMUN. BIOMATH. SCI.

2. **Ruang lingkup dan kedalaman pembahasan:**

Data penelitian sangat baik dan telah dibahas sesuai dengan kaidah ilmu di bidang matematika.

3. **Kecukupan dan kemutakhiran data/informasi dan metodologi :**

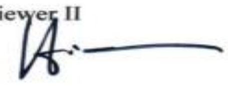
Similarity 18%, pembahasan dari data dengan pengembangan terkini. Tabel dan grafik hasil simulasi jelas.

4. **Kelengkapan unsur dan kualitas terbitan:**

Kualitas penerbit sangat baik dan konsisten dalam bahasa tulisnya.

Semarang, 19 September 2019.

Reviewer II



Prof. Dr. Heri Sutanto, SSi., MSi
NIP. 197502151998021001
Unit kerja : Departemen Fisika, FSM UNDIP

Modeling CD4+ T cells and CTL response in HIV-1 infection with antiretroviral therapy

S Sutimin, S Sunarsih, RH Tjahjana - … in Biomathematical Sciences, 2018 - journals.itb.ac.id

The majority of an immune system infected by HIV (Human Immunodeficiency Virus) is CD4+ T cells. The HIV-1 transmission through cell to cell of CD4+ T cells supports the productive infection. On the other hand, infected CD4+ T cells stimulate cytotoxic T-lymphocytes cells to control HIV-1 infection. We develop and analyze a mathematical model incorporating the infection process through cell to cell contact of CD4+ T cells, CTL compartment and the combination of RTI and PI treatments. By means of the alternative …

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Indonesia

A multiscale approach for spatially inhomogeneous disease dynamics

Markus Schmidtchen[1], Oliver Tse[2] and Stephan Wackerle[3]
[1]Department of Mathematics, Imperial College London, London SW7 2AZ, United Kingdom.
[2]Department of Mathematics and Computer Science, Eindhoven University of Technology, P.O. Box 513, 5600MB Eindhoven, The Netherlands.
[3]Fraunhofer Institute for Industrial Mathematics, Fraunhofer-Platz 1, 67663 Kaiserslautern, Germany.
[1]Email: m.schmidtchen15@imperial.ac.uk

Abstract

In this paper we introduce an agent-based epidemiological model that generalizes the classical SIR model by Kermack and McKendrick. We further provide a multiscale approach to the derivation of a macroscopic counterpart via the mean-field limit. The chain of equations acquired via the multiscale approach is investigated, analytically as well as numerically. The outcome of these results provides strong evidence of the models' robustness and justifies their practicality in describing disease dynamics, in particularly when mobility is involved. The numerical results provide further insights into the applicability of the different scaling limits.

Keywords: Epidemiology, disease dynamics, agent-based models, multiscale modeling, stochastic dynamics, mean-field limit

1. Introduction

The understanding of disease dynamics for the purpose of prevention and control has become extremely crucial in the recent years. The emergence and reemergence of infectious diseases such as influenza, HIV/AIDS, SARS, and more recently the sudden outburst of the Ebola and Zika virus are events of concern and interest to the general population throughout the world. Moreover, the environmental landscape in which we live is dynamic and often experiences dramatic shifts due to technological innovations that periodically alter the bounds of what we think is possible.

Mathematical models and computer simulations have become irreplaceable experimental tools for building and testing theories, assessing quantitative conjectures, answering specific questions, determining sensitivities to changes in parameter values, and estimating key parameters from data. Understanding the transmission characteristics of infectious diseases in communities, regions, and countries may lead to better approaches to decreasing the transmission of these diseases.

A classical epidemiologal model is the renowned SIR model formulated by Kermack and McKendrick in 1927 [1], [5], [19], [20], [22], [31], which describes the spread of a disease among a single species of N individuals. It is a compartmental model, i.e., the population is split up into three classes of individuals denoted by S, I, R, representing the total number of *susceptible*, *infected* and *recovered* individuals, respectively. Since the effective time period is assumed to be sufficiently short, the model considers neither birth nor death phenomena, nor migration of individuals. It further assumes that susceptible individuals S have never been exposed to the disease, and that they may only be infected by contagious individuals. If $\beta > 0$ (*transmission rate*) denotes the average number of adequate contacts of a person per unit time, multiplied by the risk of infection, given contact between an infectious and a susceptible individual, and $\tau = 1/\gamma$ is the mean waiting time until full recovery, then the SIR model reads

$$\frac{dS}{dt} = -\beta SI, \qquad \frac{dI}{dt} = \beta SI - \gamma I, \qquad \frac{dR}{dt} = \gamma I,$$

supplemented with initial values $S(0) = S_0$, $I(0) = I_0$, $R(0) = R_0$ for some S_0, I_0, $R_0 \in \mathbb{R}_{\geq 0}$. Clearly the system conserves the number of individuals $N = S + I + R$ for all time $t \geq 0$. Since its introduction, extensive work has been done on extending the model in various directions.

The understanding of human mobility plays a fundamental role to the research of vector-based and rapid geographical spread of emergent infectious diseases. A popular but rudimentary way to incorporate the

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A Dynamical Model of 'Invisible Wall' in Mosquito Control

Mia Siti Khumaeroh, Edy Soewono* and Nuning Nuraini
Department of Mathematics, Institut Teknologi Bandung, Indonesia
* Email: esoewono@math.itb.ac.id

Abstract

A concept of an 'invisible wall' is used here as a control mechanism to separate the human population from mosquitoes in the hope that mosquitoes gradually change their preference to other blood resources. Although mosquitoes carry inherent traits in host preference, in a situation in which regular blood resource is less available, and there are abundant other blood resources, mosquitoes may adapt to the existing new blood resource. Here we construct a model of mosquitoes preference alteration involving anthropophilic, opportunistic, and zoophilic, based on the application of repellent clothing usage and the effects of fumigation. The coexistence equilibrium is shown to be stable when the rate of mosquito ovulation, which is successfully hatching into larvae, is greater than the total of mosquito natural death rate and mosquito death rate due to fumigation. Numerical simulation is performed after the reduction of unobservable parameters is done with Human Blood Index (HBI) data. Global sensitivity analysis is then performed to determine the parameters that provide the dominant alteration effect on the mosquito population. The simulation results show that a proper selection of the fumigation rate and repellent clothing rate should be carefully done in order to reduce the mosquito population as well as to increase the zoophilic ratio.

Keywords: Mosquito preference, invisible wall, repellent, anthropophilic, opportunistic, zoophilic, HBI.

1. Introduction

Some types of mosquitoes are known as major vectors that can transmit a number of disease-causing viruses to human such as *Aedes* (causing Dengue, Zika, and Chikungunya), *Anopheles* (Malaria) and *Culex* (West Nile Virus) [1]. Virus transmission can occur through the biting process of infected adult female mosquitoes. Biologically, the biting is a natural behavior of mosquitoes to obtain protein from the blood for their breeding process [2]. Prevention and reduction of virus transmission especially on humans are mainly dependent on the effectiveness in controlling the contact between human and mosquitoes.

Currently, the most commonly used mosquito control methods are larvacide, fumigation, Indoor Residual Spraying (IRS), Insecticide-Treat Bed Nets (ITNs), and the use of repellent products (in the form of lotion, coil, or liquidator). Repellent in the form of a chemical compound is designed to push the mosquito's flying orientation away from its source [4]. It is estimated that the effectiveness of repellent only persists in a relatively short time or about 3-6 hours after its usage [5]. In addition, the researchers suggested that the use of repellent applied directly to the skin in high concentrations and long periods of time can cause side effects to the skin [6]. Hence, alternative in implementation techniques of repellent such as in fabrics and walls are being developed in textile industries [7], [8].

Repellent usage in clothing is one of the revolutionary methods in the textile development [6]. The results showed that the use of 20 grams of repellent (permethrin) per kilogram of fiber in clothing has a durability of 20 leaching (depending on the type of compound used) [9]. The use of repellent clothing can provide personal protection to human, and at the larger scale of implementation, this strategy is effective to reduce the bitting of some species of mosquitoes such as *Aedes Aegypti* which are active during daylight both inside and outside of home [10]. Currently, the use of repellent in textiles is widely applied to travel clothing, recreational clothing, and military uniforms to protect the soldiers who work in the forestry area. The researchers are also evaluating the possible use of repellent in school uniforms to protect children from the threat of mosquito-borne diseases, particularly in developing countries [11].

Basically, mosquitoes have the opportunity to choose the blood meal of available host in nature such as mammals, birds, reptiles, amphibians and fish [12], [13]. In the blood-seeking process, environmental

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