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30 STUDY ON BLOOD DYNAMIC VISCOSITY IN ARTERIES VIA CFD

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Objectives Blood is a typical non-Newtonian fluid, and poor fluidity of blood is key to the pathogenesis of thrombus. The dynamic viscosity (high blood viscosity) of blood is a key factor in blood vessel embolization, especially cardiovascular and cerebrovascular embolisms. Computational fluid dynamics (CFD) is an efficient method for Newtonian or non-Newtonian fluid flow simulation. The finite volume method (FVM) is also an efficient numerical method for fluid dynamics simulation. This study aimed to investigate blood flow characteristics in arteries, and the dynamic viscosity is taken into account via the non-Newtonian fluids and CFD theory.
Methods A series of numerical computations are presented to reproduce the process of blood flowing in arteries using the FVM code CFX. Blood flow simulation will be accelerated using the GPU parallel computation scheme with the CUDA-enabled GPU coprocessor.
Results The dynamic viscosity and flow field of blood will be computed and shown by the contours. The velocity, shear strain rate and dynamic viscosity of blood can be calculated and monitored for different ages of people.
Conclusions The dynamic viscosity and flow characteristics of blood in arteries can be reproduced using CFD and FVM. The mechanism of blood vessel embolization can be analyzed via the non-Newtonian fluids and CFD theory. Thrombus occurs when the rheology of blood is enhanced.
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31 PATENT BIBLIOMETRIC ANALYSIS OF BIO/PHARMA COLD-CHAIN LOGISTICS IN CHINA

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Objectives Our objectives are to study the development and historical evolution of the bio/pharma cold-chain logistics industry in China. Bio/pharma cold-chain logistics has attracted a large number of scholars whose research has resulted in patents. Cold-chain modes like cold-chain transportation, cold-chain circulation, low temperature and multi-modal transportation have played an important role in bio/pharma cold-chain logistics. The implementation of cold-chain logistics also guarantees that the bio/pharma will always be kept at a low temperature state during the circulation process. The highlighted issues of drug safety make this more important. Statistically, the rates of cold-chain circulation and cold-chain transportation in China are 20% and 30%, compared to more than 90% in developed countries. Therefore, it is necessary for scholars to carry out scientific research on cold-chain logistics.
Methods A scientific literature database including a patent information services platform was used. Data visualization methods such as a patent management map, quantitative methods and bibliometrics were used to study patents.
Results The results revealed that the bio/pharma literature and cold-chain logistics technologies have increased substantially. Institutes and universities are the main forces behind basic research, and bio/pharma enterprises have begun to focus on intellectual property protection and technological innovation.
Conclusions Institutes and enterprises should be encouraged to carry out cooperative research on bio/pharma cold-chain logistics, to promote cold-chain resource integration and transfer to the Midwest, and to strengthen bio/pharma enterprises to speed up investment in the secondary market in China.
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Environment and Health

32 RESEARCH ON THE FACTORS AFFECTING THE DEVELOPMENT OF BIOMEDICINE INDUSTRIAL CHAINS

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Objectives The paper studies the factors affecting the development of biomedicine industry chains based on atmospheric pollutants and their concentration levels, and provides important scientific data for the quantitative evaluation of the value chain of the emerging biomedicine industry.
Methods This paper predicts and evaluates the effect factors and their influence on the development of biomedicine industry chains using the list method, graph overlays, ecological mechanism analysis and other approaches.
Results The study identifies the relationship curve characteristics among the different effect factors so that the impact of the effect factors can be determined and a scientific basis provided for their prevention and control to enhance the development of biomedicine industry chains.
Conclusions Factors affecting biomedicine industry chains include meteorological factors (temperature, relative humidity and dew point temperature, etc) and the social and economic characteristics of the population (sex, age, level of education, smoking history, etc), which have different non-linear relationships.

33 PRACTICE BASED ON THE FULL-TIME VISITATION MODEL FOR PHARMACEUTICAL EDUCATION IN THE RIZHAO REGION, CHINA

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