**Ibragimov, A. I.**; **McNeal, C. J.**; **Ritter, L. R.**; **Walton, J. R.**

**Stability analysis of a model of atherogenesis: an energy estimate approach.** (English)

Zbl 1140.92011

Comput. Math. Methods Med. 9, No. 2, 121-142 (2008).

Summary: Atherosclerosis is a disease of the vasculature that is characterized by chronic inflammation and the accumulation of lipids and apoptotic cells in the walls of large arteries. This disease results in plaque growth in an infected artery typically leading to occlusion of the artery. Atherosclerosis is the leading cause of human mortality in the US, much of Europe, and parts of Asia. In a previous work [see *A. I. Ibragimov* et al., Math. Med. Biol. 22, No. 4, 305–333 (2005; Zbl 1080.92040)], we introduced a mathematical model of the biochemical aspects of the disease, in particular the inflammatory response of macrophages in the presence of chemoattractants and modified low density lipoproteins. Herein, we consider the onset of a lesion as resulting from an instability in an equilibrium configuration of cells and chemical species. We derive an appropriate norm by taking an energy estimate approach and present stability criteria. A bio-physical analysis of the mathematical results is presented.

**MSC:**

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| 92C50 | Medical applications (general) |
| 35Q92 | PDEs in connection with biology, chemistry and other natural sciences |
| 35B35 | Stability in context of PDEs |
| 35K57 | Reaction-diffusion equations |
| 92C17 | Cell movement (chemotaxis, etc.) |
| 35B40 | Asymptotic behavior of solutions to PDEs |



**Keywords:**

atherosclerosis; chemotaxis

**Full Text:** DOI EuDML