

The bronchial asthma, a condition of the airways which is characterized by periodic, reversible but sometimes life-threatening bronchial constriction, occurring without notice in response to many common stimuli. Although asthma is probably the most common chronic inflammatory disease worldwide, the diverse causes of the disorder remain still largely unknown. The substantial remodeling of the bronchial wall accompanies usually the development of the inflammation and sometimes proceeds its symptoms. The thickening of the bronchi is connected with the physiology of bronchial fibroblasts – cells of mesenchymal origin which are responsible for production of extracellular protein gels filling the extracellular space between cells in many organs including bronchi. Fibroblasts not only produce extracellular matrix – they also can contract and this contraction is the main cause of the changes in the shape of our body tissue.

To solve the mystery of asthma origin we plan to concentrate on these cells and their specific activities in the airways of asthmatics. We are going to isolate fibroblasts from small fragments of bronchial tissue taken from asthmatic patients during diagnostic procedure of bronchoscopy and we will analyze their physiology out of the body in *in vitro* cell culture model. We plan to use, not only standard 2D culture on solid substrate, but more natural 3D environment by putting cell into the protein gels. We will also keep fibroblasts in the presence of other bronchial cells of epithelial origin to check how they influence each other. We hope to mimic the situation in asthmatic tissue by adding the protein called transforming factor beta 1 ($TGF-\beta_1$) produced in excess by asthmatics bronchial epithelium *in vivo*. Under the influence of this factor fibroblasts change to more contractile myofibroblasts (the cells with morphology resemble in part smooth muscle cells. By comparing physiology and reactions of cells taken from asthmatics to those of healthy subjects we hope to elucidate some mechanism responsible for development of the disease. Our findings could also contribute to invention of new drugs and therapies of asthma.