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Investigating Smoke Exposure and Chronic Obstructive Pulmonary Disease (COPD) with a Calibrated Agent Based Model (ABM) of In Vitro Fibroblast Wound Healing.

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Investigating Smoke Exposure and Chronic Obstructive Pulmonary Disease (COPD) with a Calibrated Agent Based Model (ABM) of *In Vitro* Fibroblast Wound Healing.

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COPD is characterized by tissue inflammation and impaired remodeling that suggests fibroblast maintenance of structural homeostasis is dysregulated. Thus, we developed an ABM of lung fibroblasts healing a wound using NetLogo to evaluate differences among cells from COPD patients. This ABM consists of a set of rules governing the healing response, accounting for cell migration, proliferation, death, activation and senescence rates; along with the effects of heterogeneous activation, phenotypic changes, serum deprivation and exposure to cigarette smoke condensate or bFGF. Simulations were performed to calibrate parameter sets for each cell type using *in vitro* data of scratch-induced migration, viability, and expression of senescence-associated beta-galactosidase or alpha-smooth muscle actin. This model represents the prototype of a computational tool designed to explore the role of lung fibroblast functions in the pathogenesis of COPD and evaluate potential therapeutic strategies.