Smoking cigarettes is the primary cause of chronic obstructive pulmonary disease (COPD), also known as emphysema, a disease hallmarked by the degradation of lung tissue. Matrix metalloproteinases (MMPs) are a class of proteins that are involved in normal tissue degradation and turnover, but over-production of MMP-1 stimulated by cigarette smoke has recently been implicated in the progression of COPD in smokers. This technology is two separate and structurally distinct classes of drugs that inhibit cigarette smoke-induced MMP-1 production. These therapeutics have the potential to slow or prevent the development of COPD in smokers.

SSRIs and statins both inhibit MMP-1 at nanomolar concentrations

This technology uses two already well-studied types of drugs – selective serotonin reuptake inhibitors (SSRIs) and statins – as inhibitors of MMP-1. Molecules in each class were identified through a high-throughput screen of 727 structurally diverse molecules in a mammalian-cell-line-based transfection assay. Both the SSRIs and the statins blocked transcriptional activity of MMP-1 induced by cigarette smoke in less than 10 nM concentrations. MMP-1 has also been implicated in tumor invasion, arthritis, skin repair and atherosclerotic plaque rupture, suggesting that these small molecules may have broad clinical value.

In further laboratory studies, the SSRI duloxetine was successfully shown to block MMP-1 expression both in cell culture and in a rabbit cigarette smoke model.

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Applications:
- Treatment and prevention of COPD (emphysema)
- Research tool for studying the progression of COPD
- Potential treatment for other diseases in which MMP-1 is implicated (cancer, arthritis, atherosclerosis, etc.)
- Research tool for studying the role of MMP-1 in other diseases
Advantages:

- SSRIs and statins are already well-studied and FDA approved
- Provides a means of preventing COPD in smokers who fail to quit
- Molecules are active in nanomolar concentrations
- MMP-1 is implicated in a wide range of diseases

Patent Information:

Patent Pending ([WO/2016/130814](https://www.wipo.int)/)

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Related Publications:


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