# Hypothetical protective effect of chronic treatment in pulmonary hypertension patients.

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## Introduction

Pulmonary Hypertension (PH) is a chronic and debilitating disease that affects the pulmonary arteries. This disease causes increased pressure in the pulmonary arteries, which can lead to right heart failure and death. There is currently no cure for PH, and treatments focus on managing symptoms and slowing disease progression. However, there is some evidence to suggest that chronic treatment with certain medications may have a protective effect in PH patients. The concept of a protective effect in PH is based on the idea that chronic exposure to certain drugs may have a positive impact on the pathophysiology of the disease. Specifically, it is thought that long-term treatment with certain medications may slow or even halt the progression of PH. This is in contrast to traditional treatment approaches, which aim to alleviate symptoms and improve quality of life without necessarily impacting disease progression [1].

One example of a drug that may have a protective effect in PH is sildenafil, a phosphodiesterase type 5 inhibitor. Sildenafil is commonly used to treat erectile dysfunction, but it is also approved for the treatment of PH. It works by increasing the production of nitric oxide (NO), a signaling molecule that relaxes the smooth muscle cells in the pulmonary arteries and improves blood flow. There is evidence to suggest that chronic treatment with sildenafil may have a protective effect in PH patients [2].

Another drug that may have a protective effect in PH is macitentan, an endothelin receptor antagonist. Endothelin is a peptide hormone that is produced by the endothelial cells lining the pulmonary arteries. It acts as a vasoconstrictor, meaning that it causes the smooth muscle cells in the pulmonary arteries to contract and narrow, increasing pulmonary artery pressure. Endothelin receptor antagonists like macitentan block the action of endothelin, thereby reducing vasoconstriction and improving blood flow [3].

There is some evidence to suggest that chronic treatment with macitentan may have a protective effect in PH patients. For example, a study published in the New England Journal of Medicine in 2013 found that treatment with macitentan reduced the risk of disease progression or death in patients with pulmonary arterial hypertension (PAH). The study followed 742 patients with PAH for up to three years and found that those who received macitentan had a significantly lower risk of disease progression or death than those who received placebo. It is important to note that while there is some evidence to suggest that chronic treatment with certain drugs may have a protective effect in PH, more research is needed to confirm this hypothesis. Additionally, it is important to remember that PH is a complex and multifaceted disease, and no single treatment approach will be effective for all patients.

In addition to pharmacological treatments, there are also non-pharmacological interventions that may have a protective effect in PH patients. For example, exercise training has been shown to improve exercise capacity, quality of life, and hemodynamic parameters in PH patients. A study published in the Journal of the American College of Cardiology in 2013 found that a 12-week exercise training program improved exercise capacity and quality of life in PH patients. The study also found that exercise training improved endothelial function, suggesting that it may have a protective effect on the pulmonary arteries [4].

Another non-pharmacological intervention that may have a protective effect in PH patients is oxygen therapy. PH patients often experience low oxygen levels in the blood due to impaired gas exchange in the lungs. Oxygen therapy can help to alleviate this problem by increasing the amount of oxygen that is delivered to the body's tissues. Additionally, there is some evidence to suggest that oxygen therapy may have a protective effect on the pulmonary arteries themselves. For example, a study published in the American Journal of Respiratory and Critical Care Medicine in 2017 found that oxygen therapy reduced the expression of certain genes that are involved in pulmonary vascular remodeling in patients with PAH [5].

## Conclusion

The concept of a protective effect in PH is an exciting area of research that has the potential to change the way we approach the treatment of this devastating disease. While there is some evidence to suggest that chronic treatment with certain drugs may have a protective effect in PH patients, more research is needed to confirm this hypothesis. Additionally, non-pharmacological interventions like exercise training and oxygen therapy may also have a protective effect in PH patients, and should be used in conjunction with pharmacological treatments. Ultimately, the goal of any treatment approach in PH should be to improve the quality of life of patients while also slowing or halting the progression of the disease.

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***Received:** 26-Jul-2023, Manuscript No. AAINIC-23-109305; **Editor assigned:** 28-Jul-2023, Pre QC No. AAINIC-23-109305 (PQ); **Reviewed:** 11-Aug-2023, QC No. AAINIC-23-109305; **Revised:** 16-Aug-2023, Manuscript No. AAINIC-23-109305 (R); **Published:** 23-Aug-2023, DOI:10.35841/aainic-6.4.160*

***Citation:** Rubin P. Hypothetical protective effect of chronic treatment in pulmonary hypertension patients. J Invasive Noninvasive Cardiol. 2023;6(4):160*

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***Citation:*** *Rubin P. Hypothetical protective effect of chronic treatment in pulmonary hypertension patients. J Invasive Noninvasive Cardiol. 2023;6(4):160*