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# Evaluation of Cover Effects on Bare Stent Mechanical Response

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## Abstract

Covered tracheobronchial stents are used to prevent tumour growth from reoccluding the airways. In the present work a combination of experimental and computational methods are used to present the mechanical effects that adhered covers can have on stent performance. A prototype tracheobronchial stent is characterised in bare and covered configurations using radial force, flat plate and a novel non-uniform radial force test, while computational modelling is performed in parallel to extensively inform the physical testing. Results of the study show that cover configuration can have a significant structural effect on stent performance, and that stent response (bare or covered) is especially loading specific, highlighting that the loading configuration that a stent is about to be subjected to should be considered before stent implantation.

## Keywords

Nitinol, Stent, Cover, Tracheobronchial, Finite element method, Stent testing

## 1 Introduction

Lung cancer was responsible for 24% of male and 14% of female cancer deaths worldwide in 2012 [1]. Around 30% of all lung cancer patients progress to develop problems with central airway obstruction due to extrinsic or intrinsic tumour growth restricting airflow through the airways [2,3]. Primary tumours causing obstruction in the airway are rare, occurring in less than 0.1% of cases [4,5], the obstruction is most often caused due to extrinsic compression from bronchogenic,

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