

Antimicrobial Use of Nitric Oxide to Reduce Problems Associated with Catheterisation

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BACKGROUND

Cardiovascular Catheters

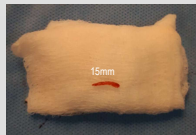
- coronary heart disease is the leading cause of death worldwide
- treatment involves implantation of stents using catheters
- problems associated with catheterisation

Infection



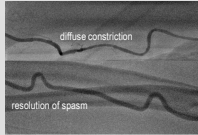
localised and / or systemic infection

Thrombosis



catheter blocked due to this blood clot

Vasospasm



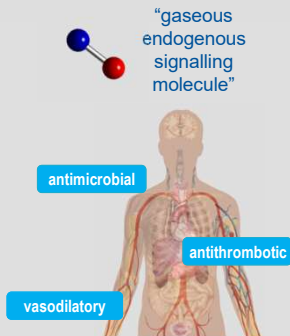
incidence rate ranges from 4 – 20 %

- 10 million percutaneous interventional procedures conducted per year

METHOD

Preventing Problems Associated With Catheterisation

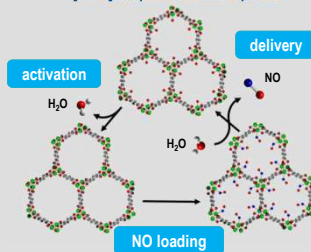
- release **nitric oxide** from the surface of catheters



"gaseous endogenous signalling molecule"

ISSUES

- difficult to administer
- toxic in high concentrations
- [NO] dependant response



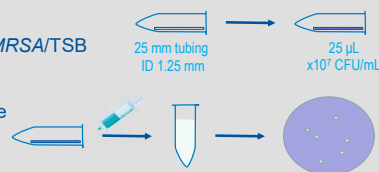
SOLUTION

- deliver from a MOF
- suitable structure CPO 27

ANTIMICROBIAL RESULTS

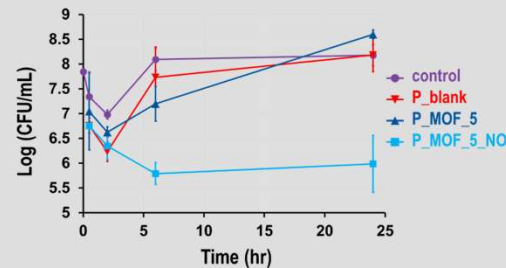
PROTOCOL

- inoculate inside of tube with *MRSA*/TSB
- incubate at 37 °C, up to 24 hr
- extract, serial dilute, spot plate



RESULTS

- bacterial cell viability from inside tubing measured over time course



- spread plates at 6 hr time point



tubing inhibits infection

- release of NO from the surface of the tubing
 - elicits a marked and prolonged reduction in bacterial growth
 - shows small colony variants - viable bacteria are highly stressed

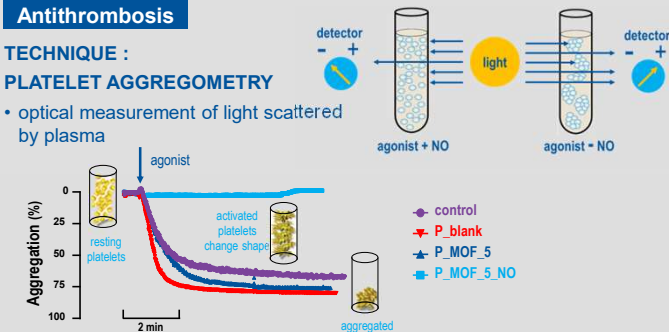
VASCULAR RESULTS

Antithrombosis

TECHNIQUE :

PLATELET AGGREGOMETRY

- optical measurement of light scattered by plasma

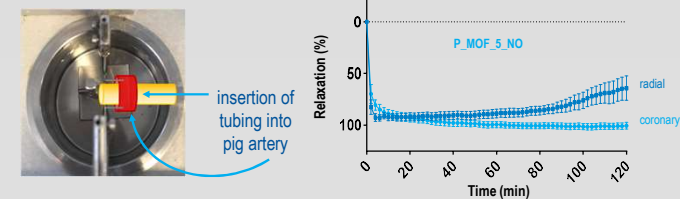


- sufficient NO released to stop cells in the blood from sticking together

Vasodilation

TECHNIQUE : MYOGRAPHY

- measuring the force produced by the blood vessel when under contraction



- coronary arteries more receptive to NO than radial arteries

CONCLUSIONS

- demonstrated that MOFs can be extruded into polymer tubes
- verified NO loaded MOF/polymer formulations are biocompatible
- capacity to tune the NO elution profile
- ability to deliver an efficacious dose of NO which meets the clinical challenges associated with cardiac catheterisation