The Arterial smart canula®

Next generation design for superior performance

The smart canula® is collapsed over a mandrel prior to insertion and re-expanded in situ: superior flow, much smaller access aperture, and less trauma result. ONE SIZE FITS ALL ADULTS!
The Arterial \textit{smart canula}® next generation design

The \textit{smart canula}® can be stretched over a mandrel and collapsed prior to intra-vascular insertion. In its “low-profile” configuration, the \textit{smart canula}® is slid over a guidewire and positioned within the target vessel.

Mathematical simulation of velocity contours for a standard 18F cannula with a flow of 4 l/min by computational fluid dynamics (CFD: high velocities are red): Pressure drop accounts for 92 mmHg.

Once in position, the guide wire and the mandrel are removed. Due to its shape memory, the \textit{smart canula}® expands and provides an unsurpassed lumen. Simple traction is enough for reduced diameter and removal.

For the same 18F access aperture and flow (4 l/min), CFD (low velocities are blue) shows for the expanding \textit{smart canula}® design significantly lower velocity contours. Pressure drop in this setting is only 55 mmHg or 40% less.

Access to the vascular system is a key issue for cardio-plumonary bypass, and other types of extra-corporeal circulation. Traditionally, cannulae are selected with an outer diameter somewhat smaller than the inner diameter of the vessel selected for access. This approach severely limits flow if there is a large difference between the cannula size and the target vessel size, i.e. the aorta. The \textit{smart canula}® principle based on “collapsed insertion and expansion in situ” overcomes such limitations. In addition, \textbf{ONE SIZE FITS ALL ADULTS}!
The Arterial smart canula®

next generation design

Schematic cranio-caudal view of the abdominal aorta, the iliac and the femoral arteries. At the target level, which is defined as the position providing optimal blood flow, standard cannulae use only a small fraction of the available cross sectional area.

In vivo assessment of an Arterial smart canula® at the level of insertion into a peripheral vessel by intravascular ultrasound (IVUS®). The luminal diameter at this point of the cannula measures 3.4 mm (10F), cross-sectional area accounts for 9.1 mm².

The diameter of a self-expanding arterial cannula is not limited by the diameter of the access vessel. As a result, the cross sectional area is superior and less pressure drop occurs even at high blood flows! Alternatively, a smaller access aperture is sufficient.

A more distal view of the smart canula® as assessed by IVUS® (same artery and Arterial smart canula® as shown above). The luminal width is 7.3 mm (22F) and the cross sectional area accounts for 41.9 mm², four times more than at the point of insertion shown above.

References

The smart canula®: A new tool for minimal access in limited access surgery. The Heart Surgery Forum 2005; 8: E2415
Vascular access for cardiopulmonary bypass procedures. Artificial Organs 2004; 28: 649-54
A smart solution for cannulation bottlenecks in mini-invasive open heart surgery. Business Briefings; Global Surgery 2003: 42-44
In vivo analysis of the smart canula® for assisted venous drainage applications. Swiss Perfusion 2003; 12: 22-5
A prototype paediatric venous cannula which changes shape in situ. Perfusion 2003; 18: 61-5
A new expandable cannula to increase venous return during peripheral access CPB. Int J Artif Organs 2002; 25:136-40

www.smartcanula.com
A smart canula® versus a standard cannula:
Only local narrowing at the point of insertion occurs with the Arterial smart canula®!

The 18 F Arterial smart canula® for remote access through small arteries measuring 4mm in diameter allows for unmatched blood flow.

Ordering information for typical Arterial smart canula® configurations

<table>
<thead>
<tr>
<th>Catalog Numbers</th>
<th>Connecting Diameter</th>
<th>Guide-wire Inch</th>
<th>Tubing Length mm</th>
<th>Covered Length mm</th>
<th>Uncovered Length mm</th>
<th>Diameter/Size F</th>
<th>Intra-vascular Total Length mm</th>
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For more information, contact your local smart canula® sales representative

*ordering numbers include smart canula® specific mandrel for collapsed insertion

device specifications may be changed at any time without prior notice

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