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# Intraoperative fluorescence angiography for the evaluation of coronary artery bypass graft patency

Issued: October 2004

**NICE interventional procedure guidance 98**

[www.nice.org.uk/ipg98](http://www.nice.org.uk/ipg98)

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## Contents

1 Guidance .....	3
2 The procedure .....	4
2.1 Indications .....	4
2.2 Outline of the procedure.....	4
2.3 Efficacy.....	5
2.4 Safety .....	5
3 Further information .....	6
Sources of evidence.....	6
Information for patients .....	6
4 About this guidance .....	7

## 1 Guidance

- 1.1 Current evidence on intraoperative fluorescence angiography suggests that the procedure is safe enough for routine use in the evaluation of coronary artery bypass graft patency.
- 1.2 There is limited evidence on the diagnostic utility (that is, the extent to which knowledge of its results improves patients' outcomes) of this procedure, and clinicians should therefore audit and review the clinical value of intraoperative fluorescence angiography in all patients having the investigation. The Institute may review the procedure upon publication of further evidence.

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## 2 The procedure

### 2.1 Indications

- 2.1.1 Coronary artery bypass grafting is one of the most common cardiac surgical interventions. In this procedure, a section of vessel from another part of the body is used to reroute (bypass) blood around a blocked coronary artery and improve blood flow to the heart. Early blockage of the graft and poor blood flow may be a significant cause of morbidity and mortality in patients who have undergone coronary artery bypass grafting.
- 2.1.2 Several techniques are used intraoperatively to assess graft patency. These include digital palpation, electromagnetic flow measurement, Doppler studies, and conventional and thermal coronary angiography techniques. A limitation with many of the imaging techniques is that they provide poor resolution and definition of the grafts.

### 2.2 Outline of the procedure

- 2.2.1 Intraoperative fluorescence angiography allows confirmation of the location of the coronary arteries and assessment of bypass graft function during coronary artery bypass procedures. The intraoperative fluorescence imaging system consists of a video camera and a laser diode that emits monochromatic light. The camera, guided by a range-detector diode, is positioned a safe distance above the heart. A small amount of indocyanine green (ICG) dye is then administered as a central venous injection. This dye fluoresces when illuminated using laser energy and the images are recorded digitally. Currently the technique is only semiquantitative, in that it permits assessment of graft flow as 'excellent', 'satisfactory' or 'poor' – it cannot provide an exact measure of graft flow. The penetrating depth of the laser beam is only around 1 mm, limiting the use of this technique to certain grafts. For more details, refer to the Sources of evidence section.

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## 2.3 Efficacy

- 2.3.1 The evidence on efficacy is based on four case series studies, with three studies reporting on clinically relevant results. In one study, intraoperative graft patency was assessed in 200 patients: graft patency was confirmed in 192 patients (96%), and the additional information provided by the procedure resulted in graft revision of these eight patients. Similar results were reported in two other studies with 1.4% (4/290) to 3.7% (4/107) of grafts revised after the procedure. No other outcomes were reported. For more details, refer to the Sources of evidence section.
- 2.3.2 One Specialist Advisor considered there to be too little information available regarding efficacy.

## 2.4 Safety

- 2.4.1 Complications associated with this procedure appear to be uncommon. There were no reports of adverse events associated with the use of the ICG dye in evaluating the patency of coronary bypass grafts. Six additional papers were identified that described complications following the administration of ICG dye for indications other than coronary graft patency. Most of these were reports of patients developing anaphylactoid reactions, with an incidence ranging from 0.02% to 0.3%. For more details, refer to the Sources of evidence section.
- 2.4.2 One Specialist Advisor stated that anaphylactic/allergic reactions might occur very rarely as a result of this procedure.

Andrew Dillon  
Chief Executive  
October 2004

## 3 Further information

### Sources of evidence

The evidence considered by the Interventional Procedures Advisory Committee is described in the following document.

['Interventional procedures overview of intraoperative fluorescence angiography for the evaluation of coronary artery bypass graft patency'](#), October 2003.

### Information for patients

NICE has produced [information on this procedure for patients and carers](#) ('Understanding NICE guidance'). It explains the nature of the procedure and the guidance issued by NICE, and has been written with patient consent in mind.

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## 4 About this guidance

NICE interventional procedure guidance makes recommendations on the safety and efficacy of the procedure. It does not cover whether or not the NHS should fund a procedure. Funding decisions are taken by local NHS bodies after considering the clinical effectiveness of the procedure and whether it represents value for money for the NHS. It is for healthcare professionals and people using the NHS in England, Wales, Scotland and Northern Ireland, and is endorsed by Healthcare Improvement Scotland for implementation by NHSScotland.

This guidance was developed using the NICE [interventional procedure guidance](#) process.

We have produced a [summary of this guidance for patients and carers](#). Information about the evidence it is based on is also [available](#).

### Changes since publication

26 January 2012: minor maintenance.

### Your responsibility

This guidance represents the views of NICE and was arrived at after careful consideration of the available evidence. Healthcare professionals are expected to take it fully into account when exercising their clinical judgement. This guidance does not, however, override the individual responsibility of healthcare professionals to make appropriate decisions in the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this guidance should be interpreted in a way which would be inconsistent with compliance with those duties.

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