Intravascular detection of myocardial ischemia by spectrometry in the near infrared spectrum in experimental animals

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 Interruption of oxygen supply in acute myocardial ischaemia reduces venous return of oxygen at the coronary sinus. In this study, the oxygen content of venous return in the coronary sinus was measured by using spectrometry in the near infrared spectrum. The authors developed a new intravascular catheter made of fibre optics. After in vitro calibration by blood flow based on a standard gas mixture used in in vitro experiment, an in vivo application in 12 domestic pigs was undertaken. The catheter was positioned in the coronary sinus and ischaemia induced by temporary occlusion of the left anterior descending artery. Recordings of the near infrared spectrum and haemodynamic data were obtained during 90 minutes' ischaemia followed by 90 minutes reperfusion. Spectrometry in the near infrared range detected a marked difference between oxyhaemoglobin and deoxyhaemoglobin, especially when the oxygen concentration was less than 30%. The near infrared spectrum of liaison between haemoglobin and oxygen in the coronary sinus shows significant and reproducible differences between pre-ischaemia occlusion of the left anterior descending artery and reperfusion. The recordings of the near infrared also show variation in CO2, pH and temperature. The authors conclude that the use of intravascular spectrometry of the near infrared spectrum could be a permanent reliable tool for detection and follow-up of acute myocardial ischaemia.

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