**Learning Objectives**

1. To understand the evolving data for perioperative steroid therapy in cardiothoracic and vascular surgical patients
2. To appreciate the role of steroid therapy in critical care
3. To discuss the current data for perioperative statin therapy in cardiothoracic and vascular surgical patients
4. To appreciate the evolving role of statin therapy in critical care

(A) Steroids

(i) Cardiac Surgery
The adverse perioperative outcomes due to the systemic inflammatory response that occurs in cardiac surgery and cardiopulmonary bypass provide the therapeutic targets for the immunosuppressive properties of steroids.\(^1\) Although there have been multiple clinical trials, they have been limited by design issues such as surrogate end-points, sample size, and lack of safety data. Three large recent meta-analyses (cumulative N = 8205) have demonstrated that perioperative steroid exposure significantly decreases atrial fibrillation, bleeding, and length of stay in the ICU and hospital.\(^2\)\(^-\)\(^4\) Although steroids had no effect on mortality and infection, they were associated with perioperative hyperglycemia. Recent meta-analysis was unable to demonstrate clinical benefit from steroid exposure in pediatric cardiac surgery.\(^5\) This body of evidence will be examined in further detail during the pharmacology panel.

There are currently at least 2 registered steroid randomized controlled trials underway in adult cardiac surgery: the SIRS (Steroids In CaRdiac Surgery) and the DECS (DEexamethasone for Cardiac Surgery) trials (full details available at [www.clinicaltrials.gov](http://www.clinicaltrials.gov)). These trials together have a goal patient enrollment of over 14 000 and have clinically meaningful end-points. An overview of these two landmark trials in progress will be provided in the pharmacology panel. The DECS trial will be also discussed in further detail at the SCA session entitled Current Clinical Trials in Cardiac Anesthesia. The findings of these well-designed randomized trials will likely determine the future indications for steroid prophylaxis in adult cardiac surgery.

(ii) Thoracic Surgery
Although dexamethasone is established as a powerful perioperative anti-emetic, a recent randomized trial also demonstrated that it significantly reduced sore throat and
hoarseness in thoracic surgery patients undergoing general anesthesia with double-lumen endotracheal tubes. Recent clinical data have also suggested that dexamethasone has significant analgesic and opioid-sparing effects when utilized in multimodal epidural analgesia. Further studies are required to delineate the full analgesic potential of steroids in patients undergoing thoracotomy for lung resection.

(iii) **Critical Care**
Recent guidelines from the American College of Critical Care Medicine have focused on critical-illness related corticosteroid insufficiency (CIRCI). These guidelines have outlined diagnostic and management criteria for the CIRCI syndrome. CIRCI may be diagnosed by a low random serum cortisol or a dampened response to the ACTH stimulation test. Hydrocortisone therapy is a consideration in septic shock, especially in those patients who respond inadequately to volume and/or vasopressor therapy. Furthermore, the guidelines recommended that steroid replacement in septic shock be maintained or at least 7 days and that this therapy be withdrawn gradually when clinically indicated. These guidelines will be reviewed in detail during the pharmacology panel.

(B) **Statins**

(i) **Cardiac Surgery**
Multiple statin trials have documented their outcome benefit after cardiac surgery. In a recent meta-analysis (N = 31725: 19 studies) exposure to statins before cardiac surgery significantly reduced morality, stroke and atrial fibrillation. The efficacy of statins for reduction of atrial fibrillation after cardiac surgery has been confirmed in subsequent meta-analyses. A recent trial demonstrated that the outcome benefits due to statins are limited in patient undergoing surgery for valvular disease: in this cardiac surgery cohort, statin exposure was significantly associated with a survival advantage in the long-term in patients who underwent concomitant coronary surgery. Although statins may slow development of aortic stenosis associated with advanced age, they have recently been shown to slow significantly the progression of rheumatic involvement of the aortic and mitral valves. Although statins are protective against stroke after cardiac surgery, recent studies have reported conflicting results with respect to delirium and acute renal injury after cardiac surgery. The appropriate adoption of statins into routine perioperative care for cardiac surgical patients depends not only on adequate evidence but sustained effort at quality improvement on a national scale.

(ii) **Thoracic Surgery**
A single clinical trial (N = 131; mean age = 73 ± 6 years) has demonstrated that in patients undergoing major lung or esophageal resection statin exposure was associated with a significantly decreased risk of perioperative atrial fibrillation (odds ratio 0.26; 95% confidence interval 0.08 – 0.82; P = 0.022). Further trials are indicated to investigate the full outcome effects of statins in noncardiac thoracic surgical patients, with study designs that account for traditional clinical risk factors.

(iii) **Vascular Surgery**
Multiple studies have documented that preoperative statin exposure significantly decreases mortality, cardiovascular events and renal dysfunction after high-risk vascular surgery.\textsuperscript{10,30-32} It is also clear that statin therapy must be continued throughout the perioperative period to maximize these outcome benefits. Due to this body of evidence, statin therapy has been recommended in patients undergoing high-risk vascular surgery to optimize their perioperative outcome.\textsuperscript{32} The key studies and guidelines will be reviewed in detail during the pharmacology panel.

(iii) Critical Care
Recent meta-analysis has suggested that statin exposure is associated with a significant survival advantage in sepsis and severe infections.\textsuperscript{33-36} These studies will be reviewed in further detail during the pharmacology panel. Further trials are indicated to delineate more thoroughly the outcome benefits of statin exposure in sepsis, including meaningful clinical end-points beyond mortality.

Overall, based on the current evidence and international consensus, statins have a high priority to be studied perioperatively for further clinical outcome optimization of our cardiothoracic and vascular surgical patients.\textsuperscript{38}

References