

## Key Papers from the Most Recent Literature Relevant to Anesthesiologists



### Conserved cell types with divergent features in human versus mouse cortex. *Nature* 2019; 573:61–8.

An understanding of the cellular scheme of the cortex is essential to our understanding of cognitive function and susceptibility to neuronal disease. This study used single-nucleus RNA sequencing to classify cell types to reveal preserved and contrasting features between mouse and the human brain. The authors identified 75 transcriptomically distinct cell types, 45 of which were inhibitory. Among the excitatory neurons the authors noted that they were not restricted to single cortical layers but rather that they were often distributed between layers. When the author compared transcriptomic cell types in humans to those in mice, they found divergence in expression between the species. More specifically, two thirds of the 9,748 genes evaluated were divergently expressed between the two species with the greatest differences noted among nonneural cells. These results suggest significant species differences in gene expression between mouse and human brain that may influence function and add to our understanding of why preclinical studies using mice are often not translatable to humans. (*Article Selection: Evan D. Kharasch. Image: ©Adobe Stock.*)

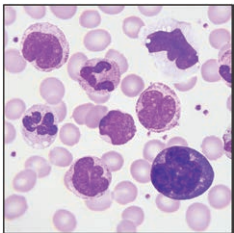
**Take home message:** There are significant differences between the human and mouse brain that may explain why preclinical studies using mice often do not translate to humans.



### Is disruptive behavior inherent to the surgeon or the environment? Analysis of 314 events at a single academic medical center. *Ann Surg* 2019; 270:463–72.

Disruptive behavior is thought to disrupt a culture of safety. This study compared accounts of a reporter and the involved individual responses to an episode of disruptive behavior to evaluate whether the hospital environment may contribute and whether disruptive behavior is associated with patient harm. The authors identified 314 reports among 204 involved individuals. Surgical specialties had the highest percentage of involved individuals (43%) and 56% of the events occurred in high-intensity environments such as the operating room or intensive care unit ( $P < 0.001$ ). Logistic regression analysis identified that unclear hospital policies (odds ratio 3.0; 95% CI, 1.7 to 5.6;  $P < 0.001$ ), a surgeon being the involved individual (odds ratio 2.4; 95% CI, 1.4 to 4.1;  $P < 0.001$ ), and urgent competing responsibilities (odds ratio 1.9; 95% CI, 1.1 to 3.2;  $P = 0.02$ ) were associated with potential harm to patients. Interestingly, events involving members of nonsurgical services were more likely to be associated with insensitivity to patients (odds ratio 2.8; 95% CI, 1.6 to 4.8;  $P < 0.001$ ). (*Article Selection: Deborah J. Culley. Image: ©gettyimages.*)

**Take home message:** Disruptive behavior that may be associated with harm to patients is related to unclear hospital policies, being a surgeon, and the presence of urgent competing responsibilities.



### Dietary intake regulates the circulating inflammatory monocyte pool. *Cell* 2019; 178:1102–14.

Caloric restriction has been shown to be beneficial for inflammatory and autoimmune diseases. This study investigated the effect of fasting on monocytes in mice and humans. The authors found that fasting reduced the pool of circulating monocytes not because the cells are dying but rather due to decreased release of monocytes from the bone marrow to the periphery. This decrease in monocytes release from the bone marrow pool may be partially mediated by a reduction in CCL2, as CCL2 administration was shown to enhance monocyte migration from the bone marrow in fasted animals. The authors also demonstrated that fasting was associated with changes in monocyte metabolic activity as the expression of more than 2,700 genes

were differentially expressed after 20 h of fasting. Perhaps the most interesting finding of these studies was that while fasting can lead to improvements in chronic inflammatory diseases, it does not affect the ability of monocytes to mobilize during acute inflammation at least in normal weight individuals. (*Article Selection: Martin J. London. Image: ©gettyimages.*)

**Take home message:** Fasting has a major effect on monocyte egress to the periphery and gene expression yet allows monocytes to maintain their ability to mobilize in the setting of an acute immune response.



### Sustained efficacy of kangaroo care for repeated painful procedures over neonatal intensive care unit hospitalization: A single-blind randomized controlled trial. *Pain* 2019; 160:2580–8.

Painful procedures are frequently performed on preterm neonates in intensive care units. A body of data suggests that maternal contact and sweet-tasting liquids reduce pain from a single procedure. This study evaluated whether maternal kangaroo care (infants placed upright on their mother's bare chest) with or without sucrose were equally efficacious in repeated procedural-related pain in neonates admitted to a neonatal intensive care unit. Preterm infants were randomized to kangaroo care plus water, kangaroo care plus sucrose, or sucrose alone before a medically indicated heel lance. A total

of 242 patients were randomly assigned to one of the three groups. Premature Infant Pain Profiles were measured at 30, 60, and 90 s after each of three heel lances. Maternal kangaroo care and sucrose were equally efficacious as pain-relieving interventions over time. There was no additional benefit of providing both maternal kangaroo care and sucrose (all  $P$  values greater than 0.3). (Article Selection: J. David Clark. Image: L. Gray.)

**Take home message:** Maternal kangaroo care was as effective as sucrose during a medically indicated heel lance in neonates.



### Effect of professional background and gender on residents' perceptions of leadership. *Acad Med* 2019 Jul 30 [Epub ahead of print].

Questions persist about how professional background and gender influence a resident's perception of leadership skills. This study used identically scripted, simulated, video-recorded resuscitation scenarios with either a male or female leader identified as either a nurse practitioner or physician to determine the effects of gender and profession on the perception of leadership skills. One hundred and sixty resident volunteers subsequently rated the leader's performance using the Ottawa Crisis Resource Management Global Rating Scale. Female leaders received lower scores in the areas of leadership and communication skills when compared to male leaders ( $P < 0.01$ ) but the sexes were equivalent in their overall performance

and in the domains of problem solving, situational awareness, and resource utilization skills. There was no effect of professional background on any of the scores. (Article Selection: Cathleen Peterson-Layne. Image: @gettyimages.)

**Take home message:** On identically scripted video recordings, females were perceived to have lower leadership and communication skills when compared to males despite identical performances. Interestingly, their overall scores were similar.



### Persistent opioid use is associated with worse survival after lobectomy for stage I non-small cell lung cancer. *Pain* 2019; 160:2365–73.

A large percentage of patients have persistent opioid use after thoracic surgical procedures. This study used a national cancer registry linked with Medicare claims to identify whether persistent opioid use 3 to 6 months after lung resection in 2,884 patients with non-small cell lung cancer was associated with worse survival. Twenty-seven percent of patients had persistent opioid use between 3 and 6 months after their surgical procedure. On multivariate analysis, predictors of mortality included higher opioid utilization, age, male sex, not being married, larger tumors, open procedures, radiation therapy, lack of chemotherapy, higher tumor grade, and higher Charleston Comorbidity score. While the title highlights

that persistent opioid use is associated with worse survival after lobectomy, the multivariate analysis suggests that there are multiple indicators for early mortality after surgery for lung cancer that may be associated with increased opioid utilization. (Article Selection: J. David Clark. Image: @gettyimages.)

**Take home message:** Higher opioid utilization, age, male sex, not being married, larger tumors, open procedures, radiation therapy, lack of chemotherapy, higher tumor grade, and higher Charleston Comorbidity score are independently associated with mortality in patients with lung cancer.



### Donor simvastatin treatment in heart transplantation. *Circulation* 2019; 140:627–40.

Data suggest that the administration of simvastatin to organ donors may inhibit allograft ischemia-reperfusion injury. This prospective, randomized, double-blinded study evaluated the effect of administering simvastatin to heart donors on ischemia-reperfusion injury after heart transplantation in 84 heart donors. Primary outcome measures included plasma concentrations of troponin T, troponin I, or creatine kinase MB subunit in the recipient in the first 24 h after organ reperfusion. Administration of simvastatin to organ donors had no effect on creatine kinase MB concentrations and troponin T levels but did reduce concentrations of troponin I from  $171,000 \pm 151,000$  to  $103,000 \pm 109,000$  ng/l ( $P = 0.04$ ) in

organ recipients. There was no effect of simvastatin on the incidence or severity of transplant rejections between the groups. (Article Selection: Martin J. London. Image: ©Adobe Stock.)

**Take home message:** Administration of simvastatin to heart donors may be associated with decreased concentrations of troponin I in organ recipients.



### Improving operating room efficiency: Machine learning approach to predict case-time duration. *J Am Coll Surg* 2019; 229:346–54.

Operating room case duration estimates are important for optimizing operating room utilization. This study evaluated whether the use of supervised artificial intelligence and linear regression analyses to statistically predict case-time duration were accurate. Data were derived from 46,986 scheduled surgical procedures. Eighty percent of the data was used for training and 20% for validation of the model and comparison using average historical times and surgeon estimates. The historical times and surgeon estimate models accurately predicted case-time duration within a 10% tolerance threshold in 31% of cases. In 27% of cases this model overpredicted the case duration and in 41% of cases this model underpredicted the

case duration. The most accurate artificial intelligence model could predict case duration within a 10% tolerance threshold 50% of the time with the least accurate models being similar to the utilization of historical times and surgeon estimates. (Article Selection: Deborah J. Culley. Image: ©Adobe Stock.)

**Take home message:** Artificial intelligence may be useful in predicting surgical case time and may make it easier to optimize operating room utilization.

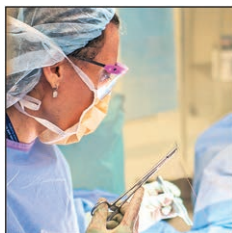


### Mechanical and oral antibiotic bowel preparation versus no bowel preparation for elective colectomy (MOBILE): A multicentre, randomised, parallel, single-blinded trial. *Lancet* 2019; 394:840–8.

A growing body of data is suggesting that mechanical and oral antibiotic bowel preparation may lead to a decrease in surgical site infections and subsequent morbidity. This multicenter, parallel, single-blinded trial included 417 patients having elective colon surgery and randomized them to no bowel preparation or mechanical and oral antibiotic bowel preparation with a primary outcome of surgical site infection within 30 days after surgery. The final analysis included the 396 patients that completed the study. Surgical site infections within 30 days of surgery occurred in 13 of 196 patients receiving

mechanical and oral antibiotic bowel preparation (7%) and in 21 of 200 patients who did not undergo bowel preparation (11%, effect size 1.65; 95% CI, 0.80 to 3.40;  $P = 0.17$ ). There were also no differences in any of the secondary outcomes including Comprehensive Complication Index score within 30 days of surgery, anastomotic dehiscence, reoperation, readmission, hospital length of stay, mortality at 30 or 90 days, and adverse effects of antibiotic administration. (Article Selection: Martin J. London. Image: ©Adobe Stock.)

**Take home message:** Mechanical and oral antibiotic bowel preparation does not appear to have benefit over no bowel preparation in patients having elective colectomy.



### Association of domestic responsibilities with career satisfaction for physician mothers in procedural vs nonprocedural fields. *JAMA Surg* 2019 Apr 10 [Epub ahead of print].

Challenges between career goals and domestic responsibilities are common among mothers who are physicians. This study surveyed female physicians to investigate associations between increased domestic workload and career satisfaction among physician mothers in procedural and nonprocedural specialties. The majority of the 1,712 participants were married (99%). Interestingly, there were no differences between proceduralists and nonproceduralists in perceiving that they held sole responsibility for the majority of domestic tasks. Despite this similarly, physician mothers in procedural specialties

responsible for five or more domestic tasks had a greater interest in changing careers to a less demanding specialty when compared to those with fewer than five domestic tasks (odds ratio 1.5; 95% CI, 1.0 to 2.2;  $P = 0.05$ ) on multivariate analysis. This difference was not noted for those in nonprocedural fields. Interestingly, there were a number of differences between proceduralists and nonproceduralists identified in this study that may be related to some of these differences. See the accompanying editorial, "Domestic Responsibilities of Physician Mothers: Chores, Catsup Sandwiches, and Snacks" (*JAMA Surg* 2019 Apr 10 [Epub ahead of print]), for creative examples of how one proceduralist mother reduced chores and parental guilt for not being that "perfect mom." (*Article Selection: Deborah J. Culley. Image: J. P. Rathmell.*)

**Take home message:** This study found an association between domestic chores and an interest in moving to a less demanding specialty among proceduralist but not nonprocedural physician mothers.



### Mortality after discontinuation of primary care-based chronic opioid therapy for pain: A retrospective cohort study. *J Gen Intern Med* 2019 Aug 29 [Epub ahead of print].

The risks of discontinuing chronic opioid therapy for the treatment of chronic pain are relatively unknown. This retrospective cohort study was designed to evaluate mortality, use of prescription opioids, and stability of primary care in patients who had been on chronic opioid therapy that was stopped. This study included 572 patients on chronic opioid therapy from a clinic opioid registry. In 60% of these patients, chronic opioid therapy was discontinued. The reasons for discontinuation included a transfer of care or behavioral and safety concerns. In 18% of the patients where chronic opioid therapy was

discontinued, there were patient-initiated reasons for discontinuation; in 77% of cases there was at least one provider-initiated reason for discontinuation of chronic opioid therapy. Discontinuation of chronic opioid therapy was not associated with an increase in the overall death rate, although the overall death rate was high ( $P = 0.12$ , 21%), but was associated with an increased in overdose deaths (hazard ratio 2.9; 95% CI, 1.0 to 8.6;  $P < 0.05$ ). (*Article Selection: Evan D. Kharasch. Image: J. P. Rathmell.*)

**Take home message:** Discontinuation of chronic opioid therapy may increase the risk of death by overdose.



### Permanent percutaneous carotid artery filter to prevent stroke in atrial fibrillation patients: The CAPTURE trial. *J Am Coll Cardiol* 2019; 74:829–39.

Some patients who are at high risk of stroke, including those with atrial fibrillation, have contraindications to anticoagulation therapy. This study assessed the feasibility and safety of placing bilateral common carotid artery filters for the prevention of stroke in 25 patients from three centers. The primary feasibility endpoint was two properly positioned filters and the primary safety endpoints included absence of device- or procedure-related death, stroke, major bleeding, more than 70% common carotid artery stenosis, common carotid artery thrombus, or common carotid artery complication requiring endovascular treatment or surgery to repair at 30 days postprocedure. For the majority of the patients (92%), the investigators were able

to properly place the filters bilaterally and satisfied the safety endpoints. On follow-up there were four patients where thrombi were found in the filter on ultrasound. These patients were treated with subcutaneous heparin with resolution of the clot. (*Article Selection: Martin J. London. Image: J. P. Rathmell.*)

**Take home message:** Placement of a permanent carotid coil filter may be safe and feasible for the capture of thromboembolism in patients deemed unsuitable for anticoagulation therapy.