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Associations of transthoracic echocardiographic features with cardioembolic stroke among patients without atrial fibrillation

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OBJECTIVES/SPECIFIC AIMS: To identify cardiac structural and function parameters, obtained on usual stroke-care TTE evaluation, associated with cardioembolic stroke (CE) in patients without AF. Hypothesis—left atrial (LA) size and valve dysfunction will be strongly associated with incident CE. **METHODS/STUDY POPULATION:** Inclusion criteria: July 1, 2013 to July 1, 2015 admission with imaging-confirmed ischemic stroke, no AF, TTE within 1st 7 days. TTE structure/function parameters were recorded. Stroke subtype (CE vs. other) defined using TOAST criteria, blinded to TTE. New AF definition: AF on ECG, telemetry or event monitor. CE/New AF outcome of interest in separate multivariable logistic regression models testing associations with TTE parameters (adjusting for demographics/vascular risk factors). **RESULTS/ANTICIPATED RESULTS:** Participants ($n = 332$) were ~60 years hypertensive black males with moderate NIHSS and normal ejection fraction. In adjusted models, odds of CE increased with increasing LA systolic diameter (per 0.1 cm), mitral E point velocity (cm/s), mitral valve dysfunction, wall motion abnormality. New AF also associated with increasing LA systolic diameter. **DISCUSSION/SIGNIFICANCE OF IMPACT:** These findings may suggest cardiac structural changes independent of AF that are on the CE causal pathway. Understanding the relationship between such TTE parameters and stroke subtype would impact clinical practice, as such TTE data is underutilized when considering stroke mechanism and management.

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Augmenting perception through direct electrical stimulation of adult somatosensory cortex

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OBJECTIVES/SPECIFIC AIMS: Our main objectives are to study sensory encoding in the adult cortex and quantify rodents' ability to use intracortical microstimulation to guide behavior. **METHODS/STUDY POPULATION:** Three rats were implanted with unilateral bipolar stimulating electrodes. The electrodes were connected to a wireless neural stimulator housed in the rat's backpack. The rat's swim path was tracked by a video camera above the circular pool, and stimulation parameters were updated in real-time based on distance from the platform. Stimulation was delivered as the distance from the platform increased. Stimulation amplitude was determined through behavioral threshold testing, and parameters ranged from 15–75 μ A with 100-Hz pulse trains and 0.2-ms pulses. Rats were first challenged with the 4-platform task in which the submerged platform was randomized across 4 possible locations. This dissociated visual cues from the platform location, as rats had knowledge of the 4 possible locations, but had to use stimulation to guide them efficiently. Next, rats were tasked with the more challenging random-platform task. Visual cues were completely dissociated from the platform location by randomizing the platform location across the entire pool. Performance using the neuroprosthetic device was assessed by comparing trials when the device was on (stimulation trial) versus off (no-stim trial) for the 2 tasks. **RESULTS/ANTICIPATED RESULTS:** *4-platform task:* Rats visited less potential platform locations when the neuroprosthetic was on versus off. Rats were also more likely to visit the correct platform location on their first swim trajectory when brain stimulation was delivered. When artificial cues were not available, rats had a greater chance of visiting the platform location from the previous trial. This indicated that rats relied on visuospatial memory without the neuroprosthetic. *Random platform task:* Performance was measured by taking the ratio of the rat's actual path length to the optimal path length. When the neuroprosthetic was on, rats demonstrated superior performance through a smaller path to length ratio compared with when the device was off. The platform locations of catch trials were matched to a random subset of stimulation trials, permitting a paired sample *t*-test. Both rats had significantly shorter path lengths when the device was on. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Rodents have excellent navigation skills that have been well studied. They have been shown to rely on multimodal sensory information from visual, olfactory, auditory, and idiothetic cues to navigate through their environment. The importance of these cues depends on both their environmental presence and task relevance. In the original Morris water maze experiment, rats use vision to form a visuospatial map of the platform location for allocentric navigation. Here, we have shown that sensory augmented rats can pick up on novel sensory information delivered through ICMS to efficiently find a hidden platform when visual cues are made

irrelevant. Our results have implications for the design of the bi-directional sensorimotor neuroprosthetic. We have demonstrated that mammals can interpret artificial sensory information to guide behavior. Future directions include investigating sensory encoding in other primary sensory areas and downstream targets along the somatosensory neuraxis.

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Authors' perceptions of the interdisciplinarity of their research

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OBJECTIVES/SPECIFIC AIMS: The objectives of this study were to compare different methods for determining the disciplines involved in a research article. We sought to address the following questions: To what extent does the number of disciplines reported by an article's corresponding author agree with their description of the article as unidisciplinary or interdisciplinary? (Q1) and To what extent does the corresponding author's description of the research as unidisciplinary or interdisciplinary agree with its classification as unidisciplinary or interdisciplinary based on the affiliation of its co-authors? (Q2). **METHODS/STUDY POPULATION:** Using Scopus, we randomly selected 100 articles from 2010 and 2015 from science teams that had at least 1 author affiliated with Johns Hopkins. Author affiliations were grouped into common academic disciplines: Basic Science, Medicine (and all clinical specialties), Public Health, Engineering, Social Science, Computer Science, Pharmacy, Nursing, and Other. Articles with more than 1 discipline were considered, interdisciplinary. We then sent an online Qualtrics survey to the corresponding author of each article and asked them to indicate (1) all of the disciplines that contributed to the research article at hand, and (2) to indicate whether they considered the research to be "unidisciplinary" or "interdisciplinary" based on definitions that we provided. **RESULTS/ANTICIPATED RESULTS:** For Q1, we asked corresponding authors to indicate the number of disciplines involved in their research and then to choose the definition that best described their research. Among 76 respondents, 42 indicated that their research consisted of 1 discipline, and 34 indicated that their research consisted of more than 1 discipline. Of the 42 respondents who indicated that their research consisted of one discipline, 21 (50%) respondents described their research as "unidisciplinary" and 21 (50%) described their research as "interdisciplinary." However, of the 34 respondents who indicated that their research consisted of more than 1 discipline, all but 1 (97%) described their research as "interdisciplinary." For Q2, we assigned a discipline to each co-author based on his/her affiliation and counted the number of disciplines involved. Among 76 respondents, of the 22 who described their research as "unidisciplinary," 16 (73%) were categorized as "unidisciplinary" and 6 (27%) were categorized as "interdisciplinary," using this method. Of the 54 respondents who described their research as "interdisciplinary," 30 (56%) were categorized as "interdisciplinary" and 24 (44%) as "unidisciplinary." **DISCUSSION/SIGNIFICANCE OF IMPACT:** Our results highlight that different methods for determining whether a given research article is interdisciplinary are likely to yield different results. Even when researchers indicate that their research is based within one major discipline, they may still consider it interdisciplinary. Likewise, classifying an article as either unidisciplinary or interdisciplinary based on the affiliations of its co-authors, may not be consistent with the way it is viewed by its authors. It is important to acknowledge that assessing the interdisciplinarity of research is complex and that objective and subjective views may differ.

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Beyond diagnosis: Using ultrasound to affect tumor vasculature for hepatocellular carcinoma (HCC) therapy

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OBJECTIVES/SPECIFIC AIMS: Preliminary animal studies showed that low-intensity ultrasound (US) coincident with intravascularly administered microbubbles locally disrupts tumor vasculature. This study translates the novel therapy of antivasculature ultrasound (AVUS) into an autochthonous model of hepatocellular carcinoma (HCC). The differential effects produced by AVUS at low and high doses are evaluated. **METHODS/STUDY POPULATION:** HCC was induced in 12 Wistar rats by ingestion of 0.01% diethylnitrosamine in drinking water for 12 weeks. Rats received AVUS treatment at low and high doses. Low dose group ($n = 6$) received 1 W/cm² US for 1 minute with 0.2 mL microbubbles injected IV.