Research Day will be held on the first floor of the Colbert Center (the library) this year. The space will be available as of 4 pm on 5/4 for those who wish to set up their poster the night before. Please plan to remove your poster by 4 pm on 5/5. Each presenter will have 10 min to present their work to the judges.

### Presentation to the Judges

<table>
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<tr>
<th>Time</th>
<th>Presenter</th>
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<tr>
<td>8:00 am</td>
<td>Dr. Wenyu “Andy” Sun</td>
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<td>8:10 am</td>
<td>Dr. Jill Blandford</td>
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<td>8:20 am</td>
<td>Dr. Jeffrey Bodle</td>
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<td>8:30 am</td>
<td>Dr. Jason Madey</td>
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<td>Dr. Kelly Matmati</td>
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<td>Dr. Samuel Taylon</td>
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<td>9:00 am</td>
<td>Dr. Jarom Hanson</td>
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<td>Dr. Sylvia Klineova</td>
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<td>Dr. Jonathan Lena</td>
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<td>Dr. Xiaoyan Sun</td>
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<td>Dr. Nolan Williams</td>
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<td>Dr. Leonardo Bonilha</td>
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<td>Dr. Vibhor Krishna</td>
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<td>11:20 am</td>
<td>Dr. Steven Morgan</td>
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<td>11:30 am</td>
<td>Dr. Timothy Monroe</td>
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12:00 pm Lunch

Presentation of Awards to Follow

12:00 - 4:00 pm Posters Available for Open Viewing
ABSTRACT

Partially or completely thrombosed aneurysms are considered dynamic and unstable structures that have the potential to cause thromboembolic infarcts; yet, many physicians do not consider them to be a mechanism for ischemic stroke. Possible mechanisms of ischemic stroke related to unruptured intracranial aneurysm include aneurysm thrombosis resulting in distal emboli, extension of intra-aneurysm thrombus into the parent artery or compression of the parent artery by the aneurysm. We present a patient with an acute stroke who presented with an M1 occlusion. She was found to have a middle cerebral aneurysm during an intra-arterial thrombectomy procedure. Her aneurysm measured 3 mm x 4 mm and was located at the bifurcation of the middle cerebral artery. Images of the thrombosis were captured during angiography demonstrating the aneurysm to be located at the epicenter of the thrombosed segment. Aneurysms as a nidus for thromboembolic infarcts provide challenges for physicians treating acute stroke patients. Typically aneurysms are considered a contraindication to systemic thrombolysis due to increased risk of aneurysm rupture and subarachnoid hemorrhage. Blood pressure parameters need to be modified to ensure preservation of cerebral perfusion without increasing the risk of intracerebral hemorrhage. Specific challenges and risks exist for neurointerventionalists during endovascular procedures. The greatest procedural risk is iatrogenic aneurysm rupture during the revascularization procedure because thrombosed aneurysms are often recognized after blood flow is restored. This case presentation will discuss aneurysm as a cause of ischemic stroke and the challenges this will create for physicians and neurointerventionalists who treat them.

Resident Name: Jill M. Blandford, DO
PGY: 2

ABSTRACT

Background:
Parkinson’s disease (PD) is the 2nd most common movement disorder only after essential tremor. To our knowledge, there is very little information on the patterns of ambulatory health care visit among patients with Parkinson disease in the United States.

Methods:
Patients visits attributed to Parkinson disease (both primary and secondary diagnoses) in the National Ambulatory Medical Care Survey (NAMCS) and National Hospital Ambulatory Medical Care Survey (NHAMCS) from 2005 to 2008 served as the study basis for epidemiological analysis. The unit of analysis was the visit. All estimates have been adjusted using weights provided by the National Center for Health Statistics (NCHS) to account for the multi-stage sampling design of the NAMCS and the NHAMCS. In this study, PD patient visit was defined by ICD-9-CM coding of 332.

Results:
There was an estimated 6.9 million PD patient visit to the physicians’ offices and hospital outpatient departments during 2005 - 2008. PD was recorded as the primary diagnose in 57% of all PD visits. PD visits per 1000 persons were 5.6 in 2005, 5.8 in 2006, 6.8 in 2007 and 5.1 in 2008. Among the 6.56 million PD visits to the physicians’ offices, top 3 specialties being visited were neurology (48%), Internal medicine (20%), General/Family practice (13%). 53% of all PD visits were made by males. 94% of all PD visits were made by the white. 99% of all PD visits were made by patients 45 years and above, 75 years and over age group account for half of all PD visits, and no PD patients of younger than 25 years were recorded. The region of the south alone accounted for 44% of all PD visits during the 4 year period. 64% of all PD visits were paid by Medicare, private insurance covered 25% and Medicaid covered 7% of all PD visits. Top co-morbidities for PD visits included hypertension 38%, Diabetes 20%, Depression 16%, Arthritis 16%, Hyperlipidemia 16%, cerebravascular disease 11%, ischemic heart disease 11%, cancer 5% of all PD visits.

Conclusions:
Our study describes the current national pattern of ambulatory health care visit among patients with Parkinson’s disease. Health care providers and policy-makers should be aware of this pattern in order to develop strategies that lead to better ambulatory health care for PD patients. Further investigation to explore the relationship between PD and co-morbidities is warranted.

Resident Name: Wenyu Sun, MD, MPH
PGY: 1

Abstract Title: Ambulatory Health Care Visit by Patients with Parkinson’s Disease in the United States 2005 -2008
## Wyburn-Mason Syndrome

Wyburn-Mason syndrome, also known as Bonnet-Dechaume-Blanc syndrome, is a rare phakomatosis characterized by unilateral arteriovenous malformations (AVMs) involving the retina, brain, and sometimes skin. [1, 2] It is congenital, nonhereditary, and without sex or race predilection. Since some patients fail to manifest the full clinical picture, the diagnosis should be entertained in anyone presenting with isolated retinal or brain AVMs, regardless of cutaneous involvement.

We present a 10-year-old boy, who was admitted to the hospital with sudden-onset left leg monoplegia and was subsequently discovered to have complex vascular malformations involving the brain and spinal cord but sparing the retina. His case suggests that Wyburn-Mason should be viewed as a continuous spectrum of disease rather than a distinct syndrome.

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## Familial Non-traumatic, Non-aneurysmal Subarachnoid Hemorrhage: A 3 First-degree Sibling Report

**Background:** Family history of aneurysmal subarachnoid hemorrhage (aSAH) is a recognized risk factor. Case-control series have revealed positive family history in 7-20% of patients presenting with aSAH. Possible environmental influences and underlying genetics of this association remain elusive; recent reports have focused on genome-wide linkage and have identified specific loci associated with the presence of intracranial aneurysms. Non-traumatic, angiographic negative SAH and perimesencephalic, pretruncal SAH (pSAH) may demonstrate different clinical presentations and clinical courses than the aneurysmal variant. Often the etiology for these events remains unknown. Familial clustering in ≥3 first degree siblings is considered extremely rare for any type of SAH. This is the first report of a three first-degree sibling family affected by non-traumatic, angiographic negative SAH.

**Methods:** Case report describing three first degree relatives with non-aneurysmal subarachnoid hemorrhage

**Conclusions:** The basis of the familial association for intracranial aneurysms and SAH has not been fully understood, research on both environmental and genetic factors has been explored, with only one report published on two first degree relatives with venous abnormalities and pSAH. We describe the case of three first degree relatives with non-aneurysmal SAH. We cannot rule out that SAH in these siblings did not occur by chance, however we do believe that having 3 first-degree relatives with no history of trauma, similar imaging and clinical courses, suggests a familial genetic or environmental predisposition.
ABSTRACT

A middle aged Caucasian female, with bilateral kidney transplant, presented to the emergency room after a sudden headache progressed into altered mental status, and a generalized tonic-clonic seizure. Examination in the ER led to suspicion of either a hemorrhagic, or ischemic cerebral event. After a negative CT study, the patient began to decerebrate posture, suggesting an increase in intracranial pressure. As there was no other evidence of increased intracranial pressure on exam, a lumbar puncture demonstrated an opening pressure of 20cm, and later, magnetic resonance imaging showed findings consistent with posterior reversible encephalopathy syndrome (PRES). With antihypertensive therapy, she quickly returned to her baseline and was discharged to home.

Resident Name: Jarom Hanson, MD
PGY: 3
Abstract Title:

ABSTRACT

With the introduction of thrombolytics for the treatment of acute ischemic stroke, it is apparent that diagnostic biomarkers are needed to distinguish ischemic stroke from stroke mimickers as well as identify patients who have contraindications to thrombolytics or whose strokes are too advanced to treat. Animal models have shown that certain sphingolipid species become elevated in the brain in response to ischemia and to reperfusion. Importantly, ceramide, a membrane sphingolipid and essential mediator of cell-stress responses becomes elevated in brain tissue that undergoes ischemia and reperfusion in animal models (Yu et al. JBC 282(35), 25940-25949, 2007). Blocking ceramide biosynthesis with its inhibitor or knocking down c-Jun kinase 3 attenuated ceramide accumulation and decreased brain injury. No human studies have been done to validate these results and to establish the time course of biomarker peaks in stroke patients. We propose a prospective study to assess the levels of specific sphingolipid biomarkers in acute stroke patients. Serum samples will be collected from acute stroke patients at time of presentation and at additional times during hospitalization and at 3 month follow-up. State of the art mass-spectrometry methods will be used to quantify sphingolipid levels in the serum. Correlations will be made with severity of stroke, reperfusion with tPA or intra-arterial thrombolysis, and time of onset. Once validated, these biomarkers may be used to diagnose and make treatment decisions for acute stroke.

Resident Name: Kelly S. Matmati, MD
PGY: 2
Abstract Title:
ABSTRACT

Background: African American (AA) population has lower risk for developing multiple sclerosis (MS) than Caucasian (CA) population, however, the disease tends to be more severe. Available data suggest that AA population acquires disability faster and to greater extent when compared with CA population. This could be caused by different response to disease modifying therapies (DMT’s). To our knowledge, there are little data available about response to treatment with DMT’s in AA population, mainly due to small sample sizes to establish statistical significance. We hypothesize that response of AA population in South Carolina to currently used disease modifying therapy (DMT) is poorer when compared with CA population.

Objective: To compare the response to disease modifying therapies used in AA and CA MS patients in South Carolina.

Methods: Retrospective chart analysis of AA and CA MS patient cohorts from South Carolina that were followed at MUSC. Rating of disease progression was based on expanded disability status score (EDSS) difference at the time of first and last visit. If EDSS score was not recorded in the chart, post hoc EDSS rating was done by investigator. We chose EDSS as one of the most widely utilized assessment instruments in multiple sclerosis and standardized measure of global neurological impairment in MS.

Group of 66 AA patients treated with DMT’s and followed at MUSC. The comparison group consisted of 67 CA patients with MS treated with DMT’s and similar follow up. To meet inclusion criteria, patients had to be diagnosed with either relapsing-remitting or secondary progressive MS and to be treated with DMT’s for the entire disease course. First and last visit had to be at least one year apart.

Results: Our data showed that gender and age at the time of diagnosis did not differ significantly between AA and CA. We found statistical significance in disease duration which was longer among CA patients (p=0.001). Median of EDSS difference was higher in AA population than in CA population (p<0.001). Increased EDSS difference suggests poorer response to DMT’s among AA patients in our study.

Conclusions: AA patients in South Carolina showed poorer response to DMT’s when compared with CA patients. Our results are similar to exploratory post hoc analysis of the EVIDENCE study. This suggests a trend, however further prospective studies on the response of AA patients to DMT’s are warranted.
**Resident Name:** Nolan Williams, MD  
**PGY:** 3  
**Abstract Title:** Successful Use of Right Unilateral Ultra-brief Electroconvulsive Therapy for Frontal-Subcortical Circuit Dysfunction

**Co-Investigator:** Carol Burns, Baron Short, Justin Nolte, Vanessa Hinson, Ziad Nahas  
**Faculty Mentor:** Ziad Nahas, Vanessa Hinson

**ABSTRACT**

**Background:** Parkinson’s disease (PD) is a neurodegenerative movement disorder frequently associated with neuropsychiatric illness such as depression, psychosis, and rarely catatonia. Electroconvulsive therapy (ECT) has been shown to be effective in eliminating neuropsychiatric symptoms along with the simultaneous effect of improving motor symptoms. Despite its marked effectiveness in producing concurrent mood and motor recovery, there is reluctance to utilize ECT due to concerns of inducing cognitive dysfunction. Recent studies have shown that the newer ECT technique of right unilateral ultrabrief pulse (RUBP) minimizes autobiographical memory losses and its use has never been presented as a treatment for PD.

**Methods:** The patient received a series of 8 right unilateral brief pulse ECT treatments (using Thymatron, Lake Bluff, IL). The patient continued with maintenance ECT on average of weekly to bi-monthly where worsening of her tremor was found to coincide with drop in her mood. This observation shaped the patient’s ECT strategy.

**Results:** Her psychiatric symptoms remitted and she exhibited a marked reduction of dyskinesia, off-time, and tremor. She discontinued her dopamine agonist and reduced her levodopa by half. Fourteen months later (39 ECT sessions), the concurrent benefits on mood and motor symptoms continue.

**Conclusions:** This case illustrates the role of RUBP ECT in PD and catatonia. We discuss the functional neuroanatomy of mood and motor regulation, their overlap and ECT’s putative shared mechanism on both networks.

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**Resident Name:** Xiaoyan Sun MD, PhD  
**PGY:** 3  
**Abstract Title:** Application of APOE genetic testing as a diagnostic adjunct in the patients already presenting with cognitive impairments

**Co-Investigator:** Stacia DeSantis PhD, Mark T. Wagner PhD, Aljoeson Walker MD, David Bachman MD

**ABSTRACT**

**Objective:** Study APOE genotypes and assess the role of APOE genotype in the patients with cognitive impairments

**Methods:** 117 cases of the patients with cognitive impairments having APOE genotypes were collected by retrospective review of medical chart. The association of APOE genotypes with clinical diagnosis of cognitive impairment was analyzed.

**Results:** Among 117 cases, there were 6 cases of ε2/3, 3 cases of ε2/4, 33 cases of ε3/3, 49 cases of ε3/4, and 26 cases of ε4/4. The ε4 accounts for 66.7 % of the whole group of the patients. High percentage of Alzheimer’s disease was diagnosed in the patients with the positive ε4. The ε4 as a diagnostic predicative factor for Alzheimer’s disease was analyzed.

**Interpretation:** APOE ε4 significantly increases the risk of Alzheimer’s disease. APOE genotype is useful as a clinical diagnostic adjunctive in the patients already presenting with cognitive impairments but without clear diagnosis.

**Interpretation:** APOE ε4 significantly increases the risk of Alzheimer’s disease. APOE genotype is useful as a clinical diagnostic adjunctive in the patients already presenting with cognitive impairments but without clear diagnosis.
ABSTRACT

Purpose: Temporal lobe epilepsy (TLE) due to hippocampal sclerosis is the most common form of medication refractory epilepsy. Radiologists are often asked to determine whether there is evidence of hippocampal abnormalities on high-resolution MRI. This decision can be made with high confidence when there is clear-cut unilateral hippocampal atrophy, but it can be challenging when atrophy is subtle or bilateral. We propose a decision support tool that uses information from a combination of MRI parameters, obtained from T1-weighted and diffusion tensor imaging (DTI) scans, to provide a quantitative score indicating the likelihood of limbic structural abnormalities in patients with TLE. The purpose of this study is to assess the detection accuracy of the proposed tool.

Materials and Methods: We used T1-weighted images and fractional anisotropy (FA) parametric maps obtained from DTI scans from 13 consecutive patients with unilateral TLE and 28 controls recruited from the local community. All TLE patients had unilateral seizure onset confirmed by prolonged video-electroencephalography recording. T1-weighted images were submitted to voxel-based morphometry yielding maps of gray matter loss. FA images were submitted to voxel-wise analysis yielding maps of white matter deficits. These images were then used as input to an in-house developed package, which constructed a pattern classifier to identify structural abnormalities.

Results: Employing T1-weighted images only, the discriminant scores correctly identified abnormalities in 8 (62%) patients. Discriminant scores from FA images alone correctly classified 11 (85%) patients. The combined scores correctly identified regional abnormalities in 12 patients (92% accuracy) (Figure).

Conclusions: With current advancements in multiparametric MRI technologies and leveraging advanced image analytics, there is growing potential for computational decision support tools to improve the accuracy of the clinical evaluation of structural abnormalities in TLE. Automated tools allow for objective assessment of subtle structural deficits that cannot be readily identified by the human eye.

Clinical Relevance/Application: Accurate detection of subtle structural abnormalities associated with hippocampal atrophy is essential to effective pre-surgical planning of medication refractory epilepsy.
**ABSTRACT**
Most cases of progressive supranuclear palsy (PSP) are sporadic. However, we present a case of a PSP-like syndrome that may have been triggered by apparently uncomplicated ascending aortic surgery. The purpose of this report is to help document a potentially rare, but severe, adverse outcome to such a surgery. Although causality cannot be assumed, there have been a few other previously documented cases that also suggest a relationship between cardiac and aortic surgeries and the onset of a PSP-like syndrome. The mechanism by which such a disease could be caused can only be speculated upon and further research is needed to help elucidate the pathologic changes that are responsible. Regardless, it is important to recognize that there might be another potential adverse consequence of cardiac and aortic surgery that patients need to be warned about.

**ABSTRACT**
Most cases of progressive supranuclear palsy (PSP) are sporadic. However, we present a case of a PSP-like syndrome that may have been triggered by apparently uncomplicated ascending aortic surgery. The purpose of this report is to help document a potentially rare, but severe, adverse outcome to such a surgery. Although causality cannot be assumed, there have been a few other previously documented cases that also suggest a relationship between cardiac and aortic surgeries and the onset of a PSP-like syndrome. The mechanism by which such a disease could be caused can only be speculated upon and further research is needed to help elucidate the pathologic changes that are responsible. Regardless, it is important to recognize that there might be another potential adverse consequence of cardiac and aortic surgery that patients need to be warned about.

**ABSTRACT**
Despite our best efforts, we are unable to determine a specific stroke mechanism in up to one-third of our stroke patients. Their stroke is subsequently termed a “cryptogenic stroke” formally defined as a stroke without an identifiable cause.

**Methods:**
Case series of two patients admitted to the stroke neurology service with acute strokes based on clinical presentation and neuroradiographic studies.

**Results:**
There were two patients admitted to the stroke neurology service within one year of each other that despite thorough evaluations were labeled as having had “cryptogenic” strokes. After identifying that they both had inappropriately placed venous ports in the arterial circulation, it was presumed that the etiology of their strokes was due to distal embolization of microemboli from the inappropriately placed foreign instrumentation.

**Conclusions:**
Despite our best efforts to identify a stroke mechanism for every stroke, we are unable to identify an obvious cause in up to one-third of all stroke patients and because of this they are labeled as cryptogenic strokes. Given that we saw two patients within 1 year at the same institution admitted with strokes felt to be secondary to inappropriately placed “venous” accesses, we deduce that this mechanism of stroke may be more prevalent than would be otherwise expected, and propose that all patients with a diagnosis of cryptogenic stroke, but also with any central access have that access transduced to ensure that it isn’t inappropriately placed in the arterial circulation.
Resident Name: Vibhor Krishna, MD  
PGY: 5

Abstract Title: Functional outcomes after injection of chitosan-gelatin hydrogel in a rat model of severe spinal cord injury

Co-Investigator: Jin,X, PhD; Sterling, J; Varma,A, MD, MSCR; Kindy, M PhD; Yu, J PhD; Banik, NK PhD; Wen, X, MD, PhD.

ABSTRACT

Introduction: Functional recovery after severe spinal cord injury is modest due to inhibition of axonal regeneration by several intrinsic factors. We designed an injectable chitosan-gelatin hydrogel for delivery of neurotrophic factors, supporting cells. The functional outcomes were evaluated after injection of this hydrogel in rat model of severe spinal cord injury.

Methods: Twenty eight adult SD rats were randomly assigned to two control (sham surgery (N=2), spinal cord injury (N=6)) and three experimental groups (hydrogel injection (N=8); hydrogel with GDNF injection (N=6); hydrogel, GDNF and oligodendrocyte precursor cell injection (N = 6). Spinal cord injury was induced by a computer controlled impactor with a diameter of 3 mm and depth of 2 mm at a speed of 4 cm/sec. 10 μL of hydrogel solution was administered at six different points bilaterally distal, proximal and within the injury site slowly over one minute. All animals were followed for 8 weeks and weekly behavioral testing was performed using the BBB scale (minimum 0, maximum 21). Subsequently animals were sacrificed and spinal cords removed for studying axonal regeneration and myelination.

Results: The mean BBB scores for control group at eight weeks was 1.67 (95% CI 0.39- 2.95). The hydrogel injection did not seem to adversely affect functional recovery (BBB score of gel only group – 1.56 (95% CI 0.26 – 2.86)). The functional score improved with the inclusion of GDNF (BBB score – 4.33 (95% CI 1.88 – 6.78)) but not with simultaneous inclusion of GDNF and OPCs (1.75, 95% CI -0.05-3.1). Immunohistochemical stains are performed to study vascularization (REC-1), axonal regeneration (β-3 tubulin), astrogliosis (GFAP) and myelination (MBP).

Conclusions: The chitosan-gelatin based injectable hydrogel medium improves functional outcomes when combined with GDNF in a rat model of severe spinal cord injury. Further studies are warranted to optimize its effects and evaluate in large animal models.

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Resident Name: Vibhor Krishna, MD  
PGY: 5

Abstract Title: Functional outcomes after topical application of chitosan-gelatin hydrogel for in a rat model of severe spinal cord injury

Co-Investigator: Jin,X, PhD; Sterling, J; Varma,A, MD, MSCR; Kindy, M PhD; Yu, J PhD; Banik, NK PhD; Wen, X, MD, PhD.

ABSTRACT

Introduction: Functional recovery after severe spinal cord injury is modest due to inhibition of axonal regeneration by several intrinsic factors. We designed a topical chitosan-gelatin hydrogel for stabilizing the damaged axonal membrane and deliver neurotrophic factors. The effects of this hydrogel were tested in rat model of severe spinal cord injury.

Methods: Twenty three adult SD rats were randomly assigned to two control (sham surgery (N=2), spinal cord injury (N=6)) and two experimental groups (topical hydrogel application (N=7) and topical hydrogel with GDNF (N=8)). Spinal cord injury was induced by a computer controlled impactor with a diameter of 3 mm and depth of 2 mm at a speed of 4 cm/sec. The dura was opened widely to expose the injured segment. 60 μL of hydrogel solution was topically administered and allowed to gelate before closure. All animals were followed for 8 weeks and weekly behavioral testing was performed using the BBB scale (minimum 0, maximum 21). Subsequently animals were sacrificed and spinal cords removed for studying axonal regeneration and myelination.

Results: The mean BBB scores for control group at eight weeks was 1.67 (95% CI 0.39- 2.95). The topical hydrogel application significantly improved functional recovery (BBB score of topical gel group – 4 (95% CI 1.9 – 6.1)). The functional scores were comparable after the inclusion of GDNF (BBB score – 4.06 (95% CI 2.07- 6.05)). Immunohistochemical stains are performed to study vascularization (REC-1), axonal regeneration (β-3 tubulin), astrogliosis (GFAP) and myelination (MBP).

Conclusions: The topical chitosan-gelatin topical hydrogel improves functional outcomes when used alone or in combination with GDNF after severe spinal cord injury in rats. The effects of this treatment strategy should be studied in large animal model in future studies.
ABSTRACT

Neurological recovery after spinal cord injury is a topic of intense research. Neuronal bridges that incorporate biodegradable polymers with supporting cells, and neurotrophic factors (NTF) have been employed to achieve functional regeneration. This multimodality intervention can induce axonal regeneration, myelination and provide contact guidance. In this systematic review, we investigate the functional outcomes and its predictors after implantation of multimodality neuronal bridges in rodent spinal cord injury model. A broad Pubmed, CINHAL search and a manual search from bibliographies of relevant articles were performed to retrieve all the published studies. Data was systematically abstracted from a total of twenty-four publications with fourteen of these reporting functional outcomes. The pooled improvement in BBB score among the fourteen studies was 4.82, 95% CI = 2.95-6.69. The mean improvement in BBB score among studies published before 2006 is significantly lower than those published after 2006 (1.98 (1.08-2.88) versus 6.6 (3.48-9.73)). A step-wise logistic regression analysis was performed to study factors associated with functional outcomes including study design, implant characteristics, and the supporting cells used. The factors associated with improved outcomes include the type of polymer used and a follow-up period greater than six weeks. We also developed recommendations for future testing and reporting to further elucidate specific factors associated with improved functional outcomes in future studies.