

Prestasi Membanggakan diraih oleh Mahasiswa FK UPNVJ pada Lomba PCC AMSC 2020

Senin, 20 April 2020 09:31 WIB

HumasUPNVJ - Mahasiswa Fakultas Kedokteran UPN Veteran Jakarta kembali berhasil meraih prestasi. Mereka berhasil menjadi juara 1 pada lomba PCC AMSC 2020 (*Pre-Conference Competition Asian Medical Students Conference*) kategori *scientific poster* dengan tema *Trauma care : Same Problems with Different Solutions*.

Lomba ini merupakan lomba tahunan yang diadakan oleh *Asian Medical Student's Conference Association Indonesia* (AMSA-Indonesia) yang digelar secara *online* untuk menjaring anggotanya yang akan menjadi delegasi AMSA-Indonesia di konferensi tersebut.

Lomba ini diikuti oleh mahasiswa (member AMSA) dari puluhan fakultas kedokteran di Indonesia. Seharusnya, tahun ini AMSC 2020 diadakan di London pada tanggal 29 Juni - 05 Juli mendatang, tetapi karena adanya pandemic Covid-19 ini, acara diundur sampai dengan batas waktu yang belum bisa dipastikan.

Tim yang bergabung dalam perlombaan ini diantaranya, Annisa Nur Insani, Bunga Vidya Prajanta, Goldy Natanael, Nitya Fithra Salsabila Alhaque.

Annisa Nur Insani mewakili timnya menjelaskan kepada Humas UPNVJ mengenai lomba yang mereka ikuti, "Dalam lomba ini kami membuat *systematic review* yang disajikan dengan media poster, judul karya kami yaitu : *CSF Biomarkers to Predict Injury Severity and Predicting Neurological Recovery in Human Traumatic Spinal Cord Injury: A Systematic Review*". jelasnya

CSF Biomarkers To Predict Injury Severity and Predicting Neurological Recovery in Human Traumatic Spinal Cord Injury : a Systematic Review

Annisa Nur Insani, Bunga Vidya Prajanta, Goldy Natanael, Nitya Salsabila Alhaque
Undergraduate Program, Faculty of Medicine, Universitas Pembangunan Nasional "Veteran" Jakarta



1 INTRODUCTION

Spinal cord injury (SCI) is a devastating condition that can lead to significant neurological impairment and reduced quality of life (Nachren, Alhaq, & Fallings, 2017). Estimated global SCI incidence is 40 to 80 new cases per million population per year, based on quality country-level incidence studies of spinal cord injury from all causes. This means that every year, between 250,000 and 500,000 people become spinal cord injured (Birkenbach & Society, 2013). This number of yearly SCI patients has their own severity which differs in the treatment approach and possible future recovery in the current settings. Assessment of spinal cord injury includes American Spinal Injury Association Impairment Scale (AIS) and Frankel score classification. However, there is a recognized challenge in conducting this examination in the early phase of injury.

In its current format, the International Standards for Neurological Classification of SCI (ISNCSCI) examination requires acute SCI patients to be conscious and cooperative enough to participate in a fairly detailed assessment of motor and sensory function. However, many such patients cannot be examined reliably upon arrival in the emergency room because of concomitant injuries or pharmacological sedation/intoxication (Burns, Lee, Dittmann, & Tessler, 2003; Lee, et al., 2012). This makes many SCI patients in the acute phase unable to be measured. Because of this limitation, we identified an alternative to the mentioned assessment tool to avoid any problems measuring patients with SCI. Recent biomolecular studies of cerebrospinal fluid (CSF) components have led us to the findings of substances that are seen as a potential indicator of patients' prognosis.

Preclinical and translational studies have highlighted the molecular pathology that follows trauma, divided into three phases: acute (a few seconds or minute after the injury), secondary (from a few minutes to a few weeks after the injury), and chronic (some months to years after the injury) (Tran, Warren, & Silver, 2015). In the acute phase, mechanical and vascular events are prevalent such as edema and alterations of the clinical microenvironment, where excitotoxicity and irritation by circulating macrophages prevail. Many of these events are also present in the secondary phase, in particular oxidative stress, inflammation, and immunological reaction also mediated by microglial cells, that lead to the infiltration of astroglial scarring, extensive demyelination, and the electrophysiological collapse. In the chronic phase, demyelination, astroglial reaction and the central cavitation continues and are prevalent (James, et al., 2011). Therefore, the biochemical analysis of the cerebrospinal fluid (CSF) composition at specific times after the trauma has been pursued for lesion severity and prognostic biomarkers discovery (Fernandez, et al., 2020).

This systematic review aims to study the usage of CSF biomarkers as a potential tool in predicting injury severity and future neurological recovery of SCI patients.

2 MATERIALS & METHODS

INCLUSION CRITERIA
1. Samples using CSF
2. Study published in 2015-2020

EXCLUSION CRITERIA
1. Non-human trials
2. Using non-English
3. Full text inaccessible

QUALITY ASSESSMENT
CERBI Level of Evidence

KEYWORDS
("Cerebrospinal fluid") OR ("CSF") AND ("Traumatic spinal cord injury") AND ("Prognosis")

IDENTIFICATION
Records identified through database searching (n = 432)
PubMed = 49
Scopus = 45
PLOS ONE = 40
Prequest = 298

SCREENING
Records after duplicates removed (n = 408)
Records excluded (n = 384)
Published before 2015 = 242
data doesn't correlate = 142

ELIGIBILITY
Full-text articles assessed for eligibility (n = 24)
7 full text inaccessible
7 systematic review
4 non human trials
1 non CSF samples

INCLUDED
Studies included in qualitative synthesis (n = 7)

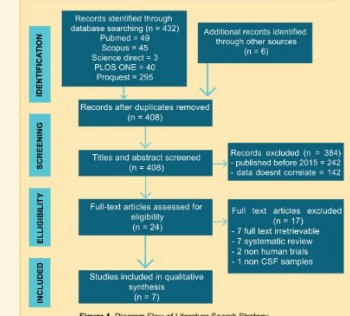


Figure 1. Diagram Flow of Literature Search Strategy

RESULTS & DISCUSSION

Sl. No.	Author Year	Design	Sample Size	Study Design	Outcome	Protein	Findings
1	Chen et al. 2016	RET	1,820 1,820	AO	CSF	IL-18, IL-6, IL-10, IL-17, IL-22, IL-27, IL-31, IL-33, IL-35, IL-36, IL-37, IL-38, IL-39, IL-40, IL-41, IL-42, IL-43, IL-44, IL-45, IL-46, IL-47, IL-48, IL-49, IL-50, IL-51, IL-52, IL-53, IL-54, IL-55, IL-56, IL-57, IL-58, IL-59, IL-60, IL-61, IL-62, IL-63, IL-64, IL-65, IL-66, IL-67, IL-68, IL-69, IL-70, IL-71, IL-72, IL-73, IL-74, IL-75, IL-76, IL-77, IL-78, IL-79, IL-80, IL-81, IL-82, IL-83, IL-84, IL-85, IL-86, IL-87, IL-88, IL-89, IL-90, IL-91, IL-92, IL-93, IL-94, IL-95, IL-96, IL-97, IL-98, IL-99, IL-100	CSF levels of IL-18, IL-6, IL-10, IL-17, IL-22, IL-27, IL-31, IL-33, IL-35, IL-36, IL-37, IL-38, IL-39, IL-40, IL-41, IL-42, IL-43, IL-44, IL-45, IL-46, IL-47, IL-48, IL-49, IL-50, IL-51, IL-52, IL-53, IL-54, IL-55, IL-56, IL-57, IL-58, IL-59, IL-60, IL-61, IL-62, IL-63, IL-64, IL-65, IL-66, IL-67, IL-68, IL-69, IL-70, IL-71, IL-72, IL-73, IL-74, IL-75, IL-76, IL-77, IL-78, IL-79, IL-80, IL-81, IL-82, IL-83, IL-84, IL-85, IL-86, IL-87, IL-88, IL-89, IL-90, IL-91, IL-92, IL-93, IL-94, IL-95, IL-96, IL-97, IL-98, IL-99, IL-100
2	Chen et al. 2016	RET	1,820	A.C	CSF	IL-18, IL-6, IL-10, IL-17, IL-22, IL-27, IL-31, IL-33, IL-35, IL-36, IL-37, IL-38, IL-39, IL-40, IL-41, IL-42, IL-43, IL-44, IL-45, IL-46, IL-47, IL-48, IL-49, IL-50, IL-51, IL-52, IL-53, IL-54, IL-55, IL-56, IL-57, IL-58, IL-59, IL-60, IL-61, IL-62, IL-63, IL-64, IL-65, IL-66, IL-67, IL-68, IL-69, IL-70, IL-71, IL-72, IL-73, IL-74, IL-75, IL-76, IL-77, IL-78, IL-79, IL-80, IL-81, IL-82, IL-83, IL-84, IL-85, IL-86, IL-87, IL-88, IL-89, IL-90, IL-91, IL-92, IL-93, IL-94, IL-95, IL-96, IL-97, IL-98, IL-99, IL-100	CSF levels of IL-18, IL-6, IL-10, IL-17, IL-22, IL-27, IL-31, IL-33, IL-35, IL-36, IL-37, IL-38, IL-39, IL-40, IL-41, IL-42, IL-43, IL-44, IL-45, IL-46, IL-47, IL-48, IL-49, IL-50, IL-51, IL-52, IL-53, IL-54, IL-55, IL-56, IL-57, IL-58, IL-59, IL-60, IL-61, IL-62, IL-63, IL-64, IL-65, IL-66, IL-67, IL-68, IL-69, IL-70, IL-71, IL-72, IL-73, IL-74, IL-75, IL-76, IL-77, IL-78, IL-79, IL-80, IL-81, IL-82, IL-83, IL-84, IL-85, IL-86, IL-87, IL-88, IL-89, IL-90, IL-91, IL-92, IL-93, IL-94, IL-95, IL-96, IL-97, IL-98, IL-99, IL-100
3	Shen et al. 2016	RET	90	A.C	CSF	IL-18, IL-6, IL-10, IL-17, IL-22, IL-27, IL-31, IL-33, IL-35, IL-36, IL-37, IL-38, IL-39, IL-40, IL-41, IL-42, IL-43, IL-44, IL-45, IL-46, IL-47, IL-48, IL-49, IL-50, IL-51, IL-52, IL-53, IL-54, IL-55, IL-56, IL-57, IL-58, IL-59, IL-60, IL-61, IL-62, IL-63, IL-64, IL-65, IL-66, IL-67, IL-68, IL-69, IL-70, IL-71, IL-72, IL-73, IL-74, IL-75, IL-76, IL-77, IL-78, IL-79, IL-80, IL-81, IL-82, IL-83, IL-84, IL-85, IL-86, IL-87, IL-88, IL-89, IL-90, IL-91, IL-92, IL-93, IL-94, IL-95, IL-96, IL-97, IL-98, IL-99, IL-100	CSF levels of IL-18, IL-6, IL-10, IL-17, IL-22, IL-27, IL-31, IL-33, IL-35, IL-36, IL-37, IL-38, IL-39, IL-40, IL-41, IL-42, IL-43, IL-44, IL-45, IL-46, IL-47, IL-48, IL-49, IL-50, IL-51, IL-52, IL-53, IL-54, IL-55, IL-56, IL-57, IL-58, IL-59, IL-60, IL-61, IL-62, IL-63, IL-64, IL-65, IL-66, IL-67, IL-68, IL-69, IL-70, IL-71, IL-72, IL-73, IL-74, IL-75, IL-76, IL-77, IL-78, IL-79, IL-80, IL-81, IL-82, IL-83, IL-84, IL-85, IL-86, IL-87, IL-88, IL-89, IL-90, IL-91, IL-92, IL-93, IL-94, IL-95, IL-96, IL-97, IL-98, IL-99, IL-100
4	Alhaque et al. 2020	RET	11,920 4,100	A.O	CSF	IL-18, IL-6, IL-10, IL-17, IL-22, IL-27, IL-31, IL-33, IL-35, IL-36, IL-37, IL-38, IL-39, IL-40, IL-41, IL-42, IL-43, IL-44, IL-45, IL-46, IL-47, IL-48, IL-49, IL-50, IL-51, IL-52, IL-53, IL-54, IL-55, IL-56, IL-57, IL-58, IL-59, IL-60, IL-61, IL-62, IL-63, IL-64, IL-65, IL-66, IL-67, IL-68, IL-69, IL-70, IL-71, IL-72, IL-73, IL-74, IL-75, IL-76, IL-77, IL-78, IL-79, IL-80, IL-81, IL-82, IL-83, IL-84, IL-85, IL-86, IL-87, IL-88, IL-89, IL-90, IL-91, IL-92, IL-93, IL-94, IL-95, IL-96, IL-97, IL-98, IL-99, IL-100	CSF levels of IL-18, IL-6, IL-10, IL-17, IL-22, IL-27, IL-31, IL-33, IL-35, IL-36, IL-37, IL-38, IL-39, IL-40, IL-41, IL-42, IL-43, IL-44, IL-45, IL-46, IL-47, IL-48, IL-49, IL-50, IL-51, IL-52, IL-53, IL-54, IL-55, IL-56, IL-57, IL-58, IL-59, IL-60, IL-61, IL-62, IL-63, IL-64, IL-65, IL-66, IL-67, IL-68, IL-69, IL-70, IL-71, IL-72, IL-73, IL-74, IL-75, IL-76, IL-77, IL-78, IL-79, IL-80, IL-81, IL-82, IL-83, IL-84, IL-85, IL-86, IL-87, IL-88, IL-89, IL-90, IL-91, IL-92, IL-93, IL-94, IL-95, IL-96, IL-97, IL-98, IL-99, IL-100
5	Alhaque et al. 2020	RET	20,020 20,020	A.O	CSF	IL-18, IL-6, IL-10, IL-17, IL-22, IL-27, IL-31, IL-33, IL-35, IL-36, IL-37, IL-38, IL-39, IL-40, IL-41, IL-42, IL-43, IL-44, IL-45, IL-46, IL-47, IL-48, IL-49, IL-50, IL-51, IL-52, IL-53, IL-54, IL-55, IL-56, IL-57, IL-58, IL-59, IL-60, IL-61, IL-62, IL-63, IL-64, IL-65, IL-66, IL-67, IL-68, IL-69, IL-70, IL-71, IL-72, IL-73, IL-74, IL-75, IL-76, IL-77, IL-78, IL-79, IL-80, IL-81, IL-82, IL-83, IL-84, IL-85, IL-86, IL-87, IL-88, IL-89, IL-90, IL-91, IL-92, IL-93, IL-94, IL-95, IL-96, IL-97, IL-98, IL-99, IL-100	CSF levels of IL-18, IL-6, IL-10, IL-17, IL-22, IL-27, IL-31, IL-33, IL-35, IL-36, IL-37, IL-38, IL-39, IL-40, IL-41, IL-42, IL-43, IL-44, IL-45, IL-46, IL-47, IL-48, IL-49, IL-50, IL-51, IL-52, IL-53, IL-54, IL-55, IL-56, IL-57, IL-58, IL-59, IL-60, IL-61, IL-62, IL-63, IL-64, IL-65, IL-66, IL-67, IL-68, IL-69, IL-70, IL-71, IL-72, IL-73, IL-74, IL-75, IL-76, IL-77, IL-78, IL-79, IL-80, IL-81, IL-82, IL-83, IL-84, IL-85, IL-86, IL-87, IL-88, IL-89, IL-90, IL-91, IL-92, IL-93, IL-94, IL-95, IL-96, IL-97, IL-98, IL-99, IL-100
6	Shen et al. 2016	RET	20,020	A.C	CSF	IL-18, IL-6, IL-10, IL-17, IL-22, IL-27, IL-31, IL-33, IL-35, IL-36, IL-37, IL-38, IL-39, IL-40, IL-41, IL-42, IL-43, IL-44, IL-45, IL-46, IL-47, IL-48, IL-49, IL-50, IL-51, IL-52, IL-53, IL-54, IL-55, IL-56, IL-57, IL-58, IL-59, IL-60, IL-61, IL-62, IL-63, IL-64, IL-65, IL-66, IL-67, IL-68, IL-69, IL-70, IL-71, IL-72, IL-73, IL-74, IL-75, IL-76, IL-77, IL-78, IL-79, IL-80, IL-81, IL-82, IL-83, IL-84, IL-85, IL-86, IL-87, IL-88, IL-89, IL-90, IL-91, IL-92, IL-93, IL-94, IL-95, IL-96, IL-97, IL-98, IL-99, IL-100	CSF levels of IL-18, IL-6, IL-10, IL-17, IL-22, IL-27, IL-31, IL-33, IL-35, IL-36, IL-37, IL-38, IL-39, IL-40, IL-41, IL-42, IL-43, IL-44, IL-45, IL-46, IL-47, IL-48, IL-49, IL-50, IL-51, IL-52, IL-53, IL-54, IL-55, IL-56, IL-57, IL-58, IL-59, IL-60, IL-61, IL-62, IL-63, IL-64, IL-65, IL-66, IL-67, IL-68, IL-69, IL-70, IL-71, IL-72, IL-73, IL-74, IL-75, IL-76, IL-77, IL-78, IL-79, IL-80, IL-81, IL-82, IL-83, IL-84, IL-85, IL-86, IL-87, IL-88, IL-89, IL-90, IL-91, IL-92, IL-93, IL-94, IL-95, IL-96, IL-97, IL-98, IL-99, IL-100
7	Fernandez et al. 2020	RET	18,020 18,020	A.C	CSF	IL-18, IL-6, IL-10, IL-17, IL-22, IL-27, IL-31, IL-33, IL-35, IL-36, IL-37, IL-38, IL-39, IL-40, IL-41, IL-42, IL-43, IL-44, IL-45, IL-46, IL-47, IL-48, IL-49, IL-50, IL-51, IL-52, IL-53, IL-54, IL-55, IL-56, IL-57, IL-58, IL-59, IL-60, IL-61, IL-62, IL-63, IL-64, IL-65, IL-66, IL-67, IL-68, IL-69, IL-70, IL-71, IL-72, IL-73, IL-74, IL-75, IL-76, IL-77, IL-78, IL-79, IL-80, IL-81, IL-82, IL-83, IL-84, IL-85, IL-86, IL-87, IL-88, IL-89, IL-90, IL-91, IL-92, IL-93, IL-94, IL-95, IL-96, IL-97, IL-98, IL-99, IL-100	CSF levels of IL-18, IL-6, IL-10, IL-17, IL-22, IL-27, IL-31, IL-33, IL-35, IL-36, IL-37, IL-38, IL-39, IL-40, IL-41, IL-42, IL-43, IL-44, IL-45, IL-46, IL-47, IL-48, IL-49, IL-50, IL-51, IL-52, IL-53, IL-54, IL-55, IL-56, IL-57, IL-58, IL-59, IL-60, IL-61, IL-62, IL-63, IL-64, IL-65, IL-66, IL-67, IL-68, IL-69, IL-70, IL-71, IL-72, IL-73, IL-74, IL-75, IL-76, IL-77, IL-78, IL-79, IL-80, IL-81, IL-82, IL-83, IL-84, IL-85, IL-86, IL-87, IL-88, IL-89, IL-90, IL-91, IL-92, IL-93, IL-94, IL-95, IL-96, IL-97, IL-98, IL-99, IL-100

Table 1. Characteristics of Included Studies

Seven studies were reviewed with the total sample of 280 patients. We identified a variety of potential proteins obtained from CSF which was reflected in the overall increase of CSF inflammatory proteins concentrations in the acute phase of injury. We also found the concentrations variability in each AIS or Frankel grade. This finding could make it possible for CSF biomarkers to classify baseline AIS or Frankel grade objectively without having to conduct full sensory and motor examination. Six of seven studies also assessed the use of each biomarker in predicting improvement in six months post injury using conversion of AIS score and total motor score (TMS). Results show that higher concentrations of analyzed biomarkers are associated with more severe injury and lesser chance of neurological improvement. Dalkic et al. (2018) explain that this may be due to the association of more-severe injuries with a greater release of the analyzed proteins into the CSF. Furthermore, Each study reviewed addressed particular proteins with the most significant results which can be used and evaluated more comprehensively in future studies.

Despite the promising result, the size of each study is still limited, therefore, further studies with larger samples are required. Furthermore, factors and variability of subjects in their response to injury should be thoroughly assessed as the result might be confounded by a variety of factors.

CONCLUSION

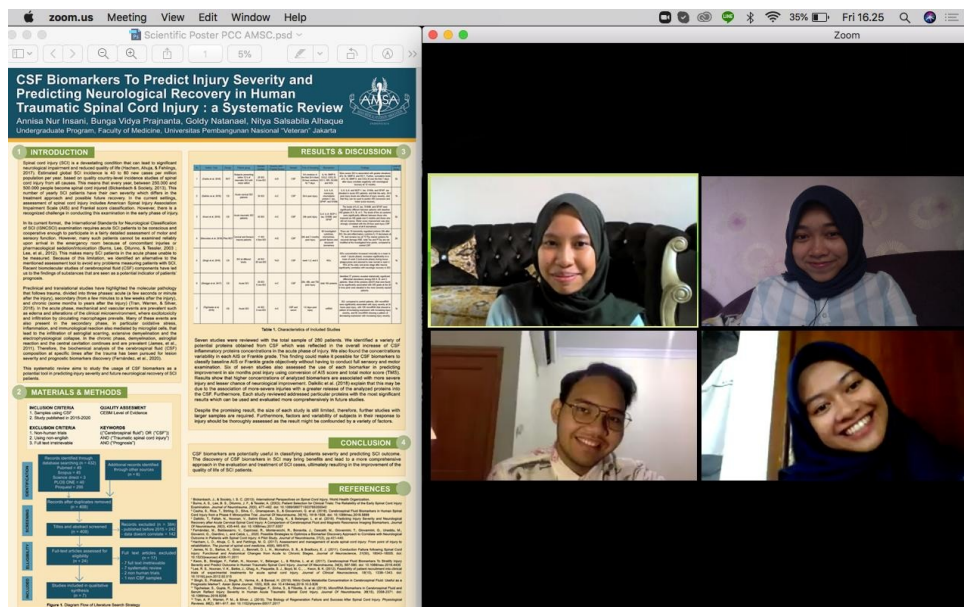
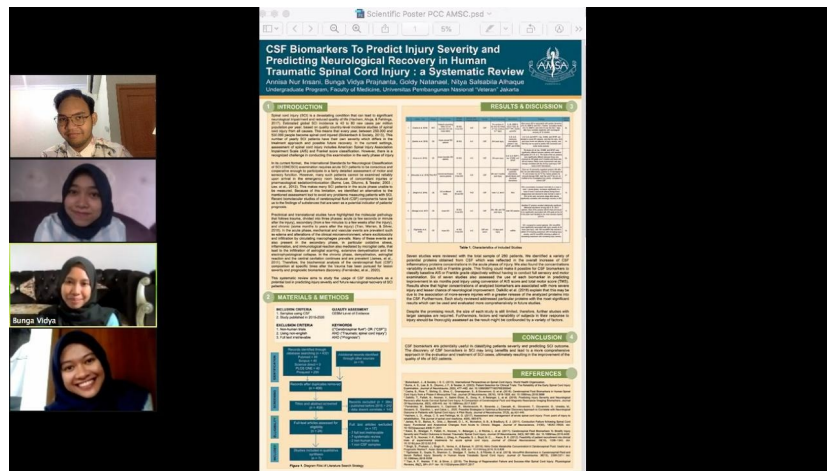
CSF biomarkers are potentially useful in classifying patients severity and predicting SCI outcome. The discovery of CSF biomarkers in SCI may bring benefits and lead to a more comprehensive approach in the evaluation and treatment of SCI cases, ultimately resulting in the improvement of the quality of life of SCI patients.

REFERENCES

- Birkenbach, J. A. Society, I. S. C. (2013). International Perspectives on Spinal Cord Injury. World Health Organization.
- Burns, A. S., Lee, B. S., Dittmann, J. F., & Tessler, A. (2003). Patient Selection for Clinical Trials: The Reliability of the Early Spinal Cord Injury Examination. *Spinal Cord*, 41(12), 877-882. doi: 10.1093/spin/41.12.877
- Chen, S., Rios, T., Saito, D., Silva, C., Ghajar, J., & Gharabaghi, S. (2018). Cerebrospinal Fluid Biomarkers in Human Spinal Cord Injury. *Journal of Neurotrauma*, 35(1), 1918-1928. doi: 10.1089/neu.2018.3508
- Dalkic, T., Fakh, N., Noonan, V., Salim Elzein, S., Dong, K., & Belanger, L. et al. (2018). Predicting Injury Severity and Neurological Recovery after Human Spinal Cord Injury: A Comparison of Cerebrospinal Fluid and Magnetic Resonance Imaging Biomarkers. *Journal of Neurotrauma*, 35(3), 435-445. doi: 10.1089/neu.2017.3537
- Fernandez, M., Saldarriaga, V., Capriles, R., Morewicz, R., Borawski, J., Casco, M., Giovanni, T., Giovanni, G., Uredski, M., Giovanni, G., Giordano, L., and Catta, L. (2020). Possible Strategies to Optimize a Biomarker Discovery Approach to Correlate with Neurological Outcomes in Patients with Spinal Cord Injury: A Pilot Study. *Journal of Neurotrauma*, 37(1), 40-43-440.
- Hatchem, L. D., Ahuja, C. S., and Fallings, M. G. (2017). Assessment and management of acute spinal cord injury: From point of injury to rehabilitation. *The Journal of spinal cord medicine*, 40(6), 668-675.
- James, N. D., Barlas, K., Graf, J., Bennett, D. L., H., Morrison, S. B., & Bradbury, E. J. (2011). Conversion Failure following Spinal Cord Injury: Functional and Anatomical Changes from Acute to Chronic Stages. *Journal of Neurotrauma*, 28(12), 1864-1876. doi: 10.1089/neu.2010.3061-3071
- Yoon, B., Sengco, F., Fakh, N., Noonan, V., Belanger, L., & Ritchie, L. et al. (2017). Cerebrospinal Fluid Biomarkers To Stratify Injury Severity and Predict Outcomes in Human Traumatic Spinal Cord Injury. *Journal of Neurotrauma*, 34(3), 567-580. doi: 10.1089/neu.2016.3405
- Lee, K. S., Noonan, V., Fakh, N., Ghajar, A., Paudyal, S., Boyd, M. C., & Kwon, B. K. (2012). Feasibility of patient recruitment to clinical trials of experimental treatments for acute spinal cord injury. *Journal of Clinical Neurotrauma*, 19(10), 1338-1343. doi: 10.1186/1744-7354-19-10
- Singh, S., Prasad, S., Singh, R., Verma, A., & Bhatia, H. (2016). Role of Cerebrospinal Fluid Biomarkers in Predicting Neurological Recovery in Human Spinal Cord Injury. *Journal of Neurotrauma*, 33(1), 105-115. doi: 10.1089/neu.2015.3301
- Tran, A. P., Warren, M. S., & Silver, J. (2015). The Biology of Regeneration Failure and Success After Spinal Cord Injury. *Physiological Reviews*, 95(2), 981-917. doi: 10.1152/physrev.00017.2015

Dalam wawancara *online* yang dilakukan dengan Humas UPNVJ, Annisa juga menjelaskan bagaimana proses pelaksanaan kegiatan ini dari awal serta membagi cerita suka dan duka selama proses pembuatan poster belangsung, "Jadi untuk prosesnya sendiri diawali dengan *brainstorming* mengenai topik bahasan dan juga konsultasi kepada dosen yang memang ahli pada bidang *traumatologi*. Seluruh proses pembuatan *systematic review* dilakukan bersama - sama via *online discussion*. Setelah selesai, sentuhan terakhir yang tidak kalah penting adalah memperindahkannya dengan desain poster yang menarik. Untuk kesan suka dan dukanya, pengalaman awal sekali bagi kami mengikuti lomba *scientific* seperti ini. Tentunya memberikan banyak pelajaran bagi kami pribadi. Awalnya cukup sedih karena tidak bisa mengerjakannya dengan tatap muka langsung karena ada hambatan pandemi, tetapi berkat dukungan dari teman - teman, semangat kami tidak menyerah untuk melanjutkan karya ini walaupun Svia daring". Ungkap Annisa

"Semoga prestasi ini menjadi pacuan dan motivasi untuk kami pribadi dan teman teman sekalian untuk bisa mengeksplorasi lebih banyak ilmu dan terus membuat karya - karya menarik dan bermanfaat lainnya". Lanjutnya



Export tanggal : Jumat, 26 Juni 2026 Pukul 04:32:02 WIB.

Exported dari [<https://www.upnvj.ac.id/id/berita/2020/04/prestasi-membanggakan-diraih-oleh-mahasiswa-fk-upnvj-pada-lomba-pcc-amsc-2020.html> (<https://www.upnvj.ac.id/id/berita/2020/04/prestasi-membanggakan-diraih-oleh-mahasiswa-fk-upnvj-pada-lomba-pcc-amsc-2020.html>)]
