

Review

Death in custody in Spain: Excited delirium syndrome. Importance of a multidisciplinary approach

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ABSTRACT

This article aims to analyse the excited delirium syndrome, especially, when Law Enforcement Officers have to make use of force and deaths in custody occur. Through a bibliographic review, inferences have been obtained to identify, in first place, what a death in custody is and the differences between positional asphyxia and excited delirium syndrome. Subsequently, we have summarized the major findings that the medical examiner should look for in order to diagnose the excited delirium syndrome from the scene examination, the autopsy and the complementary analysis. Finally, we propose some directives that may help to avoid the death of these subjects and to study them in case they occur.

1. Introduction

Deaths in custody (DiC) have always been newsworthy.¹ In Spain the cases of Roquetas² and Mame Mbaye in 2018 hit the headlines. International demonstrations followed the George Floyd case disturbances in the USA in 2020, where serious incidents occurred, particularly between police departments and the Black Lives Matter group, resulting in the prohibition of some restraint techniques and severe cuts in police budgets.³ By definition, a DiC can occur at any time during the restriction of the individual's liberty; all such deaths are included, natural or due to violence, suicidal or homicidal. Deaths in the custody of health institutions are also included.⁴ Mandatory judicial autopsies are required in all these cases. DiCs resulting from police interactions have special relevance; if arising from the use of force, criminal cases may be initiated. If Positional Asphyxia (PA) was used, the DiC may be regarded as homicidal, leading to the conviction of the police officer(s) involved. In many such cases, descriptions indicate an active Excited Delirium Syndrome (ExDS). Some 10% of detainees with ExDS in police custody are thought to be at risk of death.⁵ It is essential to differentiate these deaths from those due to natural causes (where police responsibility and drug

use can be excluded) or to accidental death (if the ExDS is a secondary event to the use of drugs of abuse). They are not homicides.¹

The medical examiner in DiC cases takes on a special role as they must perform a detailed study to clarify the cause and differential diagnosis of the manner of the death.^{6,7}

The aim of this study is to carry out a bibliographic review to examine whether the most frequent cause of DiC is ExDS or PA, which is of great importance to conclude if they are homicidal deaths, with possible responsibility for the officers involved, or not. Emphasis will be placed on reviewing the role and the methodology of the medical examiner in the study of these deaths. Finally, based on the review carried out, certain actions will be proposed aimed at an adequate handling of these cases to prevent both the fatal outcome for the subjects and the legal consequences for the officers involved.

2. Materials and methods

A bibliographic review of the concepts has been carried out: DiC, ExDS and PA. Three phases have been used: search, organize and analyse of information.

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The bibliography search sources have been: Dialnet, Elsevier, Google Scholar, Medline, PubMed, ResearchGate. Articles both in Spanish and English have been taken into account. The search was carried out during February 2021 without temporary exclusion criteria.

The terms used in the search have been: “muertes en privación de libertad”; “muertes bajo custodia”; “muertes en custodia”; “death in custody”; “síndrome del delirio agitado”; “síndrome agitado”; “delirio agitado”; “delirio excitado”; “delirium agitado”; “delirium excitado”; “excited delirium syndrome”; “excited delirium”; “ExDS”; “asfixia posicional”; “positional asphyxia”.

A screening was carried out by reading the title and abstract of the articles. The results obtained have been applied as exclusion criteria to those studies where DiC occurred:

- with no symptoms of ExDS,
- because of pharmacological restraint,
- due to prolonged restraint (over than 3 h).

Articles that exclusively studied information regarding the use of lethal and less-lethal weapons were excluded.

3. Results

Due to the exclusion criteria applied to the search, finally 55 studies were reviewed (Fig. 1).

3.1. Positional asphyxia

Asphyxia is the difficulty or arrest of respiratory function.⁸ In order to avoid hypoxia three requirements are necessary: a clear airway, correct lung function, and effective gas exchange.⁹ PA, also known as asphyxia by restraint,¹⁰ occurs when the body adopts a position that interferes with any of these requirements.¹¹ Traditionally this concept has been used when a person dies due to restraint performed by other subjects, including police and sanitary personnel.

3.2. Excited delirium syndrome

The ExDS was described for the first time in 1849 by Dr. Bell,¹² initially called Bell's Mania. With the outbreak of cocaine in North America in the 1980s, the syndrome varied. Patients cause public disorders, subsequently a very intense struggle with first responders, present a sudden muscle relaxation and die from cardiorespiratory failure.¹³ The struggle of the officers with the subject to restrain him is a stressor that increases catecholamines and metabolic acidosis, being a risk factor for a fatal outcome in subjects with ExDS.¹⁴ Numerous of the deceased in these circumstances die within a few minutes after a struggle with police officers.¹⁵

In 2009, ExDS was recognized as a pathological entity by the American College of Emergency Physicians (ACEP)¹⁵ and, in 2017, by the National Association of Medical Examiners.¹⁶ However, the World Health Organization and the American Psychiatric Association do not include it as psychiatric entity in their respective ICD and DSM. In the United Kingdom, the Faculty of Forensic & Legal Medicine⁵ uses *acute behavioral disturbance*, an umbrella term that encompasses severe behavioral disturbances, defining ExDS as the most extreme and potentially fatal disorder.

One of the common characteristics in the bibliographic reviewed is the difficulty to define the ExDS,¹⁵ its aetiology and the mechanism of death. Possible risk factors and pathophysiological mechanisms have been raised (Table 1), a multifactorial origin being more likely.

In 90% of the cases of ExDS there will be the presence of drugs of abuse and in 50% the subjects had a history of mental illness.¹⁶

There is a greater consensus when it comes to the symptoms of ExDS. In 2009, the ACEP listed ten symptoms present in the ExDS and, subsequently, the National Institute of Justice of the United States expanded

them to thirteen. A subject is considered to suffer ExDS when he shows at least six of the following symptoms:^{15,25}

- extremely aggressive or violent behaviour,
- agitation or constant physical activity,
- hyperthermia,
- not responding to police presence,
- attraction to glasses/reflecting objects and tendency to break them,
- naked or inappropriately clothed for environment,
- attraction to bright lights or loud sounds,
- rapid breathing,
- profuse sweating,
- intelligible noises or sounds,
- tolerant to pain,
- superhuman strength and
- unusual stamina despite physical activity.

Confusion and hallucinations are also symptoms included by other authors.²³ Nevertheless, DiC cases due to ExDS with fewer than 6 symptoms have been reported.¹ Recently, a subject with 5 symptoms died while being handcuffed in prone position. No struggle was described.²⁶

The guidelines of the Faculty of Forensic & Legal Medicine⁵ indicate that the presence of only one of these three symptoms, hyperthermia, near constant physical activity or extreme agitation/aggression, is enough to suspect ExDS.

In Spain, the features of the patients with ExDS are: male with an average age of 38 years, overweight, chronic drug user, with previous heart pathologies and presence of drugs, mainly cocaine, at the time of suffering the agitation.²⁷ Of the 41 DiC in Málaga, between 2004 and 2012, 5 cases (12.2%) were due to ExDS.²⁸

However, controversy has been created around ExDS. First, whether its existence is a scapegoat to cover up police excessive use of force.^{29,30} Second, it is questioned whether ExDS can be a natural cause of death by itself or whether restraint must exist as a contributing factor.³⁰

3.3. Death in custody: positional asphyxia vs. excited delirium syndrome

The term DiC was first used in a 1982 Seattle study³¹: two subjects in an acute state of physical and psychiatric agitation died suddenly while being restrained by police officers. It was concluded that the cause of the deaths was PA due to the strangulation technique used by the officers.

This study initiated a line of research of DiC that occurred during the arrest of people who had an acute episode of agitation caused by drug use, especially cocaine. The conclusions of these studies blamed the techniques used by police departments and established the PA as the cause of death, especially strangulations, prone position, prone position with weight on the back and hogtied¹ position.^{9,31–33} This approach considered DiC as a homicide. Due to these studies, some North American police departments banned the aforementioned techniques from their protocols.³⁴

The line of research that pointed to the police officers' actions and the PA as the cause of death, was criticized for its lack of depth in the study of the techniques. Thus, experimental studies were initiated with people in the controversial positions. The outcomes reflect the positions did not compromise the ventilatory or circulatory function of the subjects, but rather increased the stress levels.^{11,35–39} These studies concluded that in deaths from ExDS during restraint the most influential factors were the catecholamines, drug use and their effects on the cardiac function. Positions have been thoroughly analysed: one study placed 102.3 kg on the back of a hogtied subject, without affecting

¹ It is named for the similarity of the final position with a swine with the legs tied. The subject is positioned prone, with the hands handcuffed and the feet shackled. The limbs are attached with a restrain strip.

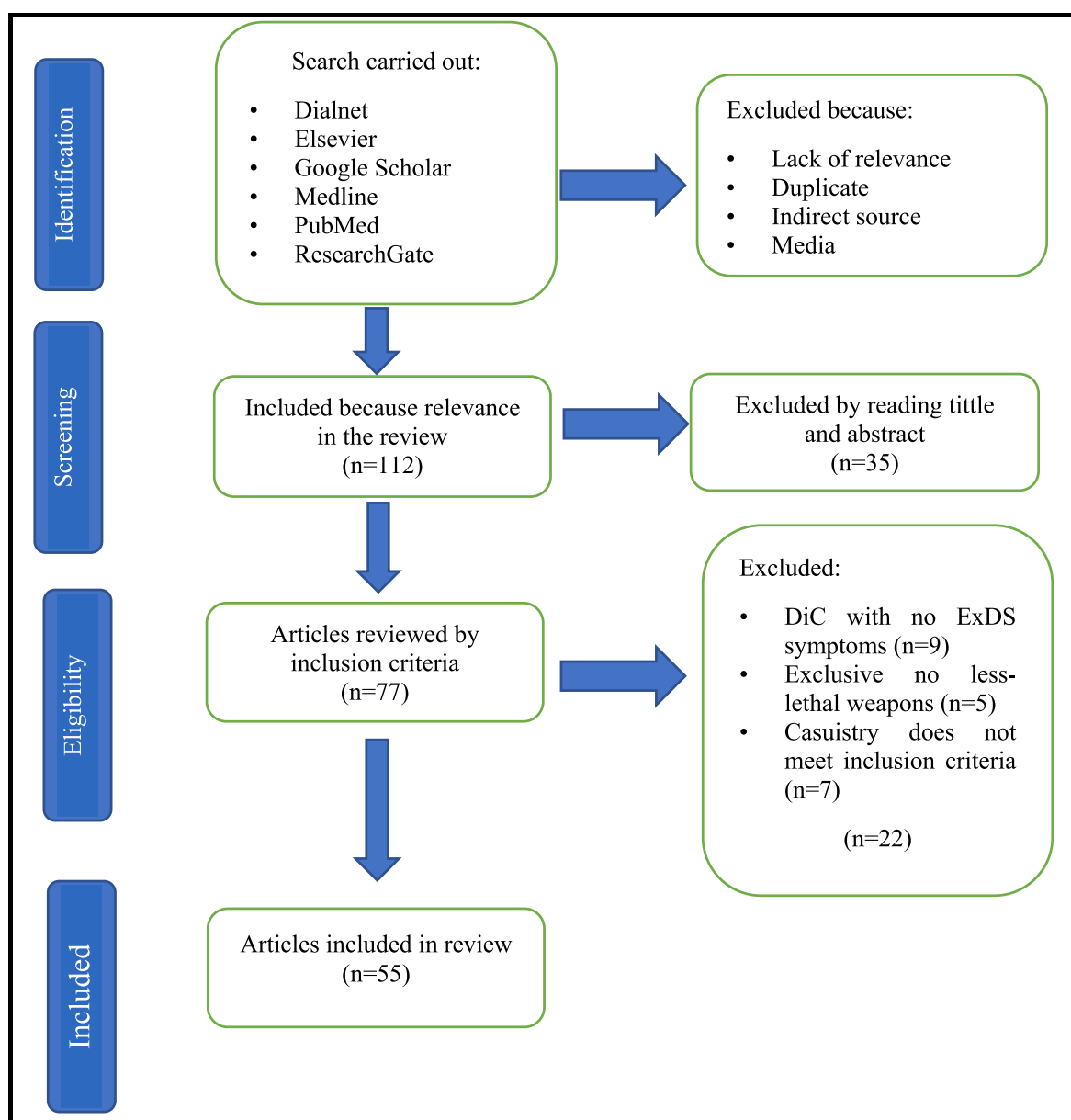


Fig. 1. Article selection flow chart.

Table 1

Main risk factors and pathophysiological mechanisms described in the ExDS.^{14,16–24}

Risk factors that increase mortality in the ExDS	Described pathophysiological mechanisms
Male	Tachycardia, tachypnea, and hypertension
Obesity	Increased release of catecholamines
Genetic susceptibility	Significant increase in the discharge of cortisol and orexin
Mental illness, especially paranoid schizophrenia and bipolar disorder	Alteration in neuronal dopamine receptors
History of cardiac pathology	Metabolic acidosis
Presence of stimulant substances, mainly cocaine	Rhabdomyolysis
Increased stress	Arrhythmias and Takotsubo pathology
Struggle/arrest by police (physical, chemical or electrical)	Hypokalemia after the struggle
Genetic susceptibility	Tachycardia, tachypnea, and hypertension

ventilatory function.³⁸ None compromise was either observed in the inferior vena cava in subjects placed in prone position with 67 kg on the back.³⁷

Currently, identical results are still being obtained⁴⁰: asphyxia is not a cause of death if positions performed correctly,⁴¹ although they do generate stress. The position in which the police officer kneels on the subject's back has been also analysed: even in overweight officers, PA is not produced.⁴²

Simultaneously, other studies observed that the deaths produced in these restraints should not have been caused by PA or excessive strength in police techniques. After studying four cases of deceased individuals with minor cranioencephalic traumatism, it was concluded that the injuries were not fatal.⁴³ Rather, death was caused by an arrhythmia due to the stress generated by the fight-or-flight² response and ExDS, related to drug use.

² Response of the sympathetic nervous system to a survival situation. By secreting hormones, the body prepares to fight or flight.

A recent study in Canada,¹⁷ with data from 4828 cases of use of force by police, revealed that in 1.5% of these interactions, the subject had 6 or more symptoms of ExDS. Of these, 9.2% were considered to be at risk of sudden death while in police custody. Death usually occurs after an intense struggle followed by cardiorespiratory failure.²³

More studies have been published^{41,44} relating DiC with ExDS and the use of force in subjects under the influence of drugs, intense emotional stress or having a psychiatric pathology. The struggle involves an increase in stress on the subject. The prone position implies a significant increase in stressors and is considered a risk factor for the person with ExDS to end up dying, usually within minutes of ending the struggle.^{16,45}

In Spain, statistics on DiC are only made in the penitentiary field, through an annual report.⁴⁶ Otherwise, there is a lack of real data on the scope of DiCs at a national level and in the police area. The lack of DiC records occurs in other European countries.^{6,7}

3.4. Forensic medicolegal study of DiC when ExDS is suspected

The diagnosis of ExDS is made by ruling out the existence of findings that justify other cause of death and contextualizing them with the clinical status of the deceased before death.^{26,47,48} Given the possible consequences for police officers depending on the forensic conclusions to determine the death as homicidal or not, a systematic and protocolized study is required to discard any other cause of death instead of the ExDS.⁴⁷ Forensic diagnosis is especially difficult if the death occurs during or shortly after the struggle with officers or the application of restraint means, conducted energy weapons or pepper spray.²³

At the time of the forensic evaluation of a case of ExDS, a differential diagnosis should be made with other entities that can cause sudden death and behavioural disturbances, including intoxications and traumatic deaths, especially those associated with police interactions. The White Paper Report on Excited Delirium Syndrome collects with the mnemonics “AEIOU TIPS” and “SMASHED 2” the differential diagnoses that must be assess (Tables 2 and 3).¹⁶

The forensic procedure begins with the scene examination. It must be meticulously studied to obtain data regarding the clinical status of the patient before death, as well as information on any other circumstance of interest (resuscitation attempts, medical procedures performed ...). It is also necessary to determine how the police restraint occurred.⁴⁵ Some of the publications give special importance to the testimony of the witnesses and to the viewing of videos of the events, in the case they exist.^{1,4,45,49}

Before initiating the autopsy, it is important to consider the medical history of the subject, specially the cardiac and psychiatric history and any information about use of substances of abuse.¹⁵ Subsequently, a radiological study will be necessary to visualize significant trauma. Furthermore, multiple abrasions and secondary trauma are common in subjects who hit their head against objects or jump from stairs or windows.²³ Therefore, the external examination of the corpse must exhaustively evaluate the existing injuries and their severity to exclude if any of them could be important enough to cause death. It should be

Table 2

Mnemonic “AEIOU TIPS” for the differential diagnosis of mental disorders.

Letter	Description
A	Alcohol
E	Endocrine, Encephalopathy, Electrolytes
I	Insulin (hypoglycemia)
O	Oxygen (hypoxia), opiates (drugs of abuse)
U	Uremia
T	Toxins, trauma, temperature
I	Infection
P	Psychiatric, porphyria
S	Stroke, shock, subarachnoid hemorrhage, space-occupying central nervous system lesion

Table 3

Mnemonic “SMASHED 2” for the differential diagnosis of mental disorders.

Letter	Title	Description
S	Substrates	Glucose (high/low), thiamine deficiency
M	Sepsis	All CNS infections, HIV dementia, encephalitis, brain abscess or toxoplasmosis
	Meningitis	
	Mental illness	Acute psychosis, medication noncompliance, mania, depression, malingering, rage, suicide intent (via police)
A	Alcohol	Intoxication or withdrawal
	Accident	Head trauma, CVA, cerebral contusion, subdural or epidural hematoma
S	Seizing	Or postictal
	Stimulants, hallucinogens, anticholinergics	Cocaine, amphetamines, caffeine, PCP, LSD, keta-mine, psilocybin, antihistamines, atropine, scopolamine, jimson weed
H	Hyper	Hypertension, hyperthyroidism, hypercarbia, hyperthermia
	Hypo	Hypotension, hypothyroidism, hypoxia, hypothermia
E	Electrolytes	Hyper/hyponatremia, hypercalcemia
	Encephalopathy	Hepatic, HIV, uremic, hypertensive, lead, Reye's syndrome, CNS tumour
D	Drugs	Intoxication or withdrawal
	Do not forget other drugs	Carbon monoxide, lithium, steroids, salicylates, designer/street drugs, theophylline, MDMA, antipsychotics, toxins not on routine drug screen, others

taken into account that some typical signs of asphyxia, such as the presence of petechiae, have also been described in cases of ExDS.²³ Injuries or thoracic trauma, that can be associated with PA, can also be present in these cases either due to the trauma that the subjects self-inflict at the time of delirium or due to the restrain techniques. The internal examination should exclude possible causes of sudden death. Meticulous cutaneous dissection including not only the neck but also the face, the limbs and even the dorsal region may be required. Emphasis should be placed on ruling out asphyxia deaths, especially with a thorough dissection of the cervical region. In cases where the medical examiner suspects ExDS, complementary tests (Table 4) aimed at excluding other causes of death and discovering other circumstances of the case will be of major relevance. After careful examination, ExDS is characterized by the absence of a specific cause of death.^{15,48}

4. Discussion

DiC have been associated with the struggle and police restraint, even blaming the officers for the death. Nonetheless, extensive casuistry of these DiC is secondary to ExDS, with the struggle being a complementary cause and not the direct cause of death. These cases usually hit the headlines.⁴¹ This, combined with possible consequences for police, requires meticulous forensic study of both the cause and the manner of

Table 4

Complementary analysis relevant to the forensic medical study of the ExDS.

Complementary studies in suspected cases of ExDS ^{1,13,17,22,23}	
Histopathology	Samples to discard sudden death Laryngeal skeleton for strangulation study Study of dopamine receptors/markers and heat shock proteins in the brain Dissection of electrical injuries in case of use of conducted energy weapons
Toxicological	Search for drugs of abuse (cocaine, amphetamines, ecstasy, etcetera), hallucinogenic drugs, and anticholinergic medication. Rule out intoxication
Biochemistry	Search for metabolic acidosis and rhabdomyolysis Study of glycemia in the vitreous humor
Genetics	Discard cardiac pathologies without substrate at autopsy such as Brugada syndrome or long QT

death.⁵⁰ Diagnosing ExDS constitutes a real challenge for medical examiners.^{13,50} Since this entity does not have a substrate that allows its diagnosis¹⁵ it is common to certify the techniques used during the containment of the person as a cause of death.^{9,31,43,51,52}

Beyond forensic action, it is essential to carry out a multidisciplinary protocol in which sanitary personnel, police officers and medical examiners participate in coordination both to prevent these deaths as far as possible and to correctly channel the medicolegal study of these cases.

At the time an incident involving subjects with ExDS is reported to the central emergency services, not only police officers but also medical services should be activated. If the officers on the scene observe a person with ExDS compatible symptoms, emergency health resources must be notified by them. In fact, in the United Kingdom, the Faculty of Forensic & Legal Medicine,⁵ considers that a person exhibiting hyperthermia, agitation or constant activity, should be treated as a medical emergency, not as an exclusively police situation. Early treatment of these patients is assured.

The initial management of these subjects requires verbal restraint, if possible, but in most cases, it will be insufficient, so some type of sedation will be required. Oral administration will be used preferably, if is not, intramuscular or parenteral administration will be required. If the environment allows it, provide space and time, to reduce the agitation autonomously without restraint.⁵ Avoiding the struggle of these subjects with officers through sedation may be useful to reduce their risk of death.^{14,16} However, we must be realistic and assume that the majority of ExDS patients will require the use of force by police.¹ Subjects suspected of having ExDS and who are restrained and detained should not be transferred to the police station but to the hospital.⁵ As well as those to whom sedation is applied, whether it has had an effect or not. In the event of death, the first step for the forensic study of an ExDS is to suspect it¹⁶ and, hence, to try to diagnose the cause of death using a meticulous methodology that includes a differential diagnosis with other entities that produce compatible symptoms, search for toxic substances and exclude other violent causes of death. Discarding other processes that may be the cause of death will be the main method to conclude the existence of an ExDS. Next, the manner of death must be established. ExDS diagnosis will avoid classifying the death as homicidal if the cause is the ExDS and thus prevent erroneous criminal investigations against these professionals.

In addition, it is essential to train the professionals who will be involved in the incident, since the first step will be for both the sanitary personnel and the law enforcement officers to be able to identify the ExDS as such, thus adapting their strategy and treat the patient as a medical emergency.¹⁷ Furthermore, it is very important that police officers have adequate training in restraint techniques and specifically in how to perform arrests in these cases. Physical containment of a subject with EXDS should be the last option, prioritizing medical treatment.⁵³ If necessary or in the absence of sanitary personnel, it will be as brief as possible, since prolonged intense struggle increases catecholamines. Strangulations, impacts and the hogtied position are not recommended, and as far as possible, thoracic compression will be avoided, prioritizing the control of the limbs in the supine position. If there is a sufficient number of first responders at the scene, one of them must assume the role of evaluating the subject, monitoring the breathing pattern and detecting a sudden collapse.^{25,54}

To know the scope of DiC in our setting, retrospective and prospective studies must be carried out, aiming to classify which are ExDS and which are not. Likewise, the creation of a DiC registry by the competent authority is proposed.^{28,55}

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Informed consent

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Research involving human participants, their data or biological material

No.

CRedit authorship contribution statement

David Martín-Ayuso: Conceptualization, Methodology, Writing – original draft, preparation. **Juan José Pajuelo Castro:** and. **Andrés Santiago-Sáez:** and. **Benjamín Herreros:** Writing – review & editing. **Pilar Pinto Pastor:** Conceptualization, Writing – review & editing, All authors read and approved the final manuscript.

Declaration of competing interest

The authors have no financial, personal, academic, or other conflicts of interest in the subject matter discussed in this manuscript.

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