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AUTO+ NEDICAL

THÈSES

MEDICAL LEGACY

As Professor Gérard Saillant steps down as President of the FIA Medical Commission, he looks back on an exceptional career in sport medicine



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INTRODUCTION/

After 10 years as President of the FIA Medical Commission, Professor Gérard Saillant is due to stand down as only the second person to have held the office, succeeding Professor Sid Watkins in 2011. We look back at his career and wish him well after leading the FIA and motor sport through one of the most difficult periods in our history, dealing with the Coronavirus pandemic.

Safety has always been of the highest priority for the FIA. Our main feature on simulation based accident analysis shows the commitment of the FIA to safety and research, and we have just seen the justification of this with Romain Grosjean walking away from a huge impact and subsequent fire with minimal injuries. We salute the bravery of Dr Ian Roberts and the others involved and recognise the value of training and work that goes on behind the scenes to make this possible.

COVID-19 continues to affect us all. The impact on all sport has been enormous and the rigorous processes put in place by the FIA to ensure motor sport has been able to continue are guite remarkable, supported by an expert medical panel headed by Professor Eric Caumes, Head of Infectious and Tropical Diseases at the Pitié- Salpêtrière Hospital in Paris, and Professor Gérard Saillant.

In our scientific section Dr Matthew MacPartlin reviews the STAAMP trial and the use of Tranexamic Acid in pre hospital care, something we should all read.

Finally news of other members of our Editorial Board. Congratulations to Dr Rob Seal who is to be inducted into the Canadian Motorsport Hall of Fame and farewell and best wishes to Dr Pau Mota who is leaving the FIA to join the IOC at the end of the year. We look forward to 2021 when hopefully we can return to some sort of normality in our sport, until

then stay safe.

The Editorial Board

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GLOBAL NEWS



FIA LAUNCHES INVESTIGATION INTO ROMAIN GROSJEAN'S BAHRAIN CRASH

The FIA has initiated a detailed analysis of Romain Grosjean's accident marshal there with an extinguisher at the 2020 Bahrain Grand Prix.

Contact between the Haas driver and Daniil Kvyat's AlphaTauri sent the Frenchman into the barriers on the inside of the track just after Turn 3. causing the VF20 to split in two on impact before being engulfed in flames.

Grosjean, who remained conscious throughout, was able to extract himself from the wreckage as the FIA Medical team, led by Dr Ian Roberts and driver Alan van der Merwe, arrived on-site within seconds.

"I could see Romain trying to get up and we needed some way of getting to

him," said Dr Roberts. "We've got the and the extinguisher was just enough to push the flame away as Romain got high enough to then reach over and pull himself over the barrier."

Grosiean suffered burns to his hands and ankles, but further x-rays taken at the hospital confirmed he sustained no fractures.

The accident investigation will look at all areas including competitor safety devices such as the helmet, HANS, safety harness, protective clothing, survival cell, headrest, in-car extinguisher system and the Halo frontal cockpit protection. Analysis will

also include chassis integrity and the safety barrier performance for an impact of that energy and trajectory, as well as the role of track marshals and the medical intervention team.

FIA Safety Director Adam Baker said: "As with all serious accidents, we will analyse every aspect of this crash and collaborate with all parties involved. With so much data available in Formula 1, it allows us to accurately determine every element of what occurred. We take this research very seriously and will follow a rigorous process to find out exactly what happened before proposing potential improvements."

FIA PAYS TRIBUTE TO RED CROSS' ROLE IN FIGHTING COVID-19 PANDEMIC

FIA President Jean Todt has paid tribute to the work carried out worldwide by Red Cross teams since the beginning of the COVID-19 pandemic.

The President met with local Red Cross teams in Bergamo, Italy, an area particularly affected throughout the pandemic, to provide

support for their actions just two days before the Italian Grand Prix at the nearby Monza circuit. He was joined by Francesco Rocca, President of the IFRC, along with a delegation of FIA and ACI officials, as well as the Mayor of Bergamo, Gorgio Gori, and Maurizio Bonomi,



FIA FORMALISES EXPERT MEDICAL PANEL HEADED BY PROF ERIC CAUMES

The FIA has formalised the expert medical panel to be at the disposal of all FIA stakeholders during the ongoing COVID-19 pandemic.

At the World Motor Sport Council Meeting in October the medical panel was confirmed by President Jean Todt, along with FIA Deputy President Graham Stoker and members joining remotely from locations across the globe.

The expert medical panel is headed by Professor Eric Caumes, head of the Infectious and Tropical Diseases at the Pitié-Salpêtriêre Hospital in Paris, and Professor Gérard Saillant, who has led the FIA's Coronavirus response.

President of the

Bergamo Red Cross. The two organisations have collaborated since 2014 on a partnership for road safety, and this year started a new agreement to join forces against the COVID-19 pandemic, including financial support of nearly €2 million. The partnership also helped Formula One become the first international sporting competition to resume this summer.

"In Bergamo and around the world, IFRC teams are carrying out vital work against the COVID-19 pandemic and the FIA is committing all its energy, as well as that of the motor sport community and the international network of its Member Clubs to support them," said President Todt.

"In these difficult times, health, sport and mobility must work together."

This follows the successful introduction of the Return to Motor Sport Guidelines issued earlier this year, which features the COVID-19 Code of Conduct and was used in major championships including the FIA Formula One World Championship, FIA World Endurance Championship and FIA World Rally Championship.

It has been key to ensuring the safe restart of most motor sport events, along with Appendix S of the International Sporting Code, which has recently been extended to be enforced at all FIA-sanctioned national events worldwide.

DR ROB SEAL TO BE INDUCTED IN HALL OF FAME

The Canadian Motor sport Hall of Fame (CMHF) has included Dr Rob Seal in the latest list of inductees for his work in motor sport medicine.

The CMHF commends Dr Seal for being one of the five founding members of the Canadian Motor sport Response Team, which went on to develop the Medical Extrication Device use to remove drivers from vehicles.

Dr Seal is also chairman of the International Council of Motor sports Sciences, and has been involved with Road Track Safety Program and One Stop Strategy Motor sports.

Fourteen individuals were picked by 42 people that represent the full spectrum of Canadian motor sport, and will be inducted into the competitors, motor sport builders, team members, significant contributors and media categories.

"We are very proud to announce this year's group of new inductees. We were extremely pleased with the quality of the nominations put forward and we thank everyone for their excellent submissions," said CMHF Chair, Dr Hugh Scully.

"I would also like to thank the members of the selection committee for their meticulous work reviewing the nominations," added Dr Scully. "On behalf of the CMHF, we applaud the achievements and contributions of the new members and we look forward to welcoming them to the Hall."

NATORI MISSES SUPER FORMULA ROUND DUE TO DEHYDRATION

Teppei Natori withdrew from the Super Formula season-opener at Motegi, Japan after suffering from dehydration.

Due to the COVID-19 travel restrictions stopping Super Formula regulars Sergio Sette Camera and Charles Milesi from making it out to Japan, Natori had to substitute in alongside his Super Formula Lights commitments.

This would have meant taking part in three races on the Sunday; the Super Formula Lights support race in the morning, the main Super Formula race, and then immediately after the final Super Formula Lights race.

The weekend was not made easier for the 19-year-old as the temperature reached 34 degrees centigrade. Following a podium on the Saturday in the support race, Natori opted to withdraw due to suffering from dehydration.

After being taken to the medical center for evaluation Natori was cleared to compete in final practice and qualifying in Super Formula.

Natori eventually chose not to continue with the rest of the Super Formula weekend, instead competing in both Super Formula Lights races on the Sunday morning and afternoon finishing seventh and fifth respectively.



ASKEW FORCED TO MISS INDYCAR DOUBLE HEADERS DUE TO CONCUSSION



IndyCar driver Oliver Askew was forced to miss the double-header IndyCar races at Indianapolis on medical grounds.

Askew admitted that following his heavy Indy 500 crash in August this year, he has since been suffering from concussion struggles.

"Initially I felt like I needed to stay in the car and continue to improve," said Askew. "And then I didn't feel like I could do that with my condition and what was going on. I was starting to lose confidence in myself. "If I had not gone to see medical

FIA EXTENDS THE SCOPE OF COVID-19 CODE OF CONDUCT

The FIA has extended the scope of the COVID-19 Code of Conduct to include all FIAsanctioned championships, cups, trophies, challenges, and international series.

This extension lists the same key sanitary measures under Appendix S of the International Sporting Code, which have been used in Formula One and other international championships since they restarted.

This includes mandatory social distancing, PCR pre-testing, wearing of face masks and hand hygiene, with adapted implementation to a smaller organisational structure. professionals I would probably stay in the car. But now after hearing what's wrong and that it could get worse, God forbid I have another hit, I know I did the right thing."

After reporting that he was having trouble with his balance and coordination ahead of the double header on the Indianapolis road course, Askew was given a full examination and was determined he was not fit enough to participate in the race weekend. Following evaluation in line with IndyCar's Return to Race protocols, Askew was given clearance by the medical team to return to action for the season finale in St. Petersburg, Miami in October.

"I think I can be an example for young drivers now in stepping up and saying something is wrong, I need to have this checked out," added Askew.

These measures are designed to limit the risk of transmission of COVID-19 and enable racing to resume in safe circumstances. "With the COVID-19 pandemic continuing to evolve in characteristics and effect, the FIA, together with local health authorities is also adapting the measures we put in place to mitigate the risk of the virus spreading in a motor sport setting to enable all FIA-sanctioned events to return to racing in the safest possible environment." said Professor Gérard Saillant. You can view Appendix S here.



DR JEAN-JACQUES ISSERMAN RECEIVES AWARD

Dr Jean-Jacques Issermann has been awarded a trophy to honour his 70th participation in the 24 Hours of Le Mans.

The trophy was presented by Pierre Fillon, President of the l'Automobile Club de l'Ouest, at the 88th running of the famous race earlier this year.

Dr Issermann has been involved in motor sport since 1950, having worked with the late Professor Sid Watkins to establish the FIA Medical Commission.

For 30 years he was Permanent Medical Inspector for the FIA, in charge of evaluating and rectifying medical structures at circuits

NEW MOBILE APP TO BENEFIT GLOBAL SAFETY RESEARCH IN MOTOR SPORT



The Australian Institute of Motor Sport Safety (AIMSS) has launched 'Crashtag' a new mobile app designed to improve safety at all levels of motor sport.

Crashtag is a free app that enables users to easily upload information and photos of motor sport incidents and crashes, and input detailed reporting live from the scene of a motor sport incident.

Event organisers will be able to use the app to simplify the reporting of crashes and major incidents, and easily compile reports to Motor sport Australia following significant incidents instead of compiling paper-based forms.

AIMSS Chair Garry Connelly said Crashtag will have significant benefits to global safety research in motor sport. around the world that hosted FIAsanctioned events.

He was responsible for introducing extrication teams and the Kendrick Extraction Device (or K.E.D) which helps drivers when they are placed on a stretcher and taken away for medical examination.



"Crashtag will further build upon and support that work, with improved data that can be provided directly from a crash site and uploaded to our secure servers, where motor sport's best and brightest safety researchers can investigate and learn lessons from each motor sport incident," said Connelly.

Plans are being put in place for Crashtag to be rolled out in Sri Lanka, United Kingdom and at least one other country in Europe in 2020, before further expansion to more countries shortly after.

"Initially, we are aiming Crashtag at competitors and officials here in Australia, but in conjunction with the FIA we have broader plans for Crashtag," added Connelly. "We foresee that National Sporting Authorities around the globe and even spectators will be able to utilise Crashtag. We've seen in many incidents that spectators have recorded video or photos of crashes that might not be captured by anyone else."

Many organisations have supported the development of Crashtag including the FIA through the FIA Innovation Fund, AIMSS, and Motor sport Australia.

FIA SUPPORTS COVID RESEARCH PROJECT

The FIA is supporting a neuroscience project by the ICM Paris Brain Institute which will look at the neurological and psychiatric impacts of COVID-19.

The project is being done in partnership with AP-HP, Sorbonne-Université, Medico-University Department of Neurosciences at the Pitié-Salpêtrière Hospital, along with support from the FIA and a €400,000 grant from the FIA Foundation.

The study will focus on the neuropsychiatric manifestations of the affected individuals and the psychiatric consequences for the patients themselves (due in particular to very long periods of resuscitation) as well as for their relatives.

It will also look at the consequences for patients already suffering from neurological pathologies such as inflammatory diseases, and neurodegenerative diseases (such as Parkinson's and Alzheimer's).

The data collected from the project will be subject to in-depth analysis using AI and will be exploited in real-time, to draw practical consequences for patients as early as May 2021.

"At the Paris Brain Institute, our mission is to find in order to cure. Therefore, the observations of our eminent specialists on this study will be decisive in helping people with COVID-19 to receive appropriate care," said Professor Gérard Saillant, President of the Paris Brain Institute and President of the FIA Medical Commission.

DR PAU MOTA TO LEAVE FIA AT THE END OF THE YEAR



Dr Pau Mota, FIA Head of Medical and Rescue, will be leaving the FIA at the end of the year to take up a new role at the International Olympic Committee.

After joining in 2018 he became the first medical doctor to be employed full-time by the FIA and has since used his background in medicine and motor sport, to drive forward the work of the FIA Medical Department.

This includes establishing the biometric data guidelines following the introduction of the biometric glove to Formula One, which details how competitor's medical data generated can be used ethically and legally.

Most recently Dr Mota's efforts have been central to the FIA's COVID-19 response and setting up the Return to Racing guidelines, which contain the Code of Conduct measures designed to limit the transmission of the virus.

After first being used to restart F1, they went on to be used in the World Endurance Championship and other top-flight championships. Most recently the FIA extended this to include all FIA-sanctioned championships, cups, trophies, challenges and international series.

"I've thoroughly enjoyed my time at the helm of the FIA's Medical and Rescue departments, and I'm very proud of the work we've achieved in the last two years," said Dr Mota.

"When I joined, the challenge was final goal being to push motor sport medicine at the level of prehospital care medicine for trauma patients. Three main strategies were started targeting medical equipment, training and a network of hospitals. The global pandemic put the majority of this project on hold and the department had to focus completely on COVID protocols to enable our pinnacle championship, Formula 1, to restart. Hopefully the next person taking over this role I have enjoyed will be able to carry on the work done so far and bring new projects to keep on improving motor sport medicine for the FIA and all our ASNs."

We wish Dr Mota all the best for his new role at the IOC. For anyone interested in applying for the FIA Head of Medical vacancy, <u>click here.</u>

FIA MEDICAL SUMMIT TO TAKE PLACE ONLINE IN 2020

The next FIA Medical Summit and Chief Medical Officers' Seminar will be taking place online on 16th and 17th December this year.

As usual it will be attended by motor sport medical professionals worldwide. Professor Gérard Saillant will open the Summit with a welcome speech and this will be followed by an overview of the latest developments in FIA Championships from five FIA Medical Delegates.

On the first day there will be a presentation of the new medical code by Pau Mota, Jean-Jacques Issermann, and Prisca Mauriello. This will be followed by a session on High Fidelity Simulation by David Halliwell, who will deliver a description of the latest technology for training in this area.

A session on Women in Motor sport will be presented by Michel Mouton, followed by a presentation on Mental First Aid from Nayla Chidiac looking at the psychological aspects of COVID-19 and the difference between trauma and stress.

"When I joined, the challenge was to give direction to a new role with the final goal being to push motor sport medicine at the level of prehospital care medicine for trauma patients. Three main strategies were started targeting medical equipment, training and a network of hospitals. The global pandemic put the majority of this

> The second day of the summit will feature workshops on Accident Analysis by Adam Baker and Dino Altmann, High Voltage Safety for Marshals and Rescue Teams by Ian Dunbar, and Psychological aspects of a serious accident presented by Nayla Chidiac.

There will also be a workshop on FIA Trauma Center Network by Pau Mota and Prisca Mauriello, with the day rounded off with a talk on E-Care Simulation software by Antonio Marttos.



ASTON MARTIN AND MERCEDES SET TO SHARE F1 SAFETY CAR DUTIES FROM '21

Aston Martin is set to join Mercedes in supplying Formula One's safety car from the 2021 season onwards.

The German manufacturer has been the championship's sole official supplier since 1996, the Mercedes AMG GT R the latest in a succession of high-performance vehicles to take on the role.

The move to share those responsibilities equally with Aston Martin could help split the financial and logistical burden, with F1 set to move to an unprecedented 23-race calendar next year.

Mercedes is understood to be set to remain as the sole Medical Car supplier. The move marks the latest stage in an increasingly close relationship between the two brands, having reached shareholding agreements and arrived at a closer technical partnership earlier in the year.

Mercedes boss Toto Wolff has a private shareholding in the British brand, and is close friends with its owner, Lawrence Stroll.

The role of the safety car is integral to the smooth running of each race, with a fine balance struck between performance, such as running at a high enough speed to maintain the tyre, brake and engine temperature on an F1 car, and practicality, with a number of safety systems required on-board.

INDYCAR SAFETY CHIEF UNDERGOES SURGERY TO TREAT CANCER

IndyCar's Director of Medical Services for the AMR Safety Team, Dr Geoffrey Billows, has undergone surgery to treat cancer.

Billows has been an instrumental figure in improving safety since he joined the series' medical staff in 1998, playing a vital role in the development of safety systems on recovery vehicles and the way drivers are treated in the aftermath of an incident.

The former firefighter and paramedic has been diagnosed with a rare and aggressive form of cancer, Salivary Dutcal Carcinoma.

He is now set to undergo a ten to twelvehour procedure across three surgeons, before an expected further night in intensive care.

"An ENT specialist will first resect the tumor, followed by a neuro specialist who will drill a hole in the base of his skull to remove the cranial nerve," his family told media.

"And finally a plastic surgeon [will come in] to 'try and do something with the mess the first two make!'", in Dr. Billows' words.

AUTO Medical would like to wish Dr Billows a speedy recovery.

VIEW FROM THE GROUND: SHEREEN HABIB

DEPUTY CHIEF MEDICAL OFFICER, EMIRATES MOTOR SPORTS ORGANISATION (EMSO) AND THE ABU DHABI GRAND PRIX.

DINFINITI

🛃 I am the Deputy Chief Medical **Officer for the Emirates Motor** sports Organisation (EMSO) and the Abu Dhabi Formula One race. I have been involved in motor sport in the United Arab Emirates for the past 12 years. Initially I was involved with the Abu Dhabi Desert Challenge, and subsequently I became involved with F1 from its first race in Abu Dhabi in 2009. In the second year of that event I was made Deputy Chief Medical Officer (DCMO).

When I started volunteering 12 years ago, there was a strong community of people who volunteered for marshal, sweep and start team roles at the Desert Challenge. We initially found it quite difficult to recruit doctors and nurses locally, as their work commitments meant that taking time off to fly around the desert in helicopters was not easy. We resorted to recruiting some local and some international volunteers. This resulted in a team of highly motivated and experienced professionals – doctors, nurses and paramedics. I am very proud to say that we have managed to keep a core group of these volunteers coming to events every year. We are also always expanding the team and taking on new local and international members as the events grow. It's come a long way from the early days where my dining room would often be full of sand from sorting the medical kit after an event, to having a professional ambulance service taking care of all that!

We have found that by specifically targeting people who are either interested in the sport, or are interested in pre-hospital medicine and a new application of their skills, we can grow the team. Volunteers are often referred to us by 'word of mouth'. They may be friends or colleagues of existing team members. Provided they have the right skillset, a willingness to flatten the hierarchy and leave their ego at home. What the events offer some new team members is an experience they may have never had otherwise. It expands their clinical skills and looks good on their CVs. We have many very experienced international volunteers too, some of whom are involved at a senior level in motor sports in their own countries. This means that there is always a lot of informal learning happening, and good humoured banter!

We have had many volunteers who are circuit doctors from around the world. This produces an amazing exchange of experience and ideas, and I'm very lucky to have met them and had the privilege of working with them. These include CMOs from the UK, Sweden, Australia, Bahrain, Qatar and Lebanon. Many of them are highly experienced and skilled, and this means that there is plenty of opportunity for them to pass on their expertise and knowledge onthe-job. We always ensure that new members are paired with 'veterans' and supervised at all times. We also have an informal WhatsApp group which means that

learning is happening all the time and do multiple incident simulations before all major events, so that everyone knows their role and responsibility and is familiar with the equipment and procedures.

If I could change one thing local motor sport in the UAE, I would increase the local media coverage of the events. Especially grassroots events like Bajas and junior events to generate more interest and I would encourage more women to participate and volunteer. EMSO have definitely made huge strides in both those areas and things are much better than when I started.

The main thing I have learned is the importance of having an excellent team. I am lucky to say that we have one of the best teams of medics in motor sport. We have professionals who are dedicated, experienced, skilled, and who are willing to step up to a challenge without their egos getting in the way. Most importantly, they are always looking out for each other, and they care about each other. In challenging situations, I think knowing that people 'have your back' is crucial.

I am so lucky to be a part of such a lovely motor sport scene. Even after having moved back to the UK, I continue to be a part of the UAE motor sport scene because of all the people who make it what it is – from the president of the governing body EMSO, Dr Mohammed ben Sulayem, to the volunteers and their sense of community. I am also very proud to be one of the few female DCMOs, especially representing the UAE, where I grew up, at FIA conferences and events.



FEATURES

MEDICAL LEGACY

As he retires from his role as President of the FIA Medical Commission, Professor Gérard Saillant can look back on an exceptional career at the forefront of sports medicine

Professor Gérard Saillant has spent the most of his career at the cutting edge of sports medicine and surgery. Born in March 1945 in Montlucon, France, he was destined to follow in his father's (and grandfather's) footsteps to become a doctor. But it was not until he was 16 years old that he decided to take up this vocation.

This was because his first love was sport. He used to run in cross-country events, play football and would go to watch motor races whenever he could. It was only in his late teens that he realised he would never become a professional athlete and so applied to study medicine at the University of Paris.

Fortunately, Saillant's first role as a junior Saillant was initially invited to join the FIA doctor was in the Orthopaedic Surgery Medical Commission and then, in 2005, to become one of the five Fellows of the new FIA department of the university hospital, under the tutelage of legendary French surgeon Robert Institute for Motor Sport Safety and Judet. From there he developed the skills to Sustainability to bring his vast experience and become one of the top surgeons in his field. help progress safety in motor sport. He swiftly He would go on to combine his talents with accepted and has been working with the FIA his love of sport many times during his career. ever since in pursuit of this cause, becoming He has been an advisor to the French minister President of the FIA Institute and then President for sport and was the official physician of the of the FIA Medical Commission. French Olympic team in the 1980s and early Now, as he turns 75 and is retiring from this 1990s. Brazilian footballer Ronaldo even position, AUTO+ Medical spoke to him about his commemorated his two winning goals in the life and career.



2002 World Cup final to Saillant, who carried out two successful operations on the striker's right knee.

A specialist in spinal surgery, Saillant has also operated on many racing and rally drivers over the last 20 years, including helping with Michael Schumacher's rehabilitation after he badly broke his leg at the British Grand Prix in 1999.

Saillant came to the attention of the FIA through his work at the Paris Brain Institute. The organisation was founded through support from the Formula One fraternity, including Schumacher, then Ferrari Director General Jean Todt, and former FIA President Max Mosley.

AUTO+ Medical: Thinking back to when you were a young man, why did you first want to become a doctor?

Gérard Saillant: Actually, I did not feel the vocation to become a doctor, but I wanted to pursue studies in the scientific field. In the end, I chose medicine simply because my father was a doctor! But if I had to do it again, I would! It is a decision I never regreted.

A+M: What made you want to focus on orthopaedic surgery?

GS: My first internship was in orthopaedic surgery, in the department of Prof. Judet, with Prof. Roy-Camille, and I was quickly thrilled by this specialty because it is one where you can see almost immediately the results and the effectiveness of your actions. So I decided to continue in this field.

A+M: How did you then get involved in sport?

GS: I have always liked and practiced sport, football and skiing in particular, even though at an amateur level. But motor sport and athletics are my favourite and I ran around 25 marathons in my life.

A+M: Were you always interested in sport from a young age?

GS: Yes I was, and I can say I almost learnt how to read thanks to sport newspapers such as l'Equipe, the most famous sports journal in France.

A+M: You were the official physician of the French Olympic team in the 80s and early 90s – what did that involve and what did it teach you about sport medicine?

GS: What I learnt from this experience is how sport medicine is organised around these

major sport events and competitions, and I found it to be really interesting. The role of sport medicine here is not only to allow athletes to perform at their best and be in the optimal physical conditions at these events, but also, and most importantly, to work ahead of the event to prevent the occurrence of injuries and if necessary, treat them. In sport medicine, unlike many other medical specialties, we must look at the medical aspects of course but we must also consider the athlete's career. For example, the same injury will not be treated in the same way whether we are dealing with a 20 year old athlete starting his or her sporting career, or a 35 year old one nearing the end of his/her career. Similarly, we don't treat an injury in the same way if it happens 3 months before the Olympic Games, or 3 months after them. The treatments will differ based on who the athlete is and where he or she is in terms of sporting career.

A+M: Brazilian footballer Ronaldo famously commemorated his two winning goals in the 2002 World Cup final to you – how did you come to be his surgeon?

GS: Ronaldo had been playing in Italy and he was suffering from a very particular patellar tendon injury which is one of the pathologies I was specifically working on.

A+M: How did you then get involved in motor sport?

GS: I have always enjoyed and been interested in motor sport, particularly F1 and Rally. My first direct contact with motor sport was in 1989 when Philippe Streiff had his serious accident during the practice session of the Brazilian GP. I flew to Brazil to see him, and on this occasion I noticed that the local medical



66 THESE YEARS AT THE FIA **HAVE BEEN VERY REWARDING** AND I MADE CLOSE FRIENDS 99

cover was very "light". My first contact with the FIA, this time, occurred after Senna's accident in 1994, when Jean-Marie Ballestre, then President of the FIA, asked me to think about how it was possible to improve the level of the Mexican GP shortly after to see how things were organised, and what could be improved. Later, Max Mosley, the next FIA President, called on me to be part of the FIA Medical Commission.

GS: At the request of Jean Todt this time, medical rescue at motor sport events. I went to shortly after he became the new FIA President, I succeeded Sid Watkins at the head of the FIA Medical Commission, when Sid retired. In parallel I also became President of the FIA Institute in 2011 until it was dissolved at the end of 2016. The Institute was focused on improving motor sport safety through a multidisciplinary research approach involving A+M: Michael Schumacher turned to you for help when he badly broke his leg in an doctors, engineers, technicians and several support functions. Being the President of the accident at the British Grand Prix in 1999 -Institute during those years was really exciting. how was it working with the best driver of his generation to get him back on track? That work has now been transferred to the FIA **GS:** Michael had emergency surgery in England Safety Department where it continues to be but it was not by me. However I ensured his pursued with great talent.

Saillant succeeded Sid Watkins as Head of the FIA Medical Commission at the request of FIA President Jean Todt

medical follow-up to allow him to get back on track as soon as possible. It was really easy and pleasing to work with Michael, it was also very instructive because he was always very keen to understand the decisions we were taking for his recovery, which we had to justify constantly. His behaviour pushed us to our limits somehow and forced us to be better.

A+M: How did you first start working with the FIA?

A+M: Have you enjoyed being President of the FIA Medical Commission in recent years?

GS: Yes I have, it is a very interesting and exciting role because you get to work and exchange with members and people who are passionate about motor sport. These people are from a variety of countries with different cultures but the objective shared by all is to be consistent with regards to motor sport safety. We have made significant progress in that field, and I feel that I, with all the Members of this Commission, contributed to it, under the leadership of Jean Todt.

A+M: What one thing are you most proud of since you started working with the FIA?

GS: I believe that one should be permanently dissatisfied and that it is dangerous to be proud of something. I am nevertheless really happy to have witnessed and contributed to the continuous improvement in motor sport safety. Consider the HANS or the Halo for example. Again, these are the outcomes of the multidisciplinary and the FIA Medical Commission has played a great role here. Also, while I'm not sure I have fully succeeded here, one of my permanent goals has been the transfer of knowledge from the pinnacle of motor sport to the grassroots categories, and from motor sport to mobility, so that everyone may benefit from these safety improvements. This has always been an obsession for me and I know there is still a lot to do here. The general public must understand that these advances are not obtained only for 20 F1 drivers but for all motor sport



Saillant has been involved at all levels of motor sport



drivers of all levels and disciplines, and for all road users.

A+M: What has been the most difficult element of the job?

GS: The most challenging part has been to translate into texts and regulations the decisions taken on the medical side, as we must always take into account the legal, administrative, economic and sporting impacts of those decisions.

A+M: How difficult has it been to spearhead motor sport's restart following the coronavirus pandemic?

GS: Putting our action plan in place has been a matter of making the impossible possible. Not only because this action plan was complex in itself, but also because we had to take into account the rapid and unpredictable evolution of the pandemic and the constantly evolving regulations in each country. But this was made possible thanks to the great team work put into this, with daily video calls involving people from around the world, and a very efficient task force, made of Bruno Famin, Pau Mota, Ian Dunbar and Tim Malyon, in charge of the operational side of the plan which allowed motor sport to restart. We overcame the difficulties, and thanks to this, the FIA was the first sporting federation to restart international competition, and in that, it can be seen as a model for many other federations.

A+M: What advice would you give to the next Commission President?

GS: My advice would be to continue what has been put in place by the FIA and my predecessors in this role. It is a long and endless chain but one should not hesitate to have the ambition to seek to reach risk zero in motor sport.

A+M: Will you stay involved in motor sport now that you're stepping down?

GS: Considering my passion for motor sport and my links with the leaders of this sport and in particular Jean Todt, I do hope that I will remain connected with the sport and the people who make it happen.

A+M: You seem to always like to keep busy, what will you do with your newfound spare time?

GS: Many other activities outside of motor sport will keep me occupied and in particular my role as President of the Paris Brain Institute and my involvement in the medical board of the Paris-Saint-German football club. I am also part of the organisation that works on the legacy of the Paris 2024 Olympic Games. Not to mention my family...

A+M: Anything else you want to add?

GS: These years at the FIA have been very rewarding and I made very close friends. I hope that the FIA Medical Commission has indeed contributed to making motor sport a better sport by improving its safety, for the benefit of all members and stakeholders of the FIA family. I would like to give a big thank you to all the people who trusted me and helped me in my roles during all these years, be it in the Medical Commission, in the entire FIA medical family made of all the Chief Medical Officers and Paramedics involved in motor sport around the world, without forgetting of course the FIA Safety Department and the whole FIA staff at the Paris and Geneva offices.





DIGITAL HUMAN

The FIA is using a digital human model, made up of over two million elements, to help analyse accidents and minimise driver injury in motor sport.

Crash testing is usually conducted using a replica of a monocoque or roll cage containing a crash test dummy, with high-speed cameras and sensors measuring how an impact might affect the driver.

Whilst this is a tried and trusted method, it is slow, expensive and laborious. Nor does it allow for detailed analysis of how collisions impact the brain, internal organs, and other parts of the body. This is why simulation has become the next frontier for motor sport safety, and more recently the FIA is turning to these techniques for its accident analysis.

Since joining the research department in June 2019 it has been the main focus for FIA Research Engineer, Paolo Panichelli, who manages the development and analysis of accident simulations, particularly using a numerical model called Total Human Model for Safety (THUMS), which offers a virtual representation of the human body down to every detail.

"The purpose of my activity is to find measures to mitigate the level of injury probability in an occupant in a realistic crash scenario," says Panichelli.

"The activity starts with the reproduction of

a real case scenario and then once we have validated this and find out the same injuries that happened in the real crash we start to think, design, and then model countermeasures in the department that allow us to mitigate these injuries."

BUILDING A CLEARER PICTURE

Around 90 per-cent of the simulation that the FIA conducts is reproducing crashes, with most of them following a specific workflow to enable the research engineers to come up with a result. This starts from modelling the 3D geometry in Computer Aided Design (CAD) software, which can either be done inhouse or by the manufacturers and is then assembled to represent the accident that is being studied.

Key to all of this is THUMS. Developed by Toyota Motor Company and originally used for road safety crash testing, THUMS has been adapted by the FIA for motor sport. The human body model is made up of almost two million elements, which accurately reproduce the human form, from rigid bone structures to soft tissues and organs, making it the most realistic representation of the human form available anywhere.

In a recent case in Cross Country Rally, it enabled the FIA to identify the most significant factors that cause spinal injury. The analysis demonstrated how heavy landings on often undulated roads have led to numerous cases of spinal fractures and injury being reported among drivers.

To validate the results of the simulation, the research relied on a correlation between the real-world cases where the injuries were documented, including an accident during a Qatar 2018 Cross Country round where a

co-driver suffered vertebra fractures from T3 through to T8.

"We needed two things: the crash data, so acceleration is recorded during the crash, and we need to have significant injuries in the occupants. Starting from these two items, we analysed an accident that happened in 2018, where one of the occupants experienced injuries in the spine," explains Panichelli.

"From this we set up a very extensive sensitivity analysis, varying also the boundary conditions. Starting from a real accident, we re-produced more than 10 accidents, because once we find a counter-measure that works well for a type of crash, we want to see also what happens if the crash is slightly different, or even a lot different."

This behaviour aspect is something that has to be considered when modelling a crash in THUMS, mainly due to the different parts of the human body that can be looked at and having to factor in what happens in reality versus how that correlates with the simulation.

"It depends also on the part of the body you're looking at. For example, bones like femoral, pelvis, the spine, ribs, which have been investigated a lot in the past and a lot of experimental tests that been done are quite well correlated. In this case, we can now hope to have a better interval of confidence."

Using the real-world accident data is

66 THE PURPOSE OF **MY ACTIVITY IS TO FIND MEASURES TO MITIGATE** THE LEVEL OF INJURY 99

THUMS can analyse the impact of internal organs such as lungs,

heart and liver

important to have as a reference point for the research, but the main aim is to come out with a solution that applies across the board rather than to any specific case.

"We need the real accident data to validate the numerical model; once the numerical model is validated, then we start to re-produce different crashes at different acceleration, but this different binary condition doesn't necessarily have to come from an accident," says Panichelli. "The procedure isn't so strict because it is always targeted towards finding solutions that are general and not orientated too much to the specific case."

BIG DATA

A single run of the simulation in THUMS takes around 24 hours of computational time, which is why it requires a lot more processing power than your average off-the-shelf computer. This is mainly due to the different types of analysis that can be done and what they each require from the computer.

"For the computational aspect the really



demanding part is the solution" says Panichelli. "In crash simulations, explicit parallel solution algorithms are used, and these are demanding in terms of processors.

"My workstation is a thirty-six, doublethreaded core workstation, so I have seventytwo cores to work with. The explicit analysis is split at the beginning and sent to different processors, each of which calculates only a part of the domain and then re-assembles it all together at the end."

In future this processing power is set to replace more traditional modes of crash testing according to Panichelli, mainly due to the amount of logistics work and cost of setting up a full-scale impact test.

For example, to be able to use a World Rally Championship car for a crash test, the manufacturers have to replicate the chassis used by the drivers and once it has been through the impact test it can no longer be used. With simulation models they can be reset, and values can be changed depending on what needs to be tested, which saves a lot Cockpit conditions can be accurately recreated in THUMS

more time and crucially a lot more money in the process.

"Crash tests are a type of test where the repeatability is very difficult to obtain, so when you work on crash tests, you always work within a statistical confidence interval, which is quite wide," says Panichelli. "I'm confident that the error which can be given by a properly done simulation can easily fall within this interval."

"At this point, the simulation is less expensive and can enable a level of control that you don't have in crash testing. And at the end, once the crash test is done, you can't do it again. If anything goes wrong in that crash, you've lost it, you have to restart from scratch - you'd have to buy a new car, set up a new test, spend more days, readjust the sensor setups, all the acquisition systems. In simulation, if you have made a mistake in a parameter, you can simply push the buttons and restart."

While it sounds simple on the face of it, the forces that are generated by motor sport impacts are at the upper level of survival and generate extreme conditions for simulation. But by utilising various methods of data analysis coupled with simulation techniques, it enables the FIA to have an even clearer picture of what is happening in even the most severe and dramatic accidents.



AUTO+MEDICAL FEATURES

66 SIMULATION CAN ENABLE A LEVEL OF CONTROL YOU DON'T HAVE IN CRASH TESTING??

Spinal Injury in Cross Country cars was studied using THUMS EPSON PETRONAS

REACTION TIMES

#Mer?

Getting a Formula One car off the line at the start of a race requires complex coordination between vision, feel and noise. *AUTO+ Medical* examines how reaction times play a crucial role in a driver's performance.

It took Valtteri Bottas just 0.04 seconds to react to the start light sequence for the 2019 Japanese Grand Prix, the Finn surging from third on the grid to take the lead and charge away to victory.

Normal human response time is between 0.15 and 0.2 seconds, but the start from Bottas showed just how crucial quick reactions can be to gaining and losing positions during one of the most intensive parts of a Formula One weekend.

To achieve this there are a lot of things that go on behind the scenes that contribute to a driver being able to react to everything around them; the lights, engine revs, and other stimuli. This is why they focus on every aspect of their cognitive skills and neural system according to Mercedes Performance Coach Antti Vierula.

"It's pretty much the whole neural system

and the muscle system that has to be relaxed, then you can react quicker. If you are already tired or tense and you're not alert in your mind then your reaction will suffer," says Vierula. "We try to practice the whole neuromuscular system, not only the fingers but the whole body equally to be alert and awake during the race weekends."

Starting an F1 car is quite a specific skill but it all falls under the same umbrella of reacting and reflexes; making sure that the driver has practiced the procedure enough times for it to become second nature.

It can vary from driver to driver on how each prepare themselves before a race; some like to play reactive games like throwing a tennis ball in quick succession or dropping them randomly for a driver to catch. In the case of Carlos Sainz, he and McLaren Performance Coach Rupert Manwaring use boxing as a way to let off any nervous energy before a race.

"If I feel that he's a little bit complacent or perhaps a bit too tense, I try and bring him back into where I think his sweet spot is in terms of mood and energy levels prior to race," says Manwaring. "Boxing is quite a good way to do that, it's one to one, face to face, and it wakes him up because there's a bit of a threat to that."

Bottas prefers to use a paddle trainer on his steering wheel, which recreates the start light sequence by giving the driver a target that they can either do in the garage or at the end of the pit lane with the traffic lights.

"We do general stuff just to wake up the muscles and the important muscle groups like neck and core, not so much with tennis balls or things like that," says Vierula. "I know some drivers do this, but we don't



66 THE WHOLE NEURAL AND MUSCLE SYSTEM HAS TO BE RELAXED TO REACT QUICKER 99

really do them on track, we do this steering wheel training more than those. But off the track we do a lot of hand to eye coordination, and reactive training with tennis balls and that sort of thing."

THE LAST SUPPER

To react quickly to any stimulus, you need a healthy and well-functioning nervous system as well as muscles, for which diet is equally as important. Nerve cells need fats in order to function properly otherwise their performance can be compromised, while carbohydrates are the essentials that muscles and the brain need to perform and stay focused.

perform and stay focused.Sleep is a vital part of ensuring good cognitive"It's very important that they get a goodperformance, decision making, memory andbalance of the main macronutrients, that giveslearning abilities, with studies showing that a fullthem energy," says Manwaring. "From acycle of sleep can help you retain 20 per-centperformance perspective, carbohydrates are verymore information when learning new tasks. For

Some drivers use routines to keep their cognative system alert



important for fuel for the brain and for the muscles to work optimally, not just at the start but throughout the whole race, particularly in a hot race or a race where there is a high cardiovascular demand,."

The timing of meals prior to the race is also important, as having a big meal could lead to a high peak shortly afterwards but within half an hour that can drop off. This could overall have an effect on reaction performance, so it's all about sustaining that level before heading into the race.

"We'll have probably a larger meal for breakfast in the morning to make sure you've got good carbohydrates in the system in the muscles where they can be stored," says Manwaring. "Then nearer we get to the race, we'll shift from solid food to carbohydrates and calories in a liquid format, just so you get a nice sustained release of energy basically."

The drivers may also take on caffeine, but this is limited according to Manwaring because while it might help with stimulating the release of adrenaline it can be detrimental to your overall performance particularly at the start where a delicate balance of the clutch paddle is needed.

"The start process involving the hands on the steering wheel and the coordination of feet is quite a dexterous activity and you need to have that element of flexibility to perform and execute it well," explains Manwaring. "I think sometimes if you're a little bit too charged up, which you might achieve with a high caffeine intake, then you probably become a little bit heavy handed." F1 drivers flying away to races can induce jet lag, so overcoming that to sustain energy throughout the day is a key factor.

"We'll probably put in a tougher exercise session on a Wednesday or Thursday, just so we get the body peaking at the right time of the day," says Manwaring. "Then maximising sleep as much as possible, so prior to each bedtime making sure Carlos is trying to wind down as much as possible, dimming the lights in the room, making sure the temperature is correct, the bed is comfortable.

"Seven hours is the minimum, but there's lots of research that suggests more than nine hours will help your nervous system and your recovery that little bit more, which then may contribute again to improve on reaction time."

According to Vierula this is also linked to the social environment for the drivers throughout the weekend, which is why Bottas and other drivers like to have a close group of people around them made up of friends, family and their trainers to ensure that they can stay focused on the task in hand.

"You can easily spend your energy talking to too many people during the weekend, so it's trying to learn over the years what is good for you," says Vierula. "Too many things during the weekends can prevent you from keeping your mind clear, but for us it's mainly some media stuff and the engineering, then Valtteri usually has his girlfriend here and me so a small group of people."

The trick according to Vierula is to keep everything in a routine throughout the weekend in order to conserve mental capacity for driving, particularly before the final part of qualifying and the race start which are the most intense parts of the weekend.

"The pressure builds up massively in qualifying and the race starts, I think those are pretty

6 6 PRESSURE BUILDS UP IN QUALIFYING AND AT THE RACE STARTS, THEY CAN BE INTENSE PLACES **9 9**

intense places," says Vierula. "We just try to repeat and try to keep the preparation model the same, of course we make small tweaks here and there to find something that works. It's trying to work that and repeat."

RIGHT EQUIPMENT

The minimum weight of an F1 car is 740kg including the driver, with the driver and seat weighing a minimum of 80kg. But to maximize on performance engineers give their drivers a target before the start of the season, which confines them to a certain weight category.

"We get a certain weight target from the engineers for the season," says Vierula. "We're kind of overweight or heavyweight which gives restrictions in terms of quantity and quality and what kind of foods you can eat.

"How your body reacts to different foods is important and over the years you learn which foods gives you enough energy and ones that don't gaining enough energy, and how much you consume energy during the day - the diet fine tunes itself over the years."

While you would normally associate the driver's equipment with extracting lap time, it can also be another key factor in their reaction times. Talking to suppliers and making the gloves, steering wheel, and race suit more bespoke to the driver is something teams do to maximize this area of human performance.

"Carlos quite likes a very stable boot made of



leather and in gloves, obviously, something soft, but as strong as possible," says Manwaring. "Whether you have the lining on the inside of the glove, or the lining on the outside of the glove is another thing, a factor that drivers are probably 50/50 on which they prefer.

50/50 on which they prefer.While the life of an F1 driver at the circuit"With the steering wheel itself you look at
the position of the clutch pedal, the buttons
themselves, the feel, all those factors can play
a part. Some drivers will just want to make
sure they can consistently hit a certain targetWhile the life of an F1 driver at the circuit
might look incredibly active in the moments
before getting into the car, it's these factors
that contribute to drivers approaching it with
an almost Zen state of mind that can enable
them to react instantly.

on the clutch paddle, so that element is something that you can't overlook, it's not going to necessarily affect their reaction times, but it can affect how consistent they are with starts."



INSIDE THE... MOTOGP TRACKSIDE **CT SCANNER**

AUTO+ Medical delves deeper into the high-tech trackside clinic utilised in MotoGP during this year's event at the Red Bull Ring near Spielberg, Austria.

The never-ending pursuit of better safety standards in motor sport has marked off several major technological milestones over the years, with MotoGP's advanced mobile trackside clinic and healthcare facilities the latest development to raise the bar.

Making its debut at this year's Austrian Grand Prix at the Red Bull Ring, Canon provided this high-tech imagery unit which can provide medical workers a much guicker turnaround for initial injury diagnosis and enable riders to be declared fit to race.

The unit is housed alongside the medical car and helicopter in the paddock, and features an in-house CT scanner, capable of delivery a full-body scan in a mere 15 seconds, the results of which can then be forwarded on immediately to the nearby Murtal Hospital that serves the circuit.

This process buys the staff precious time to prepare ahead of a patient's arrival, potentially saving lives in the event of a serious incident. It also improves the process of diagnosing a rider's injuries, with a CT scan offering a more accurate picture in the aftermath of an incident than the previously system of taking an x-ray, as well as providing a potentially key indicator as to whether the extent of a rider's injuries makes them fit to be transported to the hospital for further treatment. "From a medical point of view, high-tech trackside clinical facilities allow us to make a

guick diagnosis in the bone and the internal level," explains Dr. Angel Charte, MotoGP's Medical Director.

"It is a great tool to make the diagnosis as well as to determine the severity of the injuries that the rider presents.

It's use in MotoGP marks the first time the world's premier class of motorcycle racing has enjoyed access to such facilities and puts down the foundations for further improvements to trackside medical care in the future.

Dr. Charte believes that, in the medium term, provisions will be made to integrate similar systems into the rest of the calendar as MotoGP continually strives to raise standards for medical care.

Dr. Charte believes similar facilities will be available in the medium term but stressed "these are mobile units that should be provided by the circuits. "The CT scanner we have access to, at Spielberg, is what we expect to reach. Today, riders are breaking speed records on the track, which means that security measures must go in the same direction."



Such sophisticated trackside facilities are expensive but offer an improvement to both safety standards and the provision of medical care on-site, integrated with the local hospital if required. Dr Charte said: "It is true that all the circuits have digital radiology facilities, but in the medium term I believe we will also have CT scanners trackside."



THE ROAD BACK: SEAN GELAEL

The DAMS Formula 2 racer discusses his recovery after suffering a mid-spine fracture during the Feature Race at Circuit de Catalunya.

During the sixth round of the FIA Formula 2 championship at the Circuit de Catalunya, Sean Gelael was battling for position with Jack Aitkin when they made contact on the final lap of the feature race. The collision pitched Gelael's car into the air, before he landed heavily on a kerb, and then ground to a halt. The Indonesian driver was helped out of the car by the medical team, then transferred to the Hospital General De Granollers in Barcelona for precautionary checks.

Gelael later confirmed that he suffered a D4 mid-spine fracture and that it would take six weeks minimum before he could get back racing. With the effects of COVID-19 forcing the season to be largely formed of triple headers, it has meant Gelael has missed out on many of the races this year. He returned to the track with just two rounds left of the championship in Bahrain. AUTO+ Medical speaks to him about his injuries and recovery.

AUTO+ Medical: How did you get injured? Sean Gelael: During the last lap of Race 1 in Barcelona, I had a contact with Jake Aitken and I was pushed onto the yellow curbs. The car left off and when landing I immediately felt pain in my back.

A+M: What specific injuries did you sustain?

SG: I sustained a fracture of the anterior vertebrate body T4.

A+M: What sort of treatment did you get for your injuries?

SG: This kind of injury can't be treated, the only therapy is resting.

A+M: Were there any doctors/physios that you were working with? SG: Yes, I was followed in Jakarta by a doctor and an osteopath.

A+M: Were there any specific exercises or movements that you had to do?

SG: After two weeks, I started swimming because it reinforces the muscles of the back, without loading the column. Only after six weeks I could do some gym and lift weights to fully train my body again.

A+M: What stopped you from being able to jump back into the car immediately?

SG: We consulted some specialists and they said I couldn't drive racing cars for at least six to eight weeks. Unfortunately the calendar was busy in that period so I had to miss four races and when I recovered there was a long break in the calendar before the last two races in Bahrain.

A+M: How did you feel getting back into the car? Was there anything that the team had to do to make the seating position comfortable?

JD: It was a big emotion to get back in a racing car after such a long stop, I just could drive a kart one day before the race weekend and I didn't know if I was ready. Instead already at the first lap I felt comfortable and ready to face the racing weekend in good physical condition.

A+M: What sort of advice do you have for drivers that suffer similar injuries?

JD: Difficult to say, every case is different. In my case it was very important to organize my rehab to minimize loss in fitness while allowing my body to recover.

66 THE CAR LEFT OFF AND WHEN LANDING I IMMEDIATELY FELT PAIN IN MY BACK. 99



SCIENTIFIC ARTICLE:

PRE-HOSPITAL TXA FOR TRAUMA - THE STAAMP TRIAL

A look at how administering Tranexamic acid can have an effect on a patient before they are admitted to hospital.

Author: Dr Matthew Mac Partlin



INTRODUCTION

Tranexamic acid (TXA) is an antifibrinolytic medication that displaces plasminogen from the fibrin complex which should result in a more persistent clot. Given that the majority of trauma deaths are due to haemorrhage, this would seem to be a reasonable therapeutic target.

TXA has established use in the management of epistaxis and postpartum haemorrhage (1) . The CRASH-2 (2) and MATTERS (6) trials demonstrated mortality benefit in trauma patients at risk of bleeding by adding TXA to the regime but only if given within 3 hours of the onset of bleeding (presumed to be the time of injury). Interestingly, while there was a mortality benefit, the CRASH-2 trial did not show a difference in the amount of blood product used though there was a difference in the timing of blood product administration. Both trials have their flaws, which you can read more about here (First10EM, The Bottom position on this. A little bit of knowledge of the Line, The SGEM (3-5,7)), but TXA has been written into standard care for many trauma and non-trauma centres alike. Pre-hospital services carry it and TXA is increasingly commonly found in the drug pack of motor sport response agencies.

Pre-hospital use of TXA makes sense given its apparent time-dependant benefit, so it is somewhat surprising that most of the data to date comes from in-hospital trials. You could argue that the ED resus bay is barely in the door journals/jamasurgery/fullarticle/2771225 from the prehospital environment however and it has been traditionally argued that it is often too difficult to do high quality pre-hospital clinical trials.

Then along comes the STAAMP trial (8), published online only this month in the JAMA. And we should pay attention to it for the reasons above. No doubt there will be



vehement supporters of both sides of this particular coin so it is important that you read beyond the abstract and figure out your own CRASH-2 and MATTERS trials will help you along if you aren't already familiar with them (Links in the references below).

Tranexamic Acid During Pre-hospital Transport in Patients at Risk for Hemorrhage After Injury: A Double-blind, Placebo-Controlled, Randomized Clinical Trial. Guyette FX, Brown JB, Zenati MS, et al. JAMA Surg. Published online October 05, 2020. doi:10.1001/ jamasurg.2020.4350 https://jamanetwork.com/

66 PRE-HOSPITAL USE OF **TXA MAKES SENSE GIVEN ITS APPARENT TIME-DEPENANT** BENEFIT??

PICO

Population:

A prehospital trauma cohort at risk for haemorrhage by either of sBP 90mmHg or less, or HR 110bpm or more. N = 927 enrolled (903 analysed). Mean age 42yo (SD +/- 18years). Median ISS 12 (IQR 5 - 22). Patients were transported by air or road to one of four Level 1 trauma centres.

Intervention:

n = 447.

Pre-hospital phase = 1g TXA in 100ml 0.9% saline over 10 minutes.

In-hospital phase = one of three treatment arms:

no further TXA (ie. completing the MATTERS protocol),

1g TXA in 100ml 0.9% saline over 8 hours (ie completing the CRASH-2 protocol), a repeat 1g TXA in 100ml 0.9% saline over 10 minute followed by the 1g TXA in 100ml 0.9% saline over 8 hours (ie three 1g doses of TXA in total)

Control:

n = 456

Pre-hospital phase = 10ml 0.9% saline (placebo) in 100ml 0.9% saline over 10 minutes In-hospital phase = Same a) to c) group patterns but replacing the TXA with 10ml 0.9% saline

le. the control group got no TXA at any stage (Interesting as TXA in major trauma with haemorrhage is a standard interventions in some centre and so this could be seen as therapeutic misalignment through randomisation)

Outcomes:

Primary outcome = 30 day all cause mortality for all TXA (in-hospital groups a-c pooled together) versus placebo -> 8.1% versus 9.9% for an absolute difference of 1.8% (CI -5.6% to + 1.9%, P = 0.12. NNT 55. Fragility index using ClinCalc = 0); ie. no statistical difference to favour prehospital TXA administration for trauma at risk of haemorrhage.

There are a few things to note about this outcome straight away.

The absolute mortality difference of 1.8% is similar to that found in the CRASH-2 trial in 2010, which was a much bigger trial (n = 20,211. An in-hospital population. 28 day mortality 14.5% versus 16.0%, NNT 67, Fragility index 48).

The confidence interval is guite wide and might have been narrowed to fall below unity had the STAAMP sample size been larger. The STAAMP sample size was calculated based on assuming a baseline mortality of 16% (The control group 30 day mortality was half this at 8.1% immediately raising concerns of



underpowering) and reliably finding a 7% improvement in 30 day mortality (Arguably optimistic as very few trials that look at one intervention in a complex system of care demonstrate such a large benefit).

Additionally, the STAAMP trial was halted early due to slow recruitment and while they ultimately enrolled 93% of the planned sample size, early halting could further under power the trial calculations. So it is possible that there is actually a mortality benefit but it is smaller than could be detected by this particular trial.

Furthermore, the authors state that they "enrolled patients at risk of haemorrhage with a broad range of injury and shock severity". Trauma, like sepsis, is not a single diagnosis, rather a category of disparate illnesses and how this heterogenous collection is composed may affect the likelihood of TXA making a difference and being able to demonstrate that difference.

The median ISS (9) is only 12, though the IQR reaches up to 22, which suggests that this is not a severely injured population, thereby minimising the benefit that can be gained by adding TXA to the therapeutic mix. That said, it would be not unreasonable to expect that a trauma patient with a systolic BP of 90mmHg or less might be actively bleeding and could benefit from a medication designed to reduce blood loss. The inclusion criterion of a HR of 110bpm or greater is less convincing and it's notable that no recognised risk tool for assessing risk of major traumatic haemorrhage was employed (eg. ABC score, TASH score (10,11)). This may have been a resource issue as the ABC score includes a FAST scan result and the TASH score uses haemoglobin and base excess values, though this is not clear from the paper. All in all, with a possibly optimistic mortality benefit in an underpowered, heterogenous cohort of a

relatively low ISS in what is presumably a mature trauma system, it is perhaps not surprising that a clear benefit of prehospital TXA was not demonstrated.

The authors did dig through some prespecified subgroups which threw up some interesting results that again suggest all may not be lost for prehospital TXA.

Remember that the Intervention arm was our population. However, remember that split into three groups a) to c) based on regardless of the appeal of the numbers, this getting an in-hospital (ED resus bay) MATTERSis a secondary outcome in a small subgroup style protocol, a CRASH-2 style protocol or a population. full repeat of a TXA load over 10 minutes As for all of the other secondary outcomes followed by the 8 hour infusion. It seems that including 24 hour mortality, blood product use the more TXA these groups got the better they age at 6 and 24 hours, adverse outcomes such did as their respective 30 day mortalities were as DVT, PE, stroke and seizures, there was no 9.3%, 7.8% and 7.3%. The full repeat cohort (3 difference between the intervention and TXA doses in total) did derive a statistically control arms. significant benefit when compared to the So was this a good trial? Let's have a look at control group -> absolute difference = -2.7%; some clinical intervention trial key quality 95% CI, -5.0% to -0.4%; P = .04, NNT = 37). It indicators. seems that some TXA might be good and more might be better, however, keep in mind **Internal validity** that these are secondary outcomes in small CONSORT diagram - YES cohorts and so can only be hypothesis Randomised - YES. 1:1:1:1 randomisation in blocks of 12 using a computer algorithm. generating. The 30 day mortality for those who were Blinded - YES except for the trial oversight given TXA within an hour of their injury was committee.

4.6% versus 7.6% for placebo, for an absolute 30 day mortality benefit of 3% (NNT 33), suggesting a time-dependant benefit similar to the original CRASH-2 trial.

And the final apparent benefit might be for trauma patients with a systolic BP of 70mmHg or less for whom the TXA to placebo 30 day mortality benefit was 18.5% versus 35.5% (AR 17%, NNT 6), which is not that dissimilar to the 14.4% 30 day mortality benefit seen in the MATTERS trial. Given the rapid time to scene arrival at many motor sport events, particularly circuit events, this is relevant to

66 THE 30 DAY MORTALITY FOR THOSE WHO WERE GIVEN TXA WITHIN AN HOUR OF THE INJURY WAS 4.6% 99

Placebo - YES

All relevant outcomes reported - YES. This was thorough and included clinical outcomes, INR and TEG values and volumes of blood products used.

ITT analysis - YES

Run to completion - NO. Halted early due to slow recruitment. They ultimately enrolled 93% of the planned sample size.

Completeness of follow up - YES however 9 patients had missing outcome data. The authors tried to account for this by conducting a variety of statistical imputation techniques

and state that none of these manoeuvres altered the final outcomes.

Funding sources and competing interests declared - YES. The study funding was from the US Army Medical Research and Material Command, Fort Detrick, Maryland. Most of the authors had Department of Defense grants and some declared receiving fees from named pharmaceutical companies.

External validity

Multicentre - YES. 4 level 1 trauma centres. Similar population – That depends upon where you work. The motor sport population can vary widely depending upon the category and level. The age range is certainly covered. After that you need to go through the demographics table in the supplementary data.

Similar practices - Hard to be certain. Event the authors in the section of their paper on strengths and limitations state that variation in practice could not be controlled for.

Applicability

Feasible - YES and many services are already doing this.

So all in all, this is a pretty robust, well conducted, clean looking trial. The main downside is the underpowering of the sample size.

CONCLUSIONS

Authors: In injured patients at risk for hemorrhage, tranexamic acid administered before hospitalisation did not result in significantly lower 30-day mortality. Prehospital administration of TXA for these patients is safe and may benefit some patient subgroups.

66 I, AND MANY OTHER MOTOR **SPORT RESPONSE AGENCIES THAT I WORK WITH, ALREADY** CARRY TXA AT RACES 77

Rollcage Medic: While there appears to be no demonstrable benefit to routinely starting TXA in the pre-hospital phase for a low to moderate ISS trauma patient with a systolic BP of 90mmHg or less or a HR of 110bpm or more, this is an underpowered trial with relatively a wide confidence interval in which the absolute 30 day mortality difference is in keeping with the original CRASH-2 trial. Additionally there is suggestion that there may be a greater benefit for patients who are more haemodynamically at risk (sBP<70mmHg)

and who can be given the TXA within an hour of injury.

Given the population and context that we work with at motor sport events, on circuits, rallies and maybe some off-road endurance events, this time window is eminently achievable. I, and many of the motor sport response agencies that I work with, already carry TXA at races and for the moment I don't see that this trial changes this. I'll wait for something more convincing to warrant changing.

One last takeaway here is that this is another study showing that it is possible to run high quality meaningful clinical trials in the prehospital setting. Kudos to the authors for pulling this off.

What do you think? Were you also already carrying TXA and does the primary outcome of this trial put you off now? Have you swung the other way or are you still a committed TXA non-believer?



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