SASM
Society of Anesthesia & Sleep Medicine
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Message from the President

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SASM Starts New Initiatives

Happy New Year to all of you. 2015 will be a great year for growth and expansion. The Society of Anesthesia and Sleep Medicine (SASM) is entering its fourth year and is making leaps and bounds forward. The SASM has partnered with the Anesthesia Quality Institute to launch a new Registry: **The Obstructive Sleep Apnea Death and Near Miss Registry**. Case report instructions and forms are available on the OSA Death and Near Miss Registry website http://depts.washington.edu/asaccp/projects/obstructive-sleep-apnea-osa-death-near-miss-registry

We sincerely invite all members of SASM to support this initiative and enter possible cases in the Obstructive Sleep Apnea Death and Near Miss Registry. Your support is essential to get these rare cases in order to determine the possible risk factors. We are looking forward to your submission and we thank you in advance of your support.

Anesthesia & Analgesia is now designated as the official journal of the SASM. David Hillman, MD, has been appointed as the Section Editor for Respiration and Sleep. He has been actively playing this role for the past few months. A number of articles in the area of Respiration and Sleep has been accepted and will be published shortly. We would like to encourage SASM members to submit their scientific work on "Respiration and Sleep" to *Anesthesia and Analgesia*. SASM is also encouraging members to submit reviews, commentaries and CME materials as well.

SASM Consensus Statement Task Force

In recent years, there have been significant advances in knowledge as it relates to anesthesia and sleep-disordered breathing. Recently, the ASA published their 2014 Practice Guideline on the issue. There is still a need to develop this further regarding the preoperative screening of patients with sleep-disordered breathing. Frances Chung, MBBS and Dennis Auckley, MD are leading

continued on page 3

Editor's File

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New Horizons

I hope this has been a wonderful New Year already for all of our readers! Through the concerted efforts of our leaders and the overwhelming response from interested clinicians from all over the globe, we are seeing exciting developments in the SASM. In this edition of the newsletter, we have wonderful perspectives about two nascent SIGs in the SASM. The leaders of these groups are Dr. Pedro Gambús for the Sedation SIG, and Dr. Alexandra Bullough for the Obstetrics SIG. We congratulate them for their efforts and look to further advance our practice and knowledge of safe sedation practices!

Sedation is performed more commonly than general anesthesia in the United States, and therefore remains a potent risk exposure in specific patient populations. Further, the transition from wake state to anesthesia is extremely variable at the individual patient level. Intended levels of sedation are frequently exceeded during a given procedure and patients are often discharged home with significant residual effects of sedatives. SDB further complicates this, since airway patency is critically dependent on sedation depth.

The implications of SDB in pregnancy are barely understood at this time. Recent studies have described the causative role of excessive fluid retention on SDB, and fluid retention is a significant part of the normal physiology of pregnancy. Identifying the clinical features and mechanisms underlying the transition from physiological to pathological states would transform clinical care of at-risk obstetric patients.

Have you wondered what it takes to create a sleep lab in your hospital? Dr. David Dawson takes us on a fascinating journey of self-learning, discipline and discovery, as he describes his experience in this area. His fortitude in the face of tremendous challenges speaks volumes of what a dedicated individual can achieve in an often non-supportive system. I do not wish this to sound like a broadside against any specific hospital or health system, as one can draw parallels to our environments, and the challenges we consider insurmountable to achieve our stated goals.

I am proud to identify myself as belonging to the same department as Drs. Steve Britton and Lauren Koch, two amazing researchers who have transformed our understanding of disease models in rats. Through a series of brilliant experiments, they have created two distinct phenotypes of rats, based on their metabolic state, specifically their exercise capacity. Their story is one of tremendous fortitude and belief in creating a model that has now been validated in many disease states. More importantly, their models bear direct implications for the metabolic, cardiovascular, pulmonary and neurological stresses of the immediate perioperative period and one's ability to recover from them. We look to the creation of greater opportunities for translational research with them, to further our understanding of mechanisms surrounding perioperative complications.

A new addition to the newsletter is the Q&A section, where clinicians ask real-world questions of our experts. Hope you will find Dr. Nick Dalesio's response to Dr. Isidro Lezcano interesting and informative. We look forward to expanding this section in the coming months. Please do send in your questions to rsatyak@med.umich.edu and we shall have them answered by our experts.

Thus, we have much to cheer about the season, even as record snowstorms lash our lands! Till the next time … Stay warm, my friends! ❖

Message from the President continued from page 1

the effort in this area. The work is divided into three components. The preoperative screening component is under the leadership of Satya Krishna Ramachandran, MBBS. The component on postoperative complications is under the leadership of Stavros Memtsoudis, MD and the third component on how these patients should be prepared for surgery is under the leadership of Dennis Auckley, MD. The SASM Consensus Statement Task Force has worked diligently with the literature review, and the group met face-to-face on October 9, 2014 at the SASM Annual Meeting to discuss the available evidence in the literature. The group is continuing this effort in 2015 to work on developing this SASM consensus statement for preoperative assessment of patients with sleep-disordered breathing.

SASM Special Interest Group

Following the fantastic success of the SASM Pediatric Group, SASM initiated a **SASM Sleep Medicine Clinical Practice Group** under the leadership of Tracey Stierer, MD. A SASM Obstetric Special Interest Group was also formed under the leadership of Alexandra Bullough, MD. Anyone who is practicing sleep medicine and anesthesia and is interested in joining the **SASM Sleep Medicine Clinical Practice Group**, please submit your interest to the SASM website.

In 2015, Dr. P.L. Gambús, Servicio de Anestesiología, Hospital CLINIC de Barcelona, Spain is tasked to be the chair of the SASM Sedation Special Interest Group. He has written an introductory article in this issue of the SASM newsletter. The goal of the SASM Sedation SIG is to make the sedation experience of our patients comfortable, safe and adequate to the procedures and medical conditions in a true individualized approach. Also this group is interested in research and outcomes. Anyone who is interested, please contact the SASM website at www.sasmhq.org.

SASM 5th Annual Meeting: Oct. 22-23, 2015, San Diego, CA

The SASM gives out six awards each year to the best abstracts of the meeting, three in the category of clinical science and three in the area of basic science. The best abstract in the clinical science and the basic science category will present orally at the SASM meeting. Please plan to submit your research starting in March. Hope to see you all at the October SASM meeting. ❖

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Sedation is Here to Stay: A New Aspect in Our Society for Anesthesia and Sleep Medicine

It is not general anesthesia, nor is it physiologic sleep, but it shares some common features with both of them and has an increasing presence in the daily work of anesthesiologists and other medical specialties as well. Sedation is a term widely used to define different situations ranging from facilitating some diagnostic or minimally invasive procedures, sometimes with the association of some degree of analgesia or with very different drugs, complementing specific anesthetic techniques based on local or regional anesthetic approaches, long term protection of patients in critical care units or even providing the best conditions to terminal patients.

In an academic department it might well represent a significant percentage of activity inside the operating room and, of course, more than fifty percent of all procedures outside the operating room, and the numbers keep increasing. It has been estimated that in the near future about 50% of the income of an anesthesia departments in the US would come from services provided for the performance of colonoscopy, upper gastrointestinal endoscopy and ophthalmologic anesthesia. There is a strong demand for sedation that comes from the same society, patients do not want to feel pain or stress during their processes, and from our colleagues gastrointestinal or respiratory endoscopists, radiologists, because they know that the likelihood of an optimal exploration increases if the procedure is performed under adequate control of the stress, comfort and safety of the patient by a specialized physician.

There are several aspects that we, as doctors, optimally prepare to provide sedation and must keep in mind when our patients must go into a process requiring sedation. They are related to the specific context where sedation is going to be taken.

The Context

The context involves the procedure, its different stages and levels of stimulation or required collaboration from the patient, the patient itself with its medical particularities and even the area where the procedure will be performed (hospital or office based).

Sedation means the use of powerful drugs, most of them potentially dangerous. From a pharmacologic perspective we can refer to therapeutic effects, sedation in itself with or without analgesic coadjuvants, and collateral effects, mainly respiratory depression, but also hemodynamic instability. Both therapeutic effects and side effects usually coexist and we need to navigate through them with maximal guarantees of safety. Safety means that we must be able to continuously keep track of the state of the patient and anticipate any increase in noxious stimulation, or an excessive effect driving to respiratory depression requiring fast rescue. Each application of sedation might pose slight differences: it is not the same to keep the patient disconnected from the stress of the operating room environment than to induce unconsciousness and analgesia to facilitate some specific invasive procedure.

A wide range of patients undergo procedures under sedation combined or not with analgesia. From the healthy young patients to the sick, frail old patients, all of them can show up in the GI endoscopy area. Kids are welcome as well as the very old subjects. More and more patients are under chronic medications and the effects of those drugs might be interfered by sedative drug effects and vice versa. Sometimes very sick and unstable patients are proposed for a procedure that must be performed under sedation.

Anesthesiologists usually take the

continued on next page

leadership in providing sedation, but there are significant differences in the approach between different countries, different environments or even inside the same hospital. Independently of who takes care of providing sedation, we as physicians must have the ultimate goal of patient safety through individualization. This means that an adequate strategy must be planned beforehand. Preoperative conditions should be kept in mind to adapt our efforts to the context. How should we do it: having the most information about the patient, its medical conditions and medications, knowing the properties of the drugs we are giving, using state of the art approaches to administer and titrate, implementing optimal ways to measure sedative effects as well as collateral effects, generating accurate ways of measuring recovery with special attention to cognitive function, evaluating long term consequences, quantifying morbidity and based on all that, establishing standards of care.

How to Implement this Approach from SASM: Tridimensional 3-D Way

Our approach should be based on growing in different dimensions. Horizontally favoring the establishment of sedation patterns in typical individuals using the most common drugs and monitoring techniques and devices. Then promoting the expansion, gradually, to different subpopulations and even different drug combinations: studying the effect of aging and how sedation works in extreme age populations, expanding to different subspecialties by asking pediatricians, ICU practitioners or specialist in palliative care to provide their perspective.

Vertical understanding, going deep, to increment the knowledge on specific paths and mechanisms in the brain, promoting research in sedation as a common effect that might come through different pathways. An objective for the near future would be to try to find new, alternate ways of providing sedative effects with maximal efficacy and minimal collateral changes, maybe through different mechanisms, perhaps using different drugs and this will come by promoting research in the area of sedation.

And finally in a global perspective by promoting "big data" research on outcomes related to sedation to understand beneficial properties of sedation at different levels and to decrease the collateral damage that can derive.

This is our proposal. All aspects of sedation as we defined above will be considered in our newsletter, in formal presentations or discussions in our Annual Meeting or encouraging the presentation of work performed by research groups in our meetings. Drs. Anthony Doufas, Phil Kurien, Mervyn Maze, Ricard Mellado and Pedro Gambus, with the support of the SASM Executive Board, and very specially Professor Frances Chung, MBBS, FRCPC, are the starting group under this initiative. We ask for your interest, your collaboration and your enthusiasm. In essence, we all want to make the experience of our patients comfortable, safe and adequate to the procedures and medical conditions in a true, individualized approach. We will be able to get it with a little help from you all. ❖

The Obstructive Sleep Apnea Death and Near Miss Registry

The SASM has partnered with the Anesthesia Quality Institute to launch a new Registry: The Obstructive Sleep Apnea Death and Near Miss Registry. The goal of this new registry is to identify perioperative recurring patterns or themes underlying death or adverse events suspected to be related to obstructive sleep apnea with the ultimate aim of risk prevention and improved anesthesia patient safety. The Registry seeks to obtain a large number of case reports to achieve these goals.

Any medical provider can submit a case, but patients are not allowed to submit cases.

It is greatly encouraged to the SASM members to submit case reports to the Obstructive Sleep Apnea Death and Near Miss Registry. Case report instructions and forms are available on the OSA Death and Near Miss Registry website: http://depts.washington.edu/asaccp/projects/obstructive-sleep-apnea-osa-death-near-miss-registry

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You Don't Have a Sleep Lab?

Travel and working in different countries provides a different perspective on the delivery of medical care. As a trainee you are shown how to look after patients according to the practice in that institution. When you move to another institution, and especially if you move to a different country, you realize that there are different models of service delivery that are just as valid.

I trained as an anaesthetist in the UK. Initially in Liverpool, then in Oxford and Swindon, but I have also worked in Holland and Dunedin in New Zealand, and observed the practice in North America. I finally settled as a consultant in Bradford West Yorkshire and it was here that I first encountered Obstructive Sleep Apnoea (OSA). A terrified 55-year old gentleman who was having a cataract extraction under local anaesthetic became apnoeic following 1 mg of midazolam. I felt that this was profoundly unfair especially as I had to assist his ventilation for the best part of 20 minutes. On questioning it became apparent that he was excessively sleepy during the day and was a heavy snorer. By chance, I had attended a presentation where OSA had been described. I realized what was wrong and when I was unable to find anyone local to treat it, advised weight loss. The same patient returned for his second eye to be operated on 6 months later and he thanked me profusely for changing his life. He has lost weight and was no longer sleepy. I concluded that this was easy and anyone could treat OSA!

I was fascinated by this condition. I joined the British Sleep Society and attended national and international conferences. I visited sleep labs run by respiratory physicians, neurologists and anaesthetists. Finally, with generous support from a charitable ENT Trust, I purchased the equipment to do sleep studies and set up in the private sector. The system had been designed by an amazing individual (Dr Lyn Davies) and Professor Stradling was kind enough to spend some time with me, instructing me in its use. I had no technologists and provided the whole service myself.

In the UK, most of the insurance companies will not reimburse for sleep studies and none of them will pay for CPAP. The practice was quiet, but it did enable me to gain valuable experience. Then, purely by chance, I met Melanie Marshall and Jim Moylan. Jim was the MD of Profile Respiratory and they wanted someone to join them on a project to screen, diagnose, and treat HGV drivers. I was happy to join them as I had recently had to treat a driver who had killed 5 students when his truck ran over the top of their minibus whilst he was asleep. We couriered diagnostic kit to the drivers and retrieved the data from it. I would do a telephone consultation and if they needed CPAP it would be couriered to them and we monitored their use from data cards returned to us. This was a very different way to practice, but it worked. Profile Respiratory was taken over by Respironics and unfortunately, in the management changes, most of the project was lost.

However, Jim had met Dan Levendowski of Advanced Brain Monitoring, Inc. based in San Diego, California. Dan demonstrated the ARES device that he had developed, along with Phil Westbrook. This was so different and, if I am honest, I thought it was a bit too weird….until I tried it. I was amazed at the quality of data and the ease of use. Dan was kind enough to lend me some units and I stopped doing in-patient sleep studies. I had also started to use the Respironics service MOST (at that time this stood for Management of Sleep Therapies). Just as with the truck drivers, the CPAP is couriered to the patient. They are supported by a free phone helpline and the data is recovered from the auto titrating device and made available on a secure web site.

Around this time my NHS hospital was in financial difficulties so I offered to bring sleep medicine into

continued on next page

their hospital as well. Gradually the practice has grown. I now work with a respiratory physician and three anaesthetic consultant colleagues and a respiratory nurse specialist who have all attended the International Sleep Medicine Course. We work closely with the orthodontic department who make mandibular advancement splints for us and I run a joint clinic with one of our ENT surgeons.

However, we manage all this without a "Sleep Lab". Our Cardiorespiratory technicians hand out the ARES monitors and download the data in the NHS practice. My secretary does this in the private sector. We do not have the facility for PSG, but in those cases we consider this would be helpful, we refer to a neurologist colleague in Middlesbrough. Paul Reading also happens to be the current President of the British Sleep Society and he is of great support.

When we get requests from out of the area we can post the ARES out and I provide a video report of me analysing the data, which I then email to the patient and discuss on the phone. If needed, we organise their CPAP as well, but always insist that they are seen and examined locally by their primary care physician in order to exclude tumours of the upper airway.

I work as a medical adviser to Philips Respironics and have set up my own company to promote the diagnosis and treatment of OSA. I will be retiring from the NHS within the next 5 years, but fully intend to continue to develop and expand my role in sleep medicine. There is so much that we still do not understand.

So, I started by commenting on the value of travel in order to experience alternative ways of delivering a service. There is also some value in looking at a problem with new eyes that have not been trained (or perhaps indoctrinated) in a particular manner. Too often in the UK we call for more money in order to expand a service. If we really have only found 20% of the patients with OSA, can we realistically expect our budgets to be increased 5 fold? This problem needs innovative thinking in order to increase diagnosis and treatment without breaking the bank.

I have been incredibly fortunate along this journey. The "sleep fraternity" have been helpful and supportive and I have met some truly inspiring individuals. I wholeheartedly endorse the efforts of SASM to bring sleep medicine into the anaesthetic arena. It is in our interest (and in the interest of our institutions) to identify patients who may have an increased peri-operative risk because of untreated OSA. By doing so, we will reduce the risk to our patients and have more grateful patients like my first OSA sufferer, who hopefully will recognize that we have indeed changed their lives. ❖

RESEARCH GRANT SUBMISSION DEADLINE JULY 1, 2015

The SASM grant program supports research directed towards areas in anesthesia, sleep and pulmonary medicine. Submissions are due no later than July 1, 2015. The grant is scheduled for funding starting 1/1/16. The award is $10,000 for a study to be conducted over a maximum of one year.

6 BEST ABSTRACTS AWARDED DEADLINE JULY 1, 2015

The Scientific Program Committee will be honoring the best abstracts with the Best Presentation Awards. For more information on guidelines and qualifications visit the SASM website at www.sasmhq.org.

IMPORTANT ANNUAL MEETING DEADLINES

(For More Information Visit www.SASMhq.org):

- Abstract Submission Open from March 1st – July 1st
- Research Grant Submission Open from March 1st - July 1st
- Online Registration Opens April 2015
- ASA Housing Portal Opens May 2015

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Q & A: Obstructive Sleep Apnea

Dr. Isidro Lezcano, M.D. asks:

I would like to run by you a typical scenario that I had in my surgery center last week. I had a 13-year old patient with class +3 adenoids (kissing adenoids). The surgeon documented in his H&P that patient had Obstructive Sleep Apnea without any studies done. Patient was overweight at 220 lbs. and I met him for Tonsillectomy and Adenoidectomy. I would like to know, with this history, would you proceed in the surgery center or would you recommend that patient be done in the hospital setting?

Dr. Dalesio answers:

I appreciate your question and hope I can answer it to your satisfaction. I believe your question has multiple questions within it:

1. Does this patient actually have obstructive sleep apnea (OSA)?
2. Are there factors in this patient that predict post-operative complications?
3. Is it safe to perform adenotonsillectomy (AT) in an outpatient setting?

1. Currently, the gold standard diagnostic tool for pediatric OSA is the polysomnogram (PSG) and unfortunately, there is no alternative tool equivalent to the PSG (such as STOP-BANG questionnaire) that is sensitive/specific enough to diagnose OSA that has gained wide-spread clinical acceptance. Because he is presenting for AT, I assume he has some sort of sleep-disordered breathing (i.e. snoring, witnessed apneas, etc.) If this is true, it is likely your patient has some degree of sleep apnea, however. Only PSG can diagnose and qualify the disease to mild, moderate, or severe OSA. It has been recommended that all patients with sleep disordered breathing and suspected OSA undergo PSG, however, the cost/benefit to follow this recommendation is unclear.
2. Historically, pediatric patients with OSA presented underweight, with adenotonsillar hypertrophy, however, your patient's etiology for sleep-disordered breathing is likely of an "adult" etiology (increased mechanical load to the upper airway with neuromuscular compromise). Obesity has been shown to create a chronic inflammatory syndrome that may lead to adenotonsillar hypertrophy. Unlike in adulthood, obesity has not been directly related to upper airway patency during sleep, with research suggesting obese adolescents without sleep apnea can still maintain airway patency compared to obese patients with OSA. [1]

Morbid obesity, depending on the distribution of fat in the patient, increases the risk for difficult ventilation and intubation. Obesity in children with OSA is considered a risk factor for post-operative respiratory complications, and according to Dr. Carole Marcus' publication in Pediatrics, AT should be performed in a center that is prepared to treat complex pediatric patients.[2]

Therefore, my recommendation is to obtain a PSG on this patient prior to scheduled AT. This way you can diagnose and qualify the severity of OSA and, if in fact the patient has OSA with the additional risk factor of morbid obesity, surgery should be performed in a hospital-based setting and not a surgical outpatient center. In addition, if the patient has severe OSA, more intensive monitoring post-operatively (such as ICU admission) may be necessary. If a pre-operative PSG is not possible and the only data you have is obesity with sleep-disordered breathing, I would perform the AT in a hospital-based setting. Due to the potential for difficult ventilation/intubation and the availability for additional resources is there if needed. ❖

References:

1 Huang J, Pinto SJ, Yuan H, et al. Upper airway collapsibility and genioglossus activity in adolescents during sleep. Sleep. 2012;35(10):1345-1352. doi:10.5665/sleep.2110.

2 Marcus CL, Brooks LJ, Draper KA, et al. Diagnosis and management of childhood obstructive sleep apnea syndrome. PEDIATRICS. 2012;130(3):576-584. doi:10.1542/peds.2012-1671.

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Pregnant and Tired to Death

It's a new year and the Society for Anesthesia and Sleep Medicine (SASM) Obstetric (OB) special interest group's (SIG) resolution is to spread the good word about sleep disordered breathing in pregnancy. Sleep disordered breathing (SDB) describes abnormalities during sleep that range from habitual snoring (at least 3 nights/week) to obstructive sleep apnea (OSA). The impact of SDB is out there with new research implicating its role in high risk pregnancies such as pre-eclampsia, chronic/gestational hypertension, obesity, gestational diabetes, as well as early onset delivery and increased maternal mortality [1,2].

While it is recognized that SDB in pregnancy with an overall rate of OSA being 3 per 10,000 [2] plays a role in pregnancy complications, the extent of that role is still being unraveled. Research to date comprises small cohort studies that tell us fetal issues are more likely to be associated with maternal factors such as pre-eclampsia[3,4]. A recent retrospective cross-sectional analysis of over 55 million pregnancy-related hospital discharges from the Nationwide Inpatient Samples (NIS)[2] database shows among fetal outcomes, OSA was associated with early-onset delivery, but not fetal growth restriction or stillbirth. This same review not only supports smaller study outcomes looking at associations of OSA with pregnancy co-morbidities, but importantly highlights the association of OSA with increased maternal mortality. Yet, the evidence to date of improved clinical outcomes is currently scarce with no data looking at long-term maternal cardiovascular outcomes e.g. stroke, myocardial infarction, hypertension.

The journey is ongoing with even the simple identification of abnormal sleep symptoms in a pregnant woman being difficult due to the accepted belief that poor sleep and excessive daytime sleepiness are expected during pregnancy. Although women have the same classic symptoms described in men (witnessed apnea, choking, and restless sleep), women are less likely to self-report these symptoms, leading to misdiagnosis or even delayed diagnosis[5, 6]. Only as pregnancy progresses, especially from the second trimester onwards, do these symptoms become more marked and clinically relevant to pregnancy. But if a pregnant patient's sleep history is difficult to attain, what about which sleep questionnaire to be posed in pregnancy, as well the timing of said questionnaire, i.e. first, second or third trimesters. Predictive values of the Berlin and STOP-Bang questionnaires have been shown to be acceptable in the second trimester,[7] but not ideal in the first trimester[8]. Models incorporating clinical signs and symptoms such as habitual snoring, chronic hypertension, age and patient BMI, perform significantly better in predicting sleep apnea in pregnancy[8- 10] than the current sleep questionnaires designed for the general population.

Obesity, an issue that plagues the entirety of our population, is especially burdensome during parturition, as the pregnancy obesity time bomb continues to tick within the pregnant population. Studies already report the correlation of a high BMI in pregnancy with symptoms of SDB[9, 10] with more pregnant women complaining of disruptive sleep and more partners complaining of snoring or witnessing an apneic event. As well as these observational clinical symptoms, the presence of obesity also magnifies the association of OSA with cardiovascular disease[2] in pregnancy and ultimately increases maternal mortality[11].

As the pregnant state experiences weight gain, it also undergoes physiological changes. Hormones, especially progesterone and estrogen, are closely linked to sleep. Progesterone is thought be responsible for the excessive daytime sleepiness in the first trimester, as well as stimulating

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the ventilatory drive via increased sensitivity to CO2 and increasing the electromyographic activity of the upper airway dilator muscle, hence theoretically protecting the pregnant patient from developing sleep apnea[12] while estrogen induces hyperemia, mucosal edema and vasomotor rhinitis,[13] which can lead to airway narrowing and nasal obstruction. Chronic nocturnal nasal obstruction has been identified as a risk factor from SDB in the general population[14].

If the above changes in pregnancy warrant a sleep investigation, in the absence of a fast track referral system, high cost and lengthy waiting times for overnight laboratory polysomnography are just two factors faced by pregnant women, especially if the mother-to-be has family/work commitments and no family support system. Pregnancy is a time limited state whereby SDB investigation and treatment delays are not practical. Alternatively, ambulatory sleep testing may be the way forward when assessing the pregnant population for SDB. The use of unattended portable monitor sleep tests in conjunction with a comprehensive sleep evaluation are not only supported by the American Academy of Sleep Medicine,[15] but have also been validated in pregnancy[16].

In reality, SDB in pregnancy is still cutting a global swathe through developed nations where commonly, SDB labeled tumble weed blows across the ante-natal clinics and Labor and Delivery units. Three words prevail: education, education, education. Our goal is a heightened clinician awareness of SDB in pregnancy. We are learning more about this condition on a daily basis, but many questions still remain unanswered.

We know the pregnant state is a dynamic, transient condition that may be associated with new-onset sleep disordered breathing, usually from the second trimester onwards in high-risk pregnancies and that OSA is associated with increased maternal mortality. Similar to the composition of the SASM OB SIG, SDB in pregnancy is currently being researched by a diverse group of medical subspecialists comprising researchers and physicians from sleep, anesthesiology, obstetrics, neurology and pulmonology. Although a lot of time and effort have been invested investigating this condition, there is still a long way to go with regards to collecting data that supports universal ante-natal screening, development of a simple yet viable screening tool, establishment of SDB in pregnancy guidelines and inception of subsequent treatment protocols of SDB. Collaborative research efforts in this field are the way forward.

Our new group's mission, which we've chosen to accept, is to promote recognition of SDB in the pregnant population, determine a viable screening tool for pregnant women, successfully manage the SDB parturient in collaboration with our obstetric and sleep colleagues and finally study the outcomes of our clinical efforts . The hope is that this message won't self-destruct in 5 seconds… ❖

References:

1 Louis JM, Auckley D, Sokol RJ, Mercer BM. Maternal and neonatal morbidities associated with obstructive sleep apnea complicating pregnancy. *Am J Obstet Gynecol.* 2010 Mar;202(3):261.e1-5

2 Louis JM, Mogos MF, Salemi JL, Redline S, Salihu HM. Obstructive sleep apnea and severe maternal-infant morbidity/mortality in the United States, 1998-2009. *Sleep.* 2014 May 1;37(5):843-9. doi: 10.5665/sleep.3644.

3 Sahin FK, Koken G, Cosar E, et al. Obstructive sleep apnea in pregnancy and fetal outcome. Int *J Gynaecol Obstet* 2008; 100:141

4 Bourjeily G, Raker C. A., Chalhoub M., et al. Sleep disordered breathing symptoms in pregnancy and adverse pregnancy and fetal outcomes Eur Respir J, 36 (4) (2010), pp. 849–855

5 Kapsimalis F, Kryger MH. Gender and obstructive sleep apnea syndrome, part 1: Clinical features. *Sleep* 2002; 25:412

6 Lamberg L. Sleeping poorly while pregnant may not be "normal". *JAMA 2006*; 295:1357

7 Tantrakul V, Sirijanchune P, Panburana P, Pengjam J, Suwansathit W, Boonsarngsuk V, Guilleminault C. Screening of Obstructive Sleep Apnea during Pregnancy: Differences in Predictive Values of Questionnaires across Trimesters. *J Clin Sleep Med.* 2014 Nov 19. pii: jc-00233-14. [Epub ahead of print]

8 Facco FL, Ouyang DW, Zee PC, Grobman WA. Development of a pregnancy-specific screening tool for sleep apnea. *J Clin Sleep Med.* 2012 Aug 15;8(4):389-94. doi: 10.5664/jcsm.2030

9 Wilson DL, Walker SP, Fung AM, O'Donoghue F, Barnes M, Howard M. Can we predictsleep-disordered breathing in pregnancy? The clinical utility of symptoms *J Sleep* Res. 2013 Dec;22(6):670-8

10 O'Brien LM, Bullough AS, Owusu JT, Tremblay KA, Brincat CA, Chames MC, Kalbfleisch JD, Chervin RD. Pregnancy-onset habitual snoring, gestational hypertension, and preeclampsia: prospective cohort study. *Am J Obstet Gynecol.* 2012 Dec; 207(6):487.e1-9.

11 Berg CJ, Callaghan WM, Syverson C, Henderson Z. Pregnancy-related mortality in the United States, 1998 to 2005. *Obstet Gynecol.* 2010;116:1302–9

12 Popovic RM, White DP. Upper airway muscle activity in normal women: influence of hormonal status *J Appl Physiol,* 84 (1998):1055–1062

13 Mabry RL. Rhinitis of pregnancy. *South Med J* 1986; 79: 965–71

14 Young T, Finn L, Palta M. *Chronic nasal congestion at night is a risk factor for snoring in a population-based cohort study.* Arch Intern Med 2001; 161: 1514–9

15 *Collop NA; Anderson WM; Boehlecke et al.* Clinical Guidelines for the Use of Unattended Portable Monitors in the Diagnosis of Obstructive Sleep Apnea in Adult Patients Portable Monitoring Task Force of the American Academy of Sleep Medicine *Clinical guidelines for the use of unattended portable monitors in the diagnosis of obstructive sleep apnea in adult patients. J Clin Sleep Med 2007* ;3(7):737-747

16 O'Brien LM, Bullough AS, Shelgikar AV, Chames MC, Armitage R, Chervin RD Validation of Watch-PAT-200 against polysomnography during pregnancy. J Clin Sleep Med. 2012 Jun 15;8(3):287-94 doi: 10.5664/jcsm.1916.

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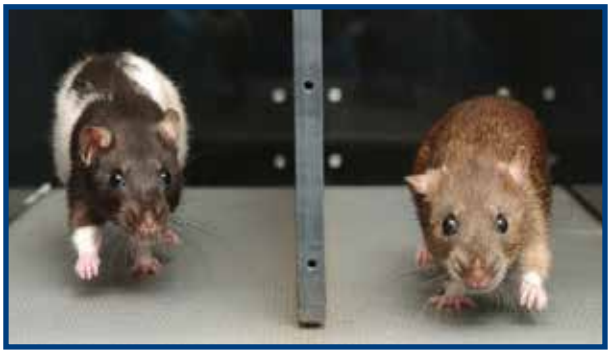
Rat Models of Susceptibility and Resistance to Disease Risk

In the 1980s, we were much influenced by the statistical geneticist John P. Rapp. He was the lead pioneer in the development and study of mammalian models of disease[1]. The goal we formulated was to generate animal models of disease that would have high utility for addressing translational problems. We had concluded that most commonly used animal models of complex disease risks were too simplistic. As a minimum, we proposed that an ideal animal model of complex disease should: a) emulate an important clinical phenotype(s), b) be polygenic (hence realistic for human translation), c) respond to positive and negative health environments, and d) be consistent with fundamental scientific principles.

Starting in the 1980's a small robust emergent literature demonstrated that low exercise capacity was a stronger predictor of morbidity and mortality relative to other commonly reported risk factors, including hypertension, chronic obstructive pulmonary disease, diabetes, obesity, and smoking[2]. Dysfunctional aerobic energy metabolism has been implicated in essentially all age-related disease conditions, including cardiac arrhythmias and sudden cardiac death [3]. Moreover, it is well known that regular physical activity reduces the risk of developing a large number of chronic diseases and can be beneficial in the treatment of numerous age-related disorders[4].

These clinical association studies led us to formulate the idea that variation in capacity for energy transfer is the central mechanistic determinant of the divide between complex disease and health, which we termed the Energy Transfer Hypothesis[5]. By the early 1990s, we had envisioned that the energy transfer hypothesis could be tested prospectively by divergent artificial selection for low and high aerobic treadmill running capacity in rats[6]. That is, if the energy transfer was true, we expected susceptibility to disease would segregate with low running capacity, and resistance to disease would segregate in rats with high running capacity and simultaneously provide uniquely contrasting models for study.



A rat model system developed by artificial selection for low and high exercise capacity (image from Science 307:334, 2005. Picture credit to Martin Vloet, University of Michigan).

In 1996, we exercise tested a large founder population (n~180) of the genetically heterogeneous N:NIH rat stock[6] for the initiation of two-way artificial selection. Maximal running distance on a speed-ramped treadmill running test was adopted as the selection criterion because it provides a strong signal corresponding to whole-body energy transfer and can be measured rather objectively in many rats. We are currently at generation 35 of selection and over 13,000 rats have been phenotyped for innate running capacity (i.e. not from training). The low and high selected rat lines differ in maximal running capacity about 8-fold. The rats bred as low capacity runners (LCR) exhaust on average after running ~250 meters (16 min) and the high capacity runners (HCR) exhaust at ~2,000 meters (75 min).

At generation 10 of selection, we first tested if disease features had segregated differentially between the lines. We discovered that adult LCR rats develop cardiovascular risks consistent with the metabolic syndrome, including large amounts of visceral adiposity, heightened blood pressure, dyslipidemia, endothelial dysfunction occurring within carotid arteries, and insulin resistance[7]. Subsequent work through generations 28 has revealed that the LCR are more susceptible whereas the HCR are quite resistant to numerous disease risks (Figure) [7-21].

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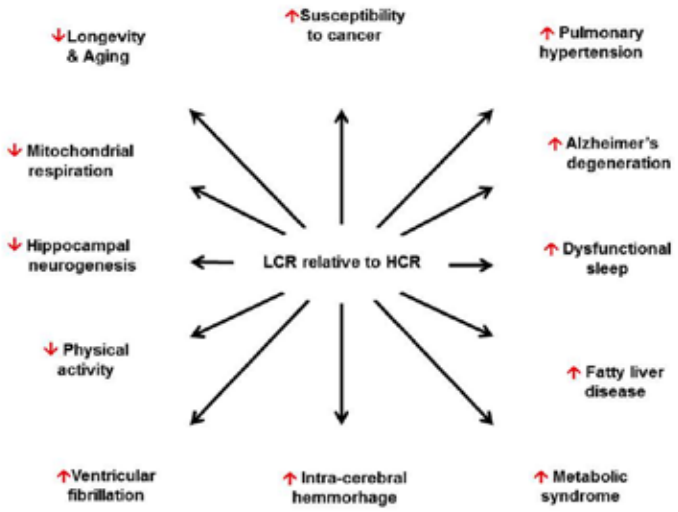

Consistent with the energy transfer hypothesis, studies of preoperative cardiopulmonary exercise testing in humans have shown that a reduced oxygen uptake at anaerobic threshold is associated with reduced short- and medium-term all-cause survivability after major surgery[22]. More recently, the LCR/HCR rat model system has been used to tackle several problems associated with anesthesiology. Postoperative cognitive dysfunction is common in the elderly, but difficult to assess mechanistically in humans [23]. Maze and colleagues[11] have demonstrated that the LCR/HCR rats can be used for in-depth exploration of the negative effect of low aerobic capacity upon postoperative cognitive dysfunction. For this, tibial fracture surgery was performed under isoflurane anesthesia in LCR and HCR rats and cognitive function was assessed postoperatively in a trace-fear conditioning paradigm and Morris Water Maze. Postoperatively LCR rats diverged from HCR rats and exhibited greater declines in memory, both short and long-term. This animal model of surgery-induced cognitive decline corroborates, with high fidelity, the findings of postoperative cognitive dysfunction in patients with low aerobic function. In subsequent work, it was found that LCR rats have ineffective inflammation resolving mechanisms that represents a plausible explanation for the exaggerated and persistent postoperative cognitive decline[24]. In other studies, Muncey et al[16] report that LCR display dysfunctional sleep, as shown by spending significantly more time awake, less time in non-rapid eye movement and more fragmented rapid eye movement sleep. Filbey et al[25] found that the sedative dexmedetomidine decreased minute ventilation in the LCR, relative the HCR rats, by depressing both duty cycle and inspiratory flow rate. Finally, Palet al.,[26] learned that the comorbidities associated with the LCR rats did not affect the anesthetic requirements for isoflurane as estimated by Minimal Alveolar Concentration (MAC). By contrast, HCR rats were associated with a higher MAC for isoflurane and thus may be at risk for sub-therapeutic dosing.

Part of the motivation for developing phenotype-based models that contrast for susceptibility to disease was our view that the enthusiasm in the 1990s for using genome sequence data for drug development was overly optimistic[27]. The pathway, known as "target-based drug discovery," has three fundamental steps: 1) identify a malfunctioning gene, 2) uncover the protein coded by that gene and 3) use that protein as a target to test for unique chemicals to correct the protein's function. The approach proved overly simplistic for uncovering genetic causation of widespread diseases like diabetes or cancer that are underwritten by numerous mutations as played out by epistatic, epigenetic, post-transcriptional and posttranslational modifications.

The LCR/HCR rat model system is an international resource maintained by the Department of Anesthesiology at the University of Michigan.

Contact Steven L. Britton or Lauren Gerard Koch for availability of rats. ❖

References:

1 Hypertension 1991;18:I18-28.
2 N Engl J Med 2002;346:793-801.
3 J Clin Invest 2005;115:3527-3535.
4 Medicine & Science in Sports & Exercise 2009;41:1510-1530 1510.1249/MSS.1510b1013e3181a1510c1595c.
5 J Physiol 2008;586:83-95.
6 Physiol Genomics 2001;5:45-52.
7 Science 2005;307:418-420.
8 American Journal of Physiology-Endocrinology and Metabolism 2014;307:E355-E364.
9 Ann Clin Transl Neurol 2014;1:589-604.
10 Acta Physiologica 2014;210:854-864.
11 Anesthesiology 2013;118:1098-1105.
12 Neurobiology of Disease 2013;49:22-28.
13 Journal of Applied Physiology 2012;113:1624-1634.
14 J Physiol Behav 2012;106:95-100.
15 Circulation Research 2011;109:1162-U1151.
16 Anesthesiology 2010;113:1176-1185.
17 Horm Behav 2010;58:355-367.
18 Journal of Applied Physiology 2009;106:1810-1818.
19 J Physiol 2009;587:1805-1816.
20 Am J Physiol Endocrinol Metab 2007;293:E31-41.
21 Am J Physiol Regul Integr Comp Physiol 2001;281:R1787-1791.
22 Br J Anaesth 2010;105:297-303.
23 Anesthesiology 2009;110:548-555.
24 Molecular Medicine 2012;18:1481-1490.
25 Sleep 2014;37:871-880.
26 Anesthesia and Analgesia 2012;114:297-302.
27 Metab Eng 2008;10:1-9.

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