

# CONNECT



December 2020 (Issue 1, Council 2020/2021)

EMBRACING, ENGAGING & INFORMING

## 3D Ultrasound - Coming of age in imaging technology

Pre-implantation Genetic Testing  
- Where are we today?

Meet the  
new Council

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**INBOX**

A publication by the Obstetrical and Gynaecological Society of Malaysia



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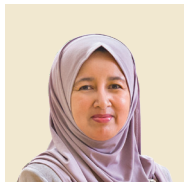
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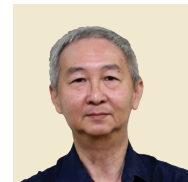
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# 3-Dimensional (3D) Ultrasound Coming of Age in Imaging Technology



**Dr Vijayan V**

Consultant Maternal & Fetal Medicine  
Aseana Pregnancy Scans  
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The Curve, Mutiara Damansara

3D ultrasound has evolved into one of the most powerful tools employed in foetal diagnosis. The rapid use of this new technology in 3D imaging technique was embraced by certain specialties, particularly in obstetrics. Demands of the digital age have given us a powerful and faster computer at a fraction of the price. This allows the clinician increasing opportunities to adopt the new and exciting technology in his day-to-day practice<sup>1</sup>.

Today, 3D ultrasound is increasingly employed to scan the anomalous foetus. In its early years, the diagnostic evidence for 3D ultrasound was not strong enough to change scanning protocols from 2D to 3D. However, a number of key improvements have driven the proliferation of the 3D technology. Areas that have been helpful include using the volumetric scan to evaluate facial, neural tube defects and skeletal malformations. The “volumetric scan” as it should be called, applies three orthogonal planes to investigate the region of interest (ROI) that is being interrogated. Hence, it is not only the surface rendering modes that we are most familiar with, such as the face.

3D ultrasonography aids in diagnosis as an adjunct to, but not a replacement for, 2D ultrasound<sup>2,3</sup>. Until recently, there was little demand for the upgraded 3D technology due to the perceived lack of clinical evidence to warrant purchasing an expensive piece of hardware. However, as machines become affordable and increasing clinical advantages accumulate, a surge in the demand for greater diagnostic accuracy has been seen. The 3D ultrasound is now a crucial addition to our current tools in foetal diagnosis.



**Dr Patrick Chia**

Consultant Maternal & Fetal Medicine  
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The Curve, Mutiara Damansara

The use of 3D is shown to be convincing in some areas of obstetrics, such as in the assessment of the extent and architecture of foetal malformations. In a prospective observational study, Sadek (2019) concluded that 3D ultrasound does add value in the diagnosis of some types of foetal malformations. The author, however, emphasised that rather than representing an alternative, 3D ultrasound is complementary to the conventional 2D sonography in the field of prenatal diagnosis. From an economic and logistic standpoint, a broad implementation of 3D ultrasound as a screening test alone cannot be currently recommended<sup>4</sup>.



4-dimensional ultrasonography (4DUS) refers to three-dimensional images that can be viewed in real-time; Live-3D. It is also called dynamic three-dimensional sonography. Kurjak et al. (2007) surveyed the medical literature and found 438 that were relevant to the review with 3DUS 4DUS. The authors concluded that 3DUS and 4DUS provide additional information that is needed for the diagnosis of facial anomalies, evaluation of neural tube defects and skeletal malformations. Further research is required to determine the clinical use of 3DUS and 4DUS for diagnosing congenital heart disease and central nervous system (CNS) problems<sup>5</sup>.

Spatial and temporal image correlation (STIC) technology has substantially contributed to foetal echocardiography. Significant improvements have been made in the last several years concerning the electronic matrix probe along with advances in grey scale and colour Doppler post processing. These resulted in the enhanced image display of vessels<sup>6</sup>.

Kurjak's Antenatal Neuro-developmental Test (KANET) attested to study foetal movements and the neurobehavioral states of the unborn child. Investigators introduced a scoring system which can further add to the investigation of behavioural concerns, helping in the diagnoses of brain and nervous system pathology<sup>7,8</sup>.

### Is there Life Beyond 4D?

In essence, 3D ultrasound presents a volume of data in a readily comprehensive and unambiguous fashion. The volume dataset is acquired, analysed and displayed. In conventional 2D ultrasound, the transducer sends and receives the ultrasound waves in one plane. The high frequency waves that are reflected or bounced back are black-and-white images of the foetus in one plane. Transducer technology has improved the visualisation of abnormal and normal anatomies. However, it is important to know that a good 3D image still relies on obtaining a good 2D image.

The 3D ultrasound uses a mechanical sector probe to acquire 90 slices of 2D images which are then integrated by a high-speed computing software to create a 3D display. 3D ultrasound images are created by combining image data acquisition, volume data analysis and a

display on the monitor. The data can be exhibited as a rendered image, tomographic mode or multi-planar format. The multi-planar format enables the operator to simultaneously assess multiple 2D image planes. Hence, when a 3D image is combined with time, this will be shown as "live 3D" or 4D movements of the baby. Viewing the baby is in real live motion, as happening in the utero. Facial expressions such as yawning or sucking the thumb or toe can be seen.

With 3D, the whole anatomy can be acquired in a single scan for many clinical applications. Volumetric scanning leaves no information behind, ultimately leading to a faster and more accurate diagnosis. The introduction of HD-live rendering and the silhouette mode<sup>9</sup> offer a natural and realistic view of the foetus through the use of a new skin-like colour that makes ultrasound images more discernible to both parents and clinicians than those obtained by conventional 2D or 3D ultrasounds. HD-live rendering can be applied during the entire pregnancy duration, although more natural and realistic views of the foetus are obtained when scanning during the first trimester.

5D ultrasound was first introduced as a form of automation where a scan is accomplished, and the results are auto-populated. It is a feature created for the time-consuming ultrasound examination that also assists the sonographer's efficiency. Therefore, the "fifth dimension" should really be defined as "automation" instead. It will automatically display measurements for diagnostic purposes. The term "5D" has been confused with HD, "High Definition" ultrasound, since it offers life-like images of the baby's face. This latest technology for surface rendering provides us with skin tone realistic views of the baby's face and should not be misinterpreted or misrepresented as "5D".

A group of Chinese researchers<sup>10</sup> have recently demonstrated the use of this "5D" software to significantly improve the image quality of key diagnostic elements in foetal echocardiography with low operator dependency and good reproducibility. STIC examines the heart but is limited by motion artefacts. Other available combinations of this automation process include 5D NT or nuchal translucency and 5D LB or foetal long bone<sup>11</sup>. Research results on its value in clinical practice are anticipated.



## Ultrasound Keepsake Debate

Over the last two decades, 3D 4D scans have become commercially<sup>12</sup> available to parents. They are generally marketed as 'bonding scans' or 'reassurance scans', in line with claims that it will enhance the mother and child-bonding. This has not been supported by medical research. With improvements in technology, obtaining a near-photographic image of the baby is possible. "Gender Reveal Parties" are organised by businesses, promising "your money back guarantee" on a wrong gender call. However, there is a worrying trend where ultrasound keepsake memorabilia of the baby are being offered to parents. These 3D models of the baby will certainly improve your haptic experience but will set you back by MYR1500. Increasingly, more scans are done without a medical indication and performed by untrained staff. This continues to fuel the debate on the keepsake ultrasound. The US-FDA and all other ultrasound regulatory bodies, however, have reaffirmed their concerns about the dangers of ultrasound exposure on the foetus and the possible long-term bio-effects of ultrasound on the baby when using 3D

## Conclusions

3D 4D ultrasound has come a long way, and from the available research, it has certainly taken root in diagnosing foetal anomalies and their management<sup>13,14</sup>. Without a doubt, the 3D 4D technique is helpful in several ways and should be made available as a tool in the armamentarium of a tertiary referral unit. However, contemporary 2D ultrasound imaging is of high quality when making a diagnosis, which some argue, may dampen our balanced appreciation of the technology. The state-of-the-art 3D 4D ultrasound equipment remains expensive. Considerable expertise can only be achieved from excellent basic 2D skills. For some, 3D 4D ultrasound is a natural progression of the imaging technology; while for others, this revolution in imaging technology has just come of age to make a real difference in the care of the foetus-in-utero.

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# Council Profile 2020/2021

## President

### Dr Muralitharan Ganesalingam

The healthcare industry produces a tremendous amount of data. Big data and the internet-of-things are the standard for record keeping in the healthcare industry and in the predictive analysis for healthcare. My aim is to introduce what is available for Obstetricians and Gynaecologists and how it will impact the manner in which we practice.



## President-Elect

### Dr Hoo Mei Lin

Dr Hoo Mei Lin is the current President-Elect of OGSM as well as the Trainee Committee Chairperson. In her role, she hopes to streamline the OGSM office to increase productivity and efficiency as well as continue to expand the trainee program.

## Immediate Past-President

### Dr Harris Njoo Suharjono

Dr Harris Njoo Suharjono is a Consultant Obstetrician & Gynaecologist, Reproductive Medicine Specialist and the Head Department of O&G attached to Sarawak General Hospital. He is also a Deputy National Head of O&G Services, Ministry of Health, Malaysia.

"Both optimists and pessimists contribute to any society. The optimist invents the aeroplane, the pessimist the parachute. I hope to continue to be the former in this term"



## Hon. Secretary

### Dr Loh Huey Wen

Dr Wen Loh is an Obstetrician and Gynaecologist in Hospital Tunku Azizah (HKL) and has been involved with OGSM since she was a trainee. She has been the trainee representative since the year 2013, providing a voice for trainees. She went on to be involved in the OGSM trainee subcommittee when it was formed. She helped develop the PACT program and was instrumental in the success of the OGSM trainee program. She served as the Assistant Secretary in 2019/2020 and is the current Honorary Secretary for the 2020/2021 term. She aspires to increase the involvement of young specialists in OGSM and elevate the PACT program. By making the engagement with trainees a priority, she hopes to not only meet the training needs of aspiring obstetricians and gynaecologists, but also inspire them to become more involved in OGSM.

## Asst. Hon. Secretary

### Dr Patricia Lim Su-Lyn

Dr Patricia Lim Su-Lyn is a Consultant Obstetrician and Gynaecologist in KPJ Tawakkal Specialist Hospital. She has been in the OGSM council since 2019. In her term, she hopes to continue to engage with women in the community through outreach projects to empower the vulnerable and promote women's health. She also wishes to contribute to the Intensive Course in Obstetric Emergencies (ICOE) by continuing to train doctors and midwives in the virtual platform, in view of the Covid-19 pandemic, while further expanding simulation-based training.







#### Hon. Treasurer

**Brig Gen Dato' Dr T. Thavachelvi a/p S. Thangarajah**  
Brigadier General Dato' Dr T. Thavachelvi S. Thangarajah is the Head of Department and Consultant Obstetrician and Gynaecologist at Hospital Angkatan Tentera Tuanku Mizan, Kuala Lumpur. Dr T. Thavachelvi has been the OGSM Hon. Treasurer since 2018.



#### Committee Member Dr Muniswaran Ganeshan

Dr Muniswaran Ganeshan is the unit lead and Maternal Fetal Medicine Specialist at the Women and Children's Hospital Kuala Lumpur and the National Heart Institute (IJN) of Malaysia. Having completed his subspecialty training in the UK, he initiated and successfully runs the Obstetric Medicine clinic, overseeing the management of patients with complex medical diseases in pregnancy. He has contributed to numerous national guidelines and is actively involved in training doctors and midwives in obstetric emergencies, both in Malaysia and internationally. His passion is to establish Obstetric Medicine services in Malaysia.



#### Committee Member

##### **Dato' Dr Balanathan a/l Kathirgamanathan**

Dato' Dr Balanathan is the Head of Department of O&G Seberang Jaya Hospital. He is a sub-specialist in Reproductive Medicine. He hopes to contribute towards enhancing the image of OGSM.



#### Committee Member Dr Ranjit Singh Dhaliwal

Dr Ranjit Singh Dhaliwal is a Consultant Obstetrician & Gynaecologist at Hospital Ampang, Selangor as well as a Life member of OGSM. Dr Ranjit is in the Council for the first time.



#### Committee Member Dr Rosalina Mohd Ali

Dr Rosalina Mohd Ali is currently an Obstetrician & Gynaecologist at Shah Alam Hospital. Her special interest is in Minimally Invasive Surgery. She strongly believes in Protege effect; hence, she is passionate in teaching and giving back to medical trainees and society at large.

# ICOE: The Equipment behind the Course

Mr Baskeran Balakrishnan  
OGSM Executive



ICOE has been an important activity of the OGSM for the past five years and an integral element of the courses are the equipment. Over the years the OGSM has purchased various training equipment which varies in its fidelity. The purchases were made gradually over time and the total value before depreciation would be in the region of RM 350,000.00. The equipment ICOE utilizes can be categorised as follows:

## A) Disposables

Disposables used for the courses include rubber gloves, syringes, blood sample bottles, needles, sutures, branulas, catheters, speculums, drapes, sterile gowns and stationery. Most of these are kindly donated by the trainers who source them from their hospitals. These are usually unused or excess items from the daily use.

## B) Reusables

Simulation involves recreating a hospital setting and for this we utilise reusable items such as simple portable collapsible beds, pulse oximeters, BP sets, drip stands, defibrillators, Daptone and stethoscopes amongst others.

### REUSABLE ITEMS

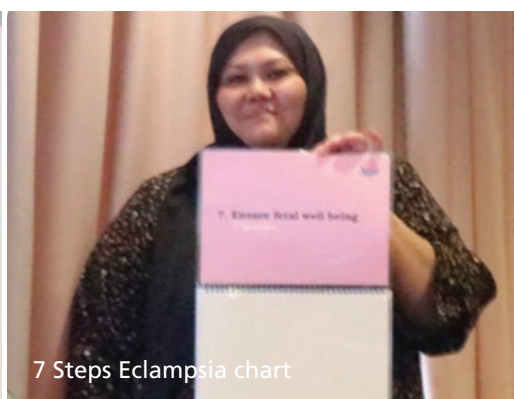
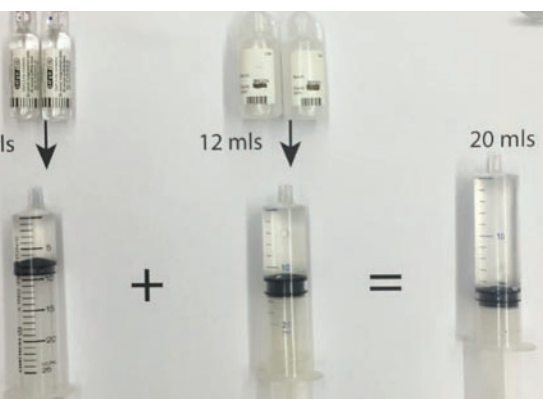


### SELF DESIGNED ITEMS





## VISUAL AIDS



## SINGLE TASK TRAINERS



### C) ICOE-designed items

Trainers have sourced various materials and developed knitted uteri complete with the uterine vessels and ovaries. We have also developed vaginal mucosal models using suture pads genital tract repairs.

### D) Visual aids

Visual aids in the form of MEOWS Charts, Eclampsia charts, partographs, CTGs and concise tables have all been internally developed as a crucial part of teaching material.

### E) Audio visuals

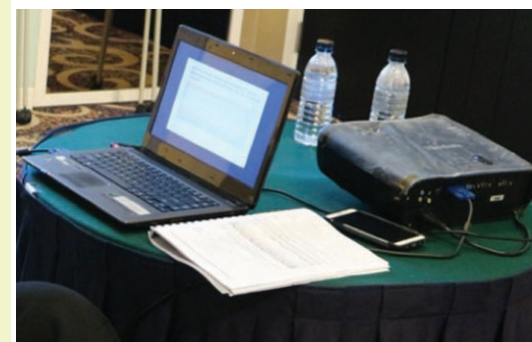
Audio visuals are extensively used in the lecture room and the three breakout rooms that run concurrently. Besides the standard laptops and projectors, we also use tablets, speakers, cameras, video recorders and external monitors. Vital signs monitor (the Japanese donated 'penguin') with simulated ECG patterns is widely used in teaching resuscitation. These audio visuals with enhanced WiFi capabilities come in handy for virtual teaching over Skype.

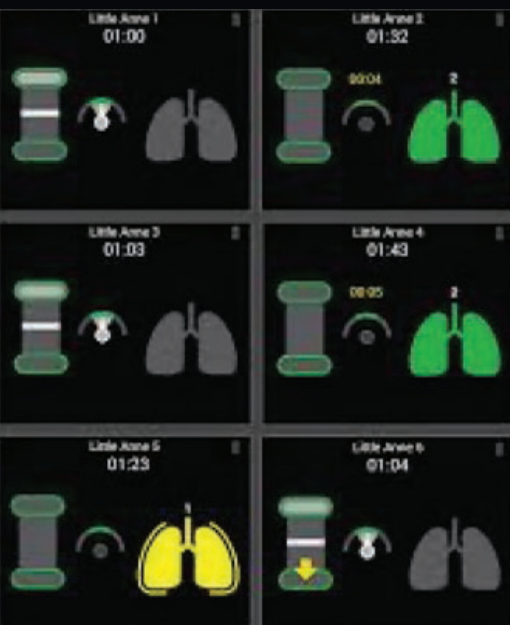
### F) Videos

ICOE has created several videos on obstetric skills and these are used along with other third-party videos as adjuncts to the lectures.

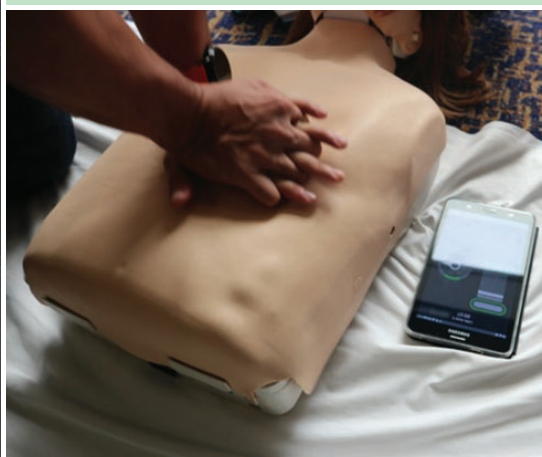
Another form of video that was developed in house is the modified 'Google glass' where the scenario is recorded from the patients point of view. These are then used to provide feedback with an impact.

## AUDIO VISUALS

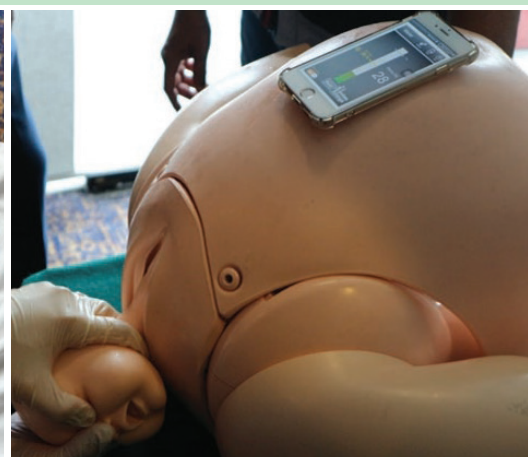




APPS



QCPR



Shoulder dystocia app &amp; Prompt Flex



Sim Mom with NASG

### G) Single Task Trainers

These manikins are used to teach and assess specific skills like resuscitation, breech delivery, shoulder dystocia and caesarean delivery. The manikins used in the course are Adam Rouilly pelvis, Sophie pelvic trainer, Mama Natalie, Prompt birthing simulator and the recently acquired C-Celia caesarean trainer. The Airway trainers and Little Anne are another examples of manikins used in teaching resuscitation

### H) High fidelity manikins

The degree to which manikins mimic real life is termed fidelity and hence there can be low and high fidelity manikins. Often single task trainers are combined with scenarios to create an element of realism such as those encountered on the labour ward. The OGSM does not have a high fidelity manikin. The Sim Mom that we use is a stripped down basic model that has been variously adapted and improvised to create a higher fidelity. The full specifications manikin comes with monitors, software and recreates eclamptic fits, abnormal CTGs and pressure pumps to simulate birth. These would cost in the region of RM 400K to 500K.

### HIGH FIDELITY



SIM MOM



C-Celia





Simulated Patient with Mama Natalie and Google Glass

#### I) Apps

Apps are becoming increasingly integral to the manikins and examples of such apps are the Little Anne chest compression app. These objectively measures the rate and depth of the chest compressions. Another interesting app is the one used in shoulder dystocia that measures the amount of pressure exerted during traction.

#### J) Standardised patient (SP)

To create more realism, we often use a standardised patient (SP) who recreates an obstetric emergency scenario like eclampsia. Trainers act as SPs and it is most useful in teaching non-technical skills eg communication and handling bad outcomes.

#### K) Hybrid simulation (SP and manikin)

Combining a standardised patient with a manikin allows a hybrid simulation. We have developed a curriculum using hybrid simulation in postpartum hemorrhage. These improvisations allow skills teaching and assessment as the SP recreates a continuous sequence of emergencies

### SIMULATION CENTRE



Simulated OT

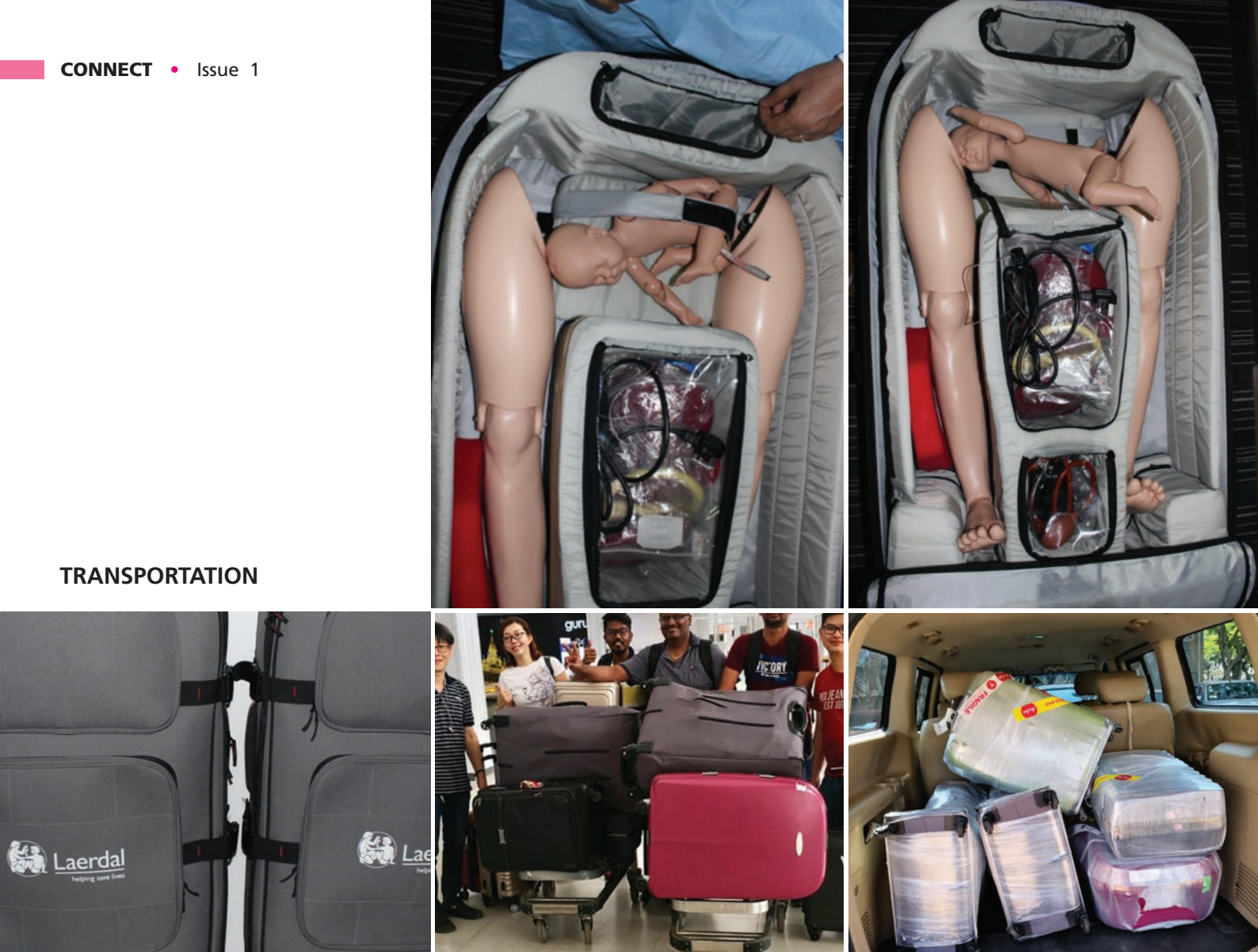


Control Room



Labour Room

## TRANSPORTATION



120kgs checked in with Handbooks as cabin luggage

### L) Simulation centre

A Simulation centre is the future and the OGSM does not have a simulation centre. These training facilities are designed and modelled to reflect the labour ward, operating theatre and intensive care. One such centre is the AHCOE in Penang which is a dedicated simulation centre.

These equipment listed above have been extensively used over the past 5 years for conducting 73 courses in 13 countries. Transporting about 120 kg of these equipment to the various countries is a challenge. Naturally there are wear and tear issues and most of the items are in dire need of repair and replacement.

ICOE has evolved over the short period of 5 years and we are continuously looking into teaching simulation in an as realistic environment as as possible. To progress we have to adopt the rapid technological advancements in equipment, both hardware and software, and the use of virtual reality. Simulation teaching will have to move from single task equipment to total clinical solutions complete with feedback.

A dedicated simulation centre that is fully equipped with equipment as above and that immerses clinical realism is the way forward.



## News from the College of Obstetricians and Gynaecologists, Academy of Medicine



**Prof Siti Zawiah Omar**  
President

College of Obstetricians and Gynaecologists,  
Academy of Medicine Malaysia

Dear Academicians,

The recently held Annual General Meeting of the College of Obstetricians and Gynaecologists, Academy of Medicine Malaysia (COGAMM), had elected a new Council. I wish to thank the former council members for their leadership. I would also like to wish Dr Michael Samy, the previous President, a speedy recovery.

The new Council moves forward with a bold front as it has to work hard to align itself with the goals of the Academy of Medicine, looking at new platforms for advancing postgraduate training and strengthening sub-specialisation training. Several new developments in the education front will have significant impacts on specialist training in O&G for both the current Master in O&G as well as parallel pathways. The development of a new National Curriculum for postgraduate education in O&G will be rolled out soon. This curriculum has been designed and structured so as to fulfil the requirements of both pathways for attaining the postgraduate degree after four years of learning.

The College will strive to ensure the quality of O&G services to be of utmost importance. In this area, it will collaborate and conduct courses for professional development and upskilling of practitioners. This is a tall order, and the various subcommittees in the COGAMM will work with trainers to develop new strategies that will help learning in this direction.

For decades, active membership has been a problem in the COGAMM. The strength of a College will be in its membership. The new Council is urging new and senior O&G practitioners to become members of the College as well as contribute to the activities of the College and the Academy in line with what other Colleges are doing; viz, College of Physicians, College of Surgeons and College of Family Physicians. Many may be aware of the Press Statement that was released by the Academy of Medicine about the launch of the AMM-COS Basic E-Training Management Platform. Our goal is to work towards similar activities. It will be necessary for trainees to become 'Candidate Members' in order to be able to access the E-Training Platform. Such involvement will pave the way to memberships of the Academy after graduation.

I shall be sharing exciting developments in coming months. The council will communicate at regular intervals so as to keep all members informed of developments in postgraduate training and professional development as well as determine how all practitioners in O&G can contribute to improving women's health in Malaysia. The college will also be involved in Fees Schedules, CPG development and Consensus statement. A small group of practitioners are working on the thorny issue of Cerebral Palsy as it affects our practice.

I would like to end this message by urging all practitioners of O&G, especially all trainers in the Ministry of Health and University lecturers, to become members of the College if you have not already done so.

Sincerely,  
**SITI ZAWIAH OMAR**



# Maternal Medicine & the COVID-19 Pandemic



Dr Muniswaran Ganeshan  
Maternal Fetal Medicine Specialist  
Women and Children's Hospital  
Kuala Lumpur

*"In purity and according to divine law, will I carry out my life and my art"*

*A phrase from the Hippocratic Oath*

One virus, three variants and three million infections - over two hundred thousand deaths yet we are far from the end. The world was unwillingly stalled by this unprecedented pandemic, where one third of the global population is in some form of lockdown. Mankind helplessly witnessed the increasing number of deaths and the world is in crisis.

The invisible enemy was known but not fully understood. Prevention is simple yet the cure remains unknown. With limited resources and protective equipment, healthcare professionals were thrown into the battlefield, fuelled only by ethics, dedication and the principles of selflessness. All that mattered was humanity and doing what is right. The information age is another untamed pandemic which aggravated the fear, but it is among the many lessons revealed by COVID-19. It is a test for humanity, values, ethics, sacrifices and essentially, our noble profession.

Frontliners became saviours and healthcare professionals were celebrated. Many went beyond their boundaries to save lives, exposing themselves and their families. Thousands were infected and exposed to hazards which include viral exposure, long working hours, psychological stress, fatigue, occupational burnout and stigma, but they marched on for humanity.

Many fell into fear, some stood still, some were overwhelmed, and some were learning; but a significant number of healthcare professionals embraced it and rose to the occasion. Priorities were set, non-essential services were closed, and resources were channelled towards combatting



the virus, which are justified. However, the implications on non-COVID victims with significant illnesses are a concern. Consultations were reduced, elective surgeries postponed, and appointments cancelled. Assessing healthcare was a challenge and unwell patients stayed away from seeking early attention in fear of the virus.

On the other hand, as obstetricians, we have set our own standards which was developed by following years of evidence. To compromise these standards overnight without much science may significantly affect the art of obstetrics.

The mortality rate from COVID-19 was estimated to be in the range of 0.6-3.4% and fortunately, pregnant mothers and new-borns are not at an increased risk. However, they are still considered vulnerable; especially for those with medical complications in pregnancy. Neglecting these mothers may have far greater consequences as compared to the pandemic itself!

We annually deliver 530,000 women and our current MMR is 23.5/100,000 livebirths. A third of these death is related to medical disorders in pregnancy. We have come a long way in keeping our mothers safe and this was only possible due to interventions and quality in obstetric care which seem to be compromised during this pandemic. Since January, initial trends in MMR has been worrying but this remains to be proven in the next few months. Modifications are essential but perhaps only for low risk pregnancies.

What is more evident is the passion shared by the multidisciplinary team in managing these patients. The cardiologist continued to manage pregnant mothers as a priority, the nephrologist increased the frequency of dialysis in pregnancy inhouse, rheumatologists optimised telemedicine while neurologists continued their combined reviews. Although most non-essential services had a reduction in workload, we realised that our workload in the maternal medicine clinic increased due to the closure of other nearby units. No patients were denied quality care.

We managed a total of 228 patients in the maternal medicine clinic during the 6-week period of the movement control order (MCO) in Malaysia. How did we achieve this?

- i) We optimised telemedicine and screening via phone, while high risk pregnancies were reviewed face-to-face.
- ii) We maintained physical distancing and staggered appointments.
- iii) Patients were encouraged to wear masks and maintain hygiene.
- iv) Symptomatic patients were screened, reviewed and managed in isolation.
- v) We could not adopt a policy of universal screening, but we adapted a protocol based on contact and symptoms, tailor-made to our resources.
- vi) We looked for solutions rather than the problems.
- vii) We appraised information logically, protecting patients and staff at all times.
- viii) The rights and health of the patient and healthcare workers were not compromised.
- ix) Leadership in maternal medicine and communication remains essential.
- x) Do no harm.
- xi) Be proactive.

Table 1: Patients managed during the first 3 phases of the Malaysian MCO (18th March – 28th April) (Non-COVID) at the Maternal Medicine Unit WCHKL

**Maternal Medicine Patients (Non-Covid)**

## Numbers

Total deliveries	<b>1419</b>
Caesarean sections	<b>327 (23.4%)</b>
Intensive care admissions (Obstetric patients)	<b>10 (0.7%)</b>
Obstetric high dependency admissions	<b>112 (7.9%)</b>
Maternal deaths	<b>0</b>

**Maternal Medicine Clinic Reviews****Total – 228**

i) Cardiac diseases	40
ii) SLE & other connective tissue diseases in pregnancy	22
iii) Lupus nephritis and chronic kidney disease	20
iv) Type 1 DM & Grave's diseases	16
v) Epilepsy and multiple sclerosis	16
vi) Malignancies	14
vii) Previous preterm delivery & cervical insufficiency	14
viii) Schizophrenia and severe depression	13
ix) Obstetric cholestasis, cholelithiasis and other liver disorders	10
x) ITP, lymphoma and blood disorders	9
xi) Antiphospholipid syndrome	7
xii) Thromboembolism	7
xiii) Severe preeclampsia	6
xiv) Tuberculosis	5
xv) Hepatitis B in pregnancy	4
xvi) AV malformations & aneurysm	4
xvii) Active psoriasis	4
xviii) Renal transplant in pregnancy	2
xix) Obstructive sleep apnoea	2
xx) Ulcerative colitis	2
xxi) End stage renal failure on dialysis in pregnancy	1
xxii) Others	6



**Obstetric High Dependency Admissions****Total – 112****Medical Emergencies****48**

1) Severe pre-eclampsia with hypertensive emergencies	19
2) Abruptio placenta	2
3) Acute kidney injury	2
4) Hypokalaemia / Tetany due to hypocalcaemia	4
5) Epilepsy	2
6) Cardiac	8
7) Deep vein thrombosis	2
8) Sepsis (Non-Covid)	5
9) AV malformation of the brain	3
10) Brain tumour	1

**Complicated Surgical procedures performed****9 (2.8%)**

Classical caesarean sections	2
Caesarean hysterectomy for placenta accreta spectrum disorders	2
Cervical cerclages ( <b>Emergency &amp; Ultrasound indicated</b> )	3
Breast conserving surgery in pregnancy	1
Management of caesarean scar pregnancy	1

**Multidisciplinary meetings (Maternal Medicine) with physical distancing****5**

i) Nasopharyngeal carcinoma with metastasis	1
ii) Invasive breast cancer in pregnancy	1

The future is going to be challenging. Priorities will change. Resources will be channelled towards finding a cure in the name of a vaccine and unfortunately, maternal and child health (which has always been a priority) may be temporarily side-lined. As we embrace and come to terms with the new norm which remains to be defined, let us never forget the one norm: that we, as healthcare professionals, must always work in the best interest of the patient as we uphold the principles of *Primum non nocere*.

High risk pregnancies should continue to be a priority. The vaccine, once available, should be prioritised towards healthcare workers first and those who are vulnerable. The rights of healthcare workers must be addressed, including rights to compensation, rehabilitation and curative services. Reverting back to the shift system may be a solution to avoid stress, fatigue and burnout. We need to invest in healthcare, focusing on resources, research and development. We need to protect our health caregivers as much as we safeguard our patients. Occupational and Safety Health needs a more proactive approach. This can only be achieved if there is political will.

# Pre-implantation Genetic Testing – where are we today?



**Ms Michelle Lim Sheng Rong**  
is a Pre-implantation Genetic Scientist and the Lead Internal Auditor at Sunfert International Fertility Centre



The concept of Pre-implantation Genetic Testing (PGT) is certainly not new. It was first clinically applied by Handyside et al. in 1990 to identify X chromosome-linked diseases<sup>1</sup>. Since then, newer techniques and rapid technological advancements have been employed to optimise the PGT process and improve outcomes.

In simple terms, PGT can be divided into three types. The first is Pre-implantation Genetic Testing for Aneuploidies, or PGT-A. This, by far, makes up the bulk of all PGT cases. While In-Vitro Fertilisation (IVF) success rates are often quoted to be a modest 30-40%, IVF followed by the transfer of a PGT-A tested embryo can increase the success rate to 60-70%. This is primarily because aneuploid embryos, a leading cause of implantation failure and miscarriage, are ruled out for transfer. Women of advanced maternal age have been shown to be at higher risk of producing aneuploid embryos<sup>2</sup>. Therefore, the main indicators for PGT-A include advanced maternal age, followed by repeated implantation failures and recurrent miscarriages. Severe male factors of infertility are also an indication for PGT-A. By utilising PGT-A, euploid embryos are preferentially selected for transfer, thus shortening the 'time-to-pregnancy', reducing the miscarriage rates and increasing the chances of a successful and healthy pregnancy.

Deciding between euploid and aneuploid embryos is obviously easy. However, with increasing sensitivity of genetic testing technologies, another type of embryo has been detected –



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mosaic embryos. Mosaic embryos are essentially embryos that are made up of more than a single cell line. Some studies have shown that approximately 30% of embryos are mosaic<sup>3,4</sup>. Clinical decision-making on which mosaic embryos can be transferred is often complex because the scientific evidence remains vague and expert consensus in flux. As a result, it is often a topic of great debate within the fraternity. Certainly, there have been numerous healthy live births from these mosaic embryo transfers in our practise as well as elsewhere<sup>5-7</sup>. Although these mosaic embryos have a lower chance of implantation and higher chance of miscarriage, they can still be considered if the patient has no euploid embryos for transfer. In fact, a mouse model of chromosome mosaicism has shown a gradual depletion of aneuploid cells provided that there is a sufficient population of euploid cells<sup>8</sup>. This means that mosaic embryos are able to 'self-correct', at least in the mouse model.

In contrast, Pre-implantation Genetic Testing for Monogenic Disease, or PGT-M, allows couples to avoid the transmission of an inherited disease to their offspring. PGT-M was initially applied to X chromosome-linked diseases and has since been extended to cover a multitude of various monogenic disorders such as thalassemia or cystic fibrosis, with the former being one of the most common genetic conditions in Malaysia. PGT-M can also be used to screen embryos for hereditary cancer genes such as BRCA 1 and 2. By screening their embryos for the disease, couples known to be at higher genetic risk are able to safely transfer unaffected embryos, having a higher chance of a healthy baby. In most genetic laboratories, PGT-M can be accomplished alongside PGT-A with the same biopsy sample, further improving the couple's chance of a successful pregnancy. With expanded carrier screening becoming more of a norm lately, more and more silent carriers of genetic diseases will be identified; thus, likely pursuing PGT-M.

Pre-implantation Genetic Testing for Structural Rearrangements (PGT-SR) is often used for patients who have balanced or reciprocal translocations. It is estimated that one in 500 people carry a balanced translocation and often experience some subfertility or recurrent miscarriages as there is a higher risk of producing unbalanced gametes. With PGT-SR, these embryos can be screened for unbalanced translocations to ensure that only normal embryos are transferred<sup>9</sup>.

Although most laboratories currently perform biopsies at the blastocyst stage, which is known to be less damaging than biopsy at the cleavage stage, it is still an invasive process<sup>10</sup>. Moreover, the biopsy procedure is not standardised and the quantity of cells biopsied from the embryos are hard to quantitate and control during the process. Thus, Non-invasive PGT (Ni-PGT) has garnered much attention recently in order to overcome these downfalls. Using just the medium that the embryo was cultured in or blastocoelic fluid, Ni-PGT seeks to use DNA extruded by the embryo for genetic screening. However, much still remains to be elucidated regarding this new technique. Studies have shown relatively poor concordance rates between the cell-free DNA and either the blastocyst biopsies or whole embryo testing. Thus, further work must be accomplished before Ni-PGT can be safely offered clinically<sup>11</sup>.

An interesting recent development has been the application of PGT for screening disorders influenced by multiple genetic variants. This is now called Pre-implantation Genetic Testing for Polygenic Disorders (PGT-P). This new option allows couples to not only choose euploid embryos, but also embryos with the lowest lifetime risk of developing polygenic disorders such as Type 1 or Type 2 diabetes, coronary heart disease, hypertension, as well as certain intellectual disabilities<sup>12</sup>. Traits such as IQ, height and weight can also be predicted

by this test. Not surprisingly, PGT-P has been met with backlash, with much of the debate focused on eugenics and ethics. Others, however, have welcomed the test with enthusiasm, excited about the prospects.

It is clear that the field of PGT is ever evolving and indeed exhilarating. Many advancements have made PGT more accessible, cheaper and faster while other involvements strive to make it safer and more accurate. As we fondly look back at what PGT used to be, we also look forward to all the new innovations, technologies and perhaps, most importantly, scientific knowledge that without a doubt, will continue to expand and advance this field.

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# GUT MICROBIOME IN EARLY LIFE:

## The role of the Obstetrician-Gynaecologist in safeguarding the health of women and children

The gut microbiome plays an important role in human health and disease. In a Q & A session with Dr Raman Subramaniam, Dr Amir Hamzah, Associate Professor Christophe Lay and Professor Jan Knol, we discussed the factors that influence gut microbiome in early life, the occurrence of gut dysbiosis, how intestinal microbes affect immunity and health, and the role Obstetrician-Gynaecologist (OG)s play in protecting women and children's health.

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## WHAT IS GUT MICROBIOME DYSBIOSIS? WHY DOES IT MATTER?

### Professor Christophe:

Gut microbiome dysbiosis could be alluded as a compromised microbiome or an unbalanced composition of the gut resident commensal microorganisms.<sup>1</sup> It occurs when there is a loss of beneficial microbes, expansion of pathobionts, and loss of microbial diversity in the gut under certain conditions.<sup>1</sup> A compromised gut microbiome in early life (resulting from caesarean section birth or antibiotic exposure for instance) has been depicted as a risk factor for immune and metabolic diseases.

### Dr Amir:

A number of studies have reported changes in the gut microbial community of those with inflammatory bowel disease (IBD), diabetes, obesity, asthma, allergies and autism.<sup>1</sup> It has been hypothesized that the changes in microbiome may contribute as a risk factor for the development of these diseases.

## WHAT ARE THE COMMON FACTORS WHICH MAY DISRUPT INTESTINAL MICROBIOME BALANCE IN EARLY LIFE?

### Dr Raman:

Early life microbiome is influenced by the maternal microbiome, mode of delivery, antibiotics exposure (prenatal, intrapartum, postnatal), maternal and infant/toddler diet, and environmental microbial exposures.<sup>2</sup>

## HOW OFTEN ARE CAESAREAN SECTIONS CONDUCTED AND WHEN ARE ANTIBIOTICS USUALLY PRESCRIBED PRIOR TO DELIVERY? WHY IS THIS A CONCERN?

### Dr Raman:

In a recent study analysing data from 12 Malaysian public hospitals, the caesarean section rate was reported to have increased by 3% over a 5-year period (2011-2015). It was also found that almost a quarter (23.2%) of deliveries were carried out via caesarean section.<sup>3</sup> This is much higher than the optimal caesarean section rate of 10-15% of live births set by the World Health Organization. Furthermore, there is evidence that the rate and increase in caesarean sections is more prevalent among women with privately funded deliveries. Data on rates of public vs. private funded caesarean deliveries in countries such as Hong Kong (16.0% vs. 43.4%),<sup>4</sup> India (13.7 vs. 37.9%)<sup>5</sup> and Brazil (18.9% vs. 84.3%)<sup>6</sup> demonstrate that caesarean section rates are much higher for privately funded deliveries, and the scenario in Malaysia may not be dissimilar. Caesarean births have been associated with higher risks of immune and metabolic conditions, possibly due to the altered gut microbiome that has been depicted as a risk factor.<sup>7</sup>

It has been estimated that >40% of pregnant women are given antibiotics just prior to delivery.<sup>8</sup> Antibiotics are usually used in prevention of preterm birth (premature rupture of membranes before term, diagnosis and treatment of asymptomatic bacteriuria, bacterial vaginosis, and gonorrhoea), prevention of Group B *Streptococcus* neonatal disease, chorioamnionitis during labour, and prevention of maternal infectious morbidity after caesarean section.<sup>9</sup> The administration of antibiotics aims to reduce maternal and foetal/neonatal complications, but it potentially impacts the gut microbiome of the next generation.

## HOW DOES GUT MICROBIOME COMPOSITION IMPACT IMMUNE SYSTEM DEVELOPMENT AND HEALTH OF THE CHILD?

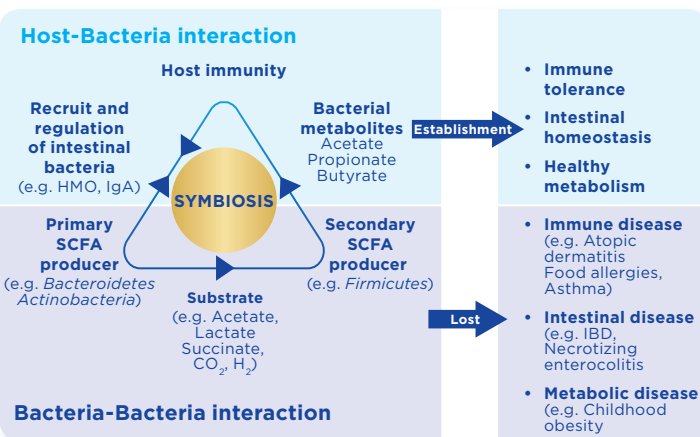


Figure 1: Infant's gut microbiome and the host immune system interaction. Adapted from Tanaka M, et al. *Allergy International* 2017.

### Professor Christophe:

Early life microbiome colonisation is crucial for the maturation of the immune system. It has been suggested that there is a bidirectional communication between the host and microbiome (Figure 1).<sup>10</sup> The intestinal microbiome not only affects the host immunity, but the host immune system also affects the gut microbiome.

Colonisation of intestinal bacteria is affected by immune factors in infancy such as maternal antibodies.<sup>11</sup> Conversely, intestinal bacteria and their metabolites, such as short chain fatty acids (SCFA), influence the proliferation and differentiation of T cells (e.g. regulatory T (Treg) and helper T (Th) cells), and B cells (e.g. immune globulin (Ig) A- or IgG-secreting B cells).<sup>11</sup>

An altered or compromised gut microbiome in early life has been associated with an impaired development of the immune system. This has been depicted as a risk factor for diseases and associated with life-long health issues such as immune, intestinal and metabolic diseases.<sup>1</sup>

## DO OGS PLAY A ROLE IN INFLUENCING EARLY LIFE MICROBIOME AND PROTECTING THE HEALTH OF A CHILD?

**Dr Raman:**

The window of opportunity for microbial modulation occurs during the first 1000 days of life- from pregnancy and birth to infancy/toddlerhood (Figure 2).<sup>12</sup> Since evidence suggests that the gut microbiome might be seeded during pregnancy, OGs play an early role in nurturing the microbial foundation to protect the health of a child.

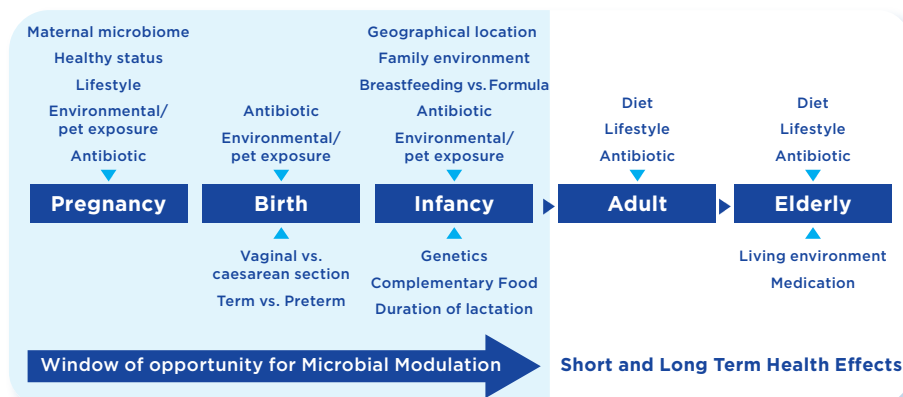


Figure 2: Factors influencing the infant gut microbiome development and the adult and elderly microbiome.

Adapted from Rodriguez JM, et al. *Microbial Ecology in Health & Disease* 2015.

## HOW COULD MICROBIOME SCIENCE AND THE EMERGING SCIENCE OF PERSONALISED NUTRITION PLAY A ROLE IN HUMAN HEALTH?

**Professor Jan:**

Early life microbiome and human milk sciences have been translated into nutritional solutions (prebiotics, probiotics and synbiotics) to nurture or modulate positively the early life microbiome.

Microbiome science and the impact of the human microbiome on health is growing in public awareness. Over the last few years, several microbiome start-ups have emerged with different value propositions- from the development of live biotherapeutics to treat/prevent diseases to the development of kits and services to profile one's individual microbiome with a translation of the data into nutritional/dietary and life style advice to optimise one's microbiome, and consequently health and well-being. The "quantify-self" paradigm that encompasses the measurement of our own physiological and biological parameters including our genome and microbiome, aims to empower each of us with the ability to take charge of our own health in a personalised manner.

This emerging science of personalised nutrition empowered by microbiome science could bring new avenues in terms of nutritional innovations and services with the aim to improve human health which is greatly influenced by our microbiome.

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For Healthcare Professionals Only

## WHAT PRACTICAL STEPS CAN AN OG TAKE AS INTERVENTION TO NURTURE THE GUT MICROBIOME OR RESTORE A COMPROMISED GUT MICROBIOME?

**Dr Raman:**

There are several strategies we can utilise to modulate the gut microbiome:

- 1. Improve maternal nutrition status<sup>13</sup>**
  - Avoid unnecessary dietary restriction during pregnancy & breastfeeding
  - Encourage a healthy wholesome diet with fruits, vegetables, legumes, grains, nuts, cultured dairy products which is low fat, food high in omega-3 fatty acids (found in fish, nuts), food high in fibre and low processed sugars. Avoid or minimise ultra-processed and processed food
  - Consider folic acid, iron, iodine and multivitamin supplementation
- 2. Monitor and maintain healthy body weight gain<sup>13</sup>**
  - High pre-pregnancy BMI and excessive weight gain during pregnancy may influence microbial colonisation and increases the risk of metabolic diseases in offspring
- 3. Stress management during pregnancy<sup>13</sup>**
  - Continuous stress might influence microbiome<sup>13</sup>
- 4. Supplementation of probiotics/synbiotics as a nutritional solution<sup>14</sup>**
  - Delivery via caesarean section or exposure to antibiotics may lead to a compromised gut microbiome in early life

**Dr Amir:**

Another step is by educating mothers on feeding practices which encourage a healthy microbiome in young ones:

- 1. Breastfeeding is the GOLD standard - Exclusive breastfeeding from birth until 6 months and continue to breastfeed until 2 years of age<sup>13,15</sup>**
- 2. If prebiotic & probiotic supplementation is considered,<sup>11,16</sup>**
  - Synbiotic supplementation has been demonstrated to compensate for the delayed colonisation by *Bifidobacterium* (compromised gut microbiome) in caesarean section-delivered infants. This was accompanied with a modulation of the production of acetate (SCFA) and the acidification of the gut, both biological observations have been associated with a healthy baby gut that prevents the growth of opportunistic pathogens<sup>7</sup>
- 3. Introduction of complementary feeding at the age of 6 months<sup>15</sup>**
  - Healthy and diverse food that includes fruits, vegetables, legumes, grains and cereals which contain insoluble/soluble indigestible fibres.<sup>11,15</sup> Weaning has been associated with a modulation of the gut microbiome "weaning reaction" and this has been described to have a positive impact on immunity<sup>17</sup>



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