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Newsletter of The Indian College of Obstetricians & Gynaecologists

ICOG campus

Advancing Standards of Education and Healthcare Practices

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Model Residency Co-Op. Hsg. Society,
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Vice Chairman's Message

Dr. Uday L. Nagarseker
Vice Chairman, ICOG
Chairman of Sub Committe

It is almost one year since our new ICOG Executive Committee has taken over and you are the witness to the various programmes and progress that ICOG is doing at very fast pace.

Inducting more than 100 Fellows and Members in the ICOG Family this year, itself speaks of faith reposed by FOGSI Members in ICOG. The Convocation held at Guwahati during AICOG 2010 was a unforgettable event. I am sure, more and more FOGSI Members, who are yet to join ICOG in spite of having fulfilled the admission criteria, will join this year in record numbers.

The ICOG family directory will be in possession of each ICOG Fellow and Member by the time you receive this issue of ICOG Campus. I am sure, by now, you have contacted number of your old friends, who were untraceable because of your inability to get their contact details. ICOG will try to update this Directory every year with addition of new family members.

Current Opinion is the brainchild of our Chairman Dr. Duru Shah and we had an overwhelming response to this year's first topic " PCOS and Syndrome X ". These type of annual meets should be a permanent feature for years to come.

With the changes in Rules and Regulations of ICOG, every Fellow will now participate directly in electing the Executives of ICOG in addition to Governing Council. I am sure, the Members also will be involved shortly in this process by amending certain Rules.

The Credit Point System is already finalized after many deliberations and I expect each and every FOGSI Society to get the Credit Points approved from ICOG, for any CME / Workshop / Conference they propose to organize at their level and publish them in their first brochure itself.

Accumulation of Credit Points in their individual account will help every FOGSI Member to re register his / her basic MBBS degree. Medical Council of India has made it mandatory now to have a minimum of 30 Credit Hours of CME attendance for re registration in 5 years. We shall try to link these ICOG Credit Points with Credit Hours of State Medical Councils.

The vibrant ICOG website is already in place managed by Dr. Mandakini Parihar and you must visit it if you have not yet visited and give your feed back.

The topics for various CMEs under ICOG are already announced and my request to every Society is to grab one CME before it is too late. Dr. Uday Thanawalla has taken keen interest in this to make it a great success.

I am confident that under the Presidentship of Dr. Sanjay Gupte, ICOG will prosper further and every FOGSI Member will be hoping to join ICOG Family.

Dr. Uday L Nagarseker
Vice Chairman, ICOG

Message from 1st Vice President, FOGSI

Dr. Rishma Dhillon Pai
Vice President, FOGSI

"The greatest achievement of the human spirit is to live up to one's opportunities and make the most of one's resources."
~ Vauvenargues

From a humble beginning, with just an idea and a goal to further academics, ICOG started in 1984. Today, looking at the latest issue of ICOG Campus, I am amazed at the strides this Indian College of Obstetrics and Gynaecology has made. From each dynamic Chairperson to the other, this college has grown in ideas, concepts, and members and now encompasses various areas of academics untouched before. From the FOGSI ICOG satellite school which reaches out to thousands of postgraduate students all over the country to the Ethiskills hands on surgical course, all are unique ideas which have translated into excellent opportunities for the young upcoming gynaecologists.

There was a real need for Indian guidelines and I am glad to know that already eight such recommendations have been published. The 'E' learning through the web portal is truly keeping in pace with the times, and can reach out to every member throughout the country to who wants to keep abreast with the latest developments in gynaecology and obstetrics.

I am sure, under the dynamic leadership of Dr. Duru Shah, the ICOG will progress to greater heights and will be an institution we are all proud of.

Wishing you all the best for your future activities.

Dr. Rishma Dhillon Pai
Vice President, FOGSI

Announcement –

ICOG Post Graduate Residential Review Course
29th April - 1st May 2010

ICOG Online Quiz
10th April -10th May 2010

Registration form on page 15
Details on www.icogonline.org

Great Prizes to be won in the 1st month

Chairman's Address

Dr. Duru Shah
Chairman ICOG
chairman.icog@gmail.com

To become a **new Member or Fellow** of ICOG ...please log on to **www.icogonline.org** for details.

Your feedback will also be appreciated by e mail **chairman.icog@gmail.com**

I congratulate all the new Members and Fellows on the accomplishment of a step ahead in the world of academics and technological advances. It is a matter of pride that you are the few out of the thousands of FOGSI members who are eligible to receive your certificates at the convocation. But when we leave this room, we must remember that the greatest advances are not its discoveries, but how these discoveries are applied to improve women's health. The greatest human achievement is reducing suffering through quality healthcare and strong public education.

There are 220 million children in this country who go to school. This is almost half the population of Europe and three fourth of the population of the US. There are about 530 million in India who are less then 25 years of age. This is more than the entire population of Europe! It is therefore a herculean task to have an education system that reaches out to so many millions of children. But the biggest problem is the fact that our gross enrolment ratio i.e. the number of children who move into the University System after having passed Class XII - is only 12.4 % i.e. out of every 100 children who finish high School, only 12 move to College! If you look at any developed country these percentage is way above 50%.

Our country can move forward only when this ratio touches 30-35%, so that there is a critical mass of people who drive creativity, who form the foundation of ideas and intellectual property. India is the youngest nation in the world, we will be the suppliers of quality human resource, not just for India, but for the rest of the world. It will be our children who will grow up and provide this human resource. It is in our interest to seize these opportunity, it will not come again to us.

The Government cannot do it alone. It cannot carry the entire burden of education on its shoulders. It has to be a partnership between the Central and State Governments, the civic society, the NGO's, the parents, the students and the teachers. Today, technical colleges select the students they want. We want to see the day when our students can select the centre of Excellence which they would like to go to! Such should be the education system, that the student should have a choice!

But reforming the Higher Education System means freeing the University from the control of the Government and making sure that the Vice Chancellors are appointed not through a political process, but through a process of academic excellence- manned by highly reputed academicians who have nothing to do with politics!

Nearly 80% of India's population resides in villages and gradually there is an exodus to the cities, because of lack of infrastructure in the villages. Education and health are some of the important reasons why villagers move. It has been projected that between the years 2020-25, 50% of the India's population would be living in cities. If we look at these 80% people, we will understand the ground realities of basic education, intermediate as well as higher education. Children have to walk about 3 km to reach their basic school, about 10 km to reach the high school and move to inhuman cities for higher education. And what is the quality of the education? The world is changing new innovations are created everyday but have we equipped our teachers? Do we upgrade our syllabus in medical colleges at regular intervals? If we are unable to equip our teachers, how will we equip our students?

Till infrastructure gets developed in our villages, there will be a lack of skilled doctors from the cities who will go to the villages. Hence to address the need of healthcare in the villages, the Union Health Minister is set to introduce a new course, "Bachelor of Rural Medicine and Surgery" in 2010. For this course, there will be no medical entrance test. Instead students will be selected from primary health centres on the basis of their excellence in class XII. The Medical Council of India has approved this course of 3 ½ yrs. which will consist of working in the primary health centres in the first year, the District Hospital in the 2nd year and the tertiary hospitals in their 3rd year. For 5 years after graduating, rural graduates they will have to practice only in areas with less than 50,000 population and will not be eligible for post graduate courses. After 5 years they will be at par with other doctors and can go to the cities to enrol for post graduate courses. This pilot, will hopefully pave the way for rural healthcare.

The Indian College of Obstetricians and Gynaecologists is playing an important role in strengthening maternal healthcare in the public sector. Through its EMOC program, skills are being transferred to MBBS doctors from the public sector on basic and emergency obstetric care, thus creating larger human resources. Through the Accreditation Program, after the first phase of developing the Accreditation Criteria is complete, the second phase will soon be initiated. This will now involve our FOGSI members to get them private health facilities accredited by ICOG so that they can upgrade the skills of the nurses from the public sector. The same accredited health facilities can also partner with the government to cater to the reproductive and neonatal health services of women from below the poverty line and in return we have been able to procure some good incentives from the Government for our members.

Besides attending to transfer of skills and participation in healthcare services, ICOG has been at the helm of Distance Education through the FOGSI-ICOG Satellite School in collaboration with the Indian Space Research Organization. We are now in the process of initiating a "Web Portal" so that the latest technologies can reach the most distant students through the internet.

Our drive has been to be inclusive with excellence. We welcome all FOGSI members who fulfil their requirements to become Members and Fellows of ICOG, and request them to assist us in imparting excellent quality academics.

Our new endeavour to have a high quality academic event is entitled "Current Opinion" which will entail a focused multi disciplinary approach to a problem, based on current evidence. The first in the series is "PCOS and SyndromeX" which is being held between 19th to 21st March 2010 in Goa in collaboration with the International Society of PCOS and Androgen Excess. This will be a unique opportunity for our members to learn more about this subject from others besides gyneacologists!

ICOG's motto is "Advancing Standards of Education and Healthcare Practices" Various programs such as 6 months Certification Courses, Ethiskills which are - skilled based courses, Fellowships and Visiting Professor ships are available through ICOG. "Good Clinical Practice Recommendations have been initiated which assist our members in offering the optimum healthcare to their patients. The new Website is buzzing with information and updates. ICOG is vibrant and kicking which is very well seen in by the 3 issues of the ICOG Campus released and 112 new entrants joining us today.

I welcome all the new members and Fellows into ICOG and I look forward to your support to take our College and our country to greater heights. We all need to collectively come together and we need to collectively put our minds together. India cannot wait for solutions. We much find those solutions for India quickly and effectively.

My personal thanks to my wonderful team at ICOG of Dr. Uday Nagarsekar, Dr. Hema Divakar, Dr. Mandakini Parihar, Dr. Atul Munshi, Dr. Uday Thanawalla, Dr. Parul Kotdawalla and the invisible Dr. Safala Shroff, Dr. Ameya Purandare and all the Governing Council members headed by the President of FOGSI, Dr. Sanjay Gupte. My thanks also to Varsha my secretarial staff at ICOG and Rochelle at my office.

Dr. Duru Shah
Chairman ICOG

CURRENT OPINION

PCOS & The Syndrome X Conference

Held On: March 19-21st, 2010

A Report

by Dr. Madhuri Patil

The Indian College of Obstetricians and Gynaecologists (ICOG) has initiated a series of new academic updates, titled "Current Opinion."

For the first of the Current Opinion series, ICOG collaborated with the International Society of Androgen Excess and PCOS (AEPCOS) and had the first focused Update on the subject of "PCOS and Syndrome X" This focused meeting was held between 19 - 21st March 2010 at Goa Marriot Resort, Miramar beach, Panaji Goa. It was a great success with many delegates. 14 credit points were awarded by ICOG to all delegates attending this update on PCOS and 6 credit points were awarded by the Goa Medical Council.

We had involved a multi disciplinary faculty from India and abroad to deliberate on this complex subject, which included gynaecologists, endocrinologists, cardiologists and infertility specialists. Both National and International experts in the field were present and put forth the current evidence based opinions on PCOS. This multi disciplinary approach to PCOS was much appreciated by all the delegates.

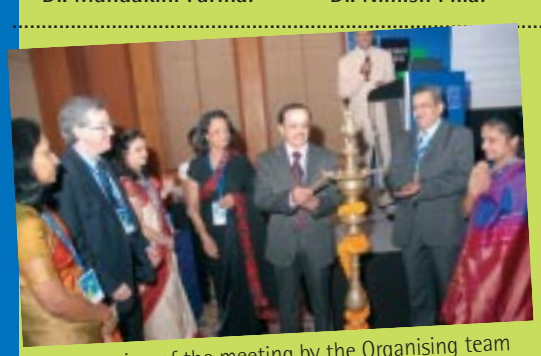
In this 3 day update, the topics discussed were metabolic and cardiovascular issues, obesity and androgen excess in PCOS. On the last day treatment of infertility and reproductive tract disorders in PCOS were discussed. Like never before the panel discussion had questions from delegates for all the speakers of that session. This approach helped the gynaecologists understand the practical issues on the subject better. For the first time we had E-posters displayed. Of the twelve E- posters, the four best posters were presented as Oral presentations. To judge these E- posters there was a panel of 4 judges - 2 International and 2 National.

We have had a very good feedback both from the faculty as well as the delegates. This will make us move ahead in doing many more such focused meetings, which will be of great clinical help to our Gynaec fraternity.

Very soon all the presentations will be displayed for viewing as a PDF file on the ICOG website.

Organizing Team

	Dr. Sanjay Gupte	
Dr. Duru Shah	**Dr. Uday Nagarsekar**	**Dr. Hema Divakar**
Dr. Mandakini Parihar	**Dr. Nimish Pillai**	**Dr. Madhuri Patil**



Inauguration of the meeting by the Organising team of both the Organisations

Panel Discussion on Metabolic Issues in PCOS

Executives of AEPCOS with our National Faculty

Releasing the ICOG Directory

Our National experts....

.... International experts

Presenting Mementos to our International faculty

Our staff enjoying the music and dance

Our delegates at the pool side

The Carnival Night

Messages of Appreciation

"Many thanks for your kind hospitality and that of the rest of the organizing committee during my stay in Goa.
I congratulate all of you on a meeting well run. As we discussed, I would be happy in the future to assist you and your colleagues in furthering your research endeavours."
Best regards,
Ricardo Azziz, M.D., M.P.H., M.B.A.

"Thanks very much for your kindness and hospitality. The scientific content of the meeting was truly A class and the event very enjoyable."
Thank you
Dr Rina Agrawal

"It was a fantastic effort, top class conference and world class academics. Great show! "
In prayer
Dr. Pankaj Desai

"PCOS conference is certainly the ever all of the best Conference attended. Every speaker is a gem & series of lecturers are like a gem necklace so appropriable for a PCOS conference which is diagnosed by necklace on USG"
Regards
Dr. Ragini Agrawal

"Many many thanks for your kind invitation and warm hospitality afforded to us from Lanka. We really felt so comfortable in India and are proud to be a part of its educational activities. Indeed the meeting was excellent and we look forward to a healthy networking of those interested in taking the field forward on Asian PCOS research to help South Asian women in particular."
Dr. Chandrika N. Wijeyaratne

ICOG Secretary Speaks...

Dr. Hema Divakar
Hon. Secretary, ICOG
secretary.icog@gmail.com

My dear friends ,

Each of the initiatives by ICOG serves as a genuine catalyst, supported by some extraordinary Fellows and Members of FOGSI-ICOG. One such example is the establishment of Certification Courses, serving as centres of excellence for teaching and training. These examples clearly show how the organisation and the members can work together to achieve what was first thought impossible.

With respect to advanced teaching on superspeciality subjects where our members were often forced to go overseas for training and observer programmes, there was perceived the establishment of such centres in INDIA. We thought this would be a worthy initiative. It was in the year 2007, that ICOG, the academic wing of FOGSI accepted the challenge because it was aspirational, honourable and the right thing to do. Borrowing the words of George Bernard Shaw "Some men see things as they are and ask WHY; I dream of things that never were and say WHY NOT?" and these ideas were implemented.

There is a formal accreditation process by which the centres can apply for recognition for conducting a six months training course in the following subjects

1. Perinatology
2. Reproductive Medicine
3. Ultrasonography
4. Minimally invasive surgery

Details of the centres already recognised and conducting such courses and the syllabus can be obtained by visiting our website www.icogonline.org

The candidate will be examined at the end of the course and awarded a certificate from FOGSI-ICOG.

For the first time in the last so many years, we have seen our leaders in FOGSI-ICOG confident enough to accept that we indeed have problems in areas of quality standards in education and healthcare and we lack our own data and research work.

In my opinion, openness to admitting problems and accepting that there is room for improvement and tapping the skills of our own members to lead such initiatives are themselves the attributes of effective leaders that we see in our Chairman Dr. Duru Shah and President Dr. Sanjay Gupte.

We hope that our members remain open to new ideas and will have the ability and spirit to learn from the people who have performed better than others.

Let us conduct ourselves as great citizens rather than just good people and lead the way to Generation Next !

Warm regards

Dr Hema Divakar
Hon. Sec ICOG

To all Organizers of Conferences, Workshops and Training courses.

Awarding Credit through Training Courses and Conferences. If you determine that your course, seminar or conference qualifies for credit points, please send details to **secretary.icog@gmail.com**

To participate in FOGSI 2010 initiative

Visit www.fogsi.org & click on
" I want to participate in FOGSI 2010"

To participate in webenabled National Eclampsia Registry
Visit www.abcofobg.com/Eclampsia

Folic Acid and Wheat Fortification in India

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Modern diets are unsuitable and have been significantly degraded in many developed countries since the mid 1800s. As radical as this statement may seem at first glance, more and more evidence suggests its truth and the fact that numerous diseases result from the nutritional deficiencies that are prevalent today. [1]

Neural tube defects (NTDs), the devastating multi-factorial malformations of the central nervous system are commonly ascribed to deficiency of folic acid. Anencephaly and spina bifida compromise more than 90 percent of NTDs. Both arise from incomplete closure of the neural tube within 28 days post conception, a time when most women are unaware that they are pregnant.

The NTD problem in India was graphically highlighted for members of the Federation of Obstetric and Gynaecological Societies of India (FOGSI) when Dr. Duru Shah delivered her presidential address during its 2008 convocation. She noted that of 36 million births annually in India, 131,400 babies (0.36%) were born with NTDs. Of these, she stated that 98,650 could have been prevented by the timely administration of folic acid. The final point section in this section of her address was that pre-pregnancy and early pregnancy administration of folic acid was crucial, as the neural tube closed at the 28th day of gestation. This article respectfully uses her address as background for the points that follow.

FOLIC ACID

Folic acid (Pteroglutamic Acid or PGA) is a synthetic form of folate-the form which occurs naturally in dark green leafy vegetables, orange juice, legumes (beans), nuts, asparagus and other select foods. In contrast, meat, with the exception of liver, is not a good source of folate. Compared to dietary sources, folic acid from nutritional supplements or fortified foods is generally more bio-available, but this fact is not well appreciated by many physicians and not widely discussed in the literature. Using broccoli as an example, one can obtain three different values of folate per cup serving depending upon the method of preparation, and it is likely that similar variations exist for other vegetables. Recent evidence suggests that the actual content of folate in foods has been declining on an annual basis for some years because of overproduction as well as the use of artificial fertilizers. Although fertilizers enhance crop yield, they do so at the expense of nutrient value, as most of the enhancement is of the macronutrient components, namely, carbohydrates and protein.[2]

A large body of modern medical literature, especially that directed towards pregnant women, strongly advises that nutrients be obtained naturally and solely from foodstuffs. Unfortunately, this statement does not take into account the concept of bioavailability – especially considering the fact that the bioavailability of folate, for example, in natural foodstuffs is variable and often low. Thus, a pregnant woman trying to obtain her daily requirement of folate would in effect have to substitute her morning tea with a spinach infusion, and spinach would necessarily also be the main component of her breakfast, lunch and dinner. It is easy to see how patients would rebel against such an unpalatable regimen that was advocated for nine months.

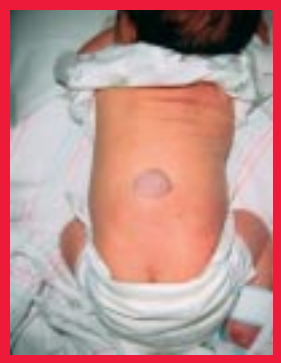
In contrast, under such circumstances supplementation would appear ideal for the pregnant woman, as well as for other members of society interested in enhancing their levels of vitamins, minerals, and micronutrients. Supplements containing all three components are available with and without prescription in India. Some are monosupplements - i.e., vitamin A, E, C, etc. Others can be characterized as a "balanced palate" - these contain vitamins, minerals and micronutrients. Numerous specially formulated pre-natal brands also are available in India for pregnant women.

Folate requirements increase during pregnancy, a fact that has been appreciated for decades. What has not been appreciated until recently is the fact that folate deficiencies must be addressed before the woman becomes pregnant, because many women do not receive medical care until after the 28th day of conception, at which time any deficiency cannot be corrected in time to prevent NTDs that may have already occurred.

Prenatal vitamin supplements available to most Indian consumers contain between 400 and 1,000 µg of folic acid. The higher doses are in excess of the 400 µg per day, the accepted international dose. The doses cited here are prevalent in literature and are based upon a number of randomized control trials (RCTs) clearly showing that pregnant women should consume 400 µg of folic acid daily for prevention of NTDs. One RCT conducted in China in areas of low and high NTD prevalence showed conclusively that 400 µg daily of folic acid had a protective effect for the first occurrence of NTD. The second RCT was conducted by the UK Medical Research Council which demonstrated that recurrence was markedly reduced with a dose of 4000 µg per day. This dose is ten times greater than the dose required for prevention. [3]

The reason for mandating folic acid fortification

The United States was the first country to mandate the enrichment of staple grains-flour, bread, farina, cornmeal, rice and pasta-with folic acid. Of note, whole grain products were not fortified as they contain some natural folate, although there was then and still continues a strong discussion of the quantity of fortification. The present U. S. requirement is that 140 mg of folate be added per hundred grams of flour. After this action, several countries began to change their fortification requirements, Canada being the first and followed by 67 additional countries. Altogether approximately 30% of the world's wheat flour that feeds approximately one-fifth of the world population is now fortified. However, the actual reduction in NTDs obtained from fortification processes and the doses used in the process varies throughout the world.



The most widely quoted reductive figure is that of the Medical Research Council (MRC) in the United Kingdom which suggests that the protective effect of fortification can be as high as 72 percent. There are several potential problems with this figure, however, not the least of which is the fact that the MRC study confidence interval is wide (29-88%). Another is that it only assessed recurrence risk in women with a previous NTD pregnancy.

In general, the benefits of fortification depend upon a number of factors including the baseline incidence of NTDs prior to fortification, methods of ascertainments of NTD incidence, and the degree to which other potential causes of NTDs exist within a given racial / ethnic group. Given these circumstances, it is reasonable to propose that reduction rates of 30-60 percent are likely.

The flour fortification initiative of India

India is a recent comer to the table of countries that





fortify wheat and its products. Interest in fortification began with the recognition that India's rate of 8.2 NTDs per thousand live births was 16 times the global average. The All India Institute of Medical Sciences began considering the topic in 2002, and subsequently a national symposium on NTDs and Folic Acid Deficiency was conducted. Details of this symposium and a further technical consultation held on August 4, 2006 may be obtained from the Office of Micronutrient Initiative, C-43, Niti Bagh, New Delhi. [4][5]

What distinguishes India's present position is the fact that it is a partnership between governmental and non-governmental agencies. In reality, flour fortification in India started in 1998 when Kapoor Brothers Roller Mills (Rose Brand Atta, Maida, Suji, Bran, Wheatgerm) and Vinod Mills (brands not available to present authors) began fortification voluntarily. Shortly thereafter, India participated in the Asian Development Bank's 'The Manila Forum Food Fortification Policy - The potential for protecting populations from mineral and vitamin deficiencies in Asia and the Pacific.'

By the end of 2007, key stakeholders met in Delhi to not only consider folic acid deficiency but also to address iron deficiency and anaemia. A key outcome was the formation of the India Flour Fortification Network (IFFN) which has been in place and working since that date. Some of the issues regarding folate fortification in India include: 1) a general lack of awareness and interest among the millers as well as physicians and the public-at-large; 2) no clear understanding of the cost of intervention vs. the cost of not combating the problem; 3) absence of clear stewardship at the government level (a factor which can be expected to change with time); and 4) the need to increase the Indian RDA from 100 ?g to 400 ?g per day, which is the international standard. A further consideration is the more recent recognition that NTDs in India may not only be due to folic acid deficiency. [6] Another recent study showed that the decline in a country's NTD cases was independent of the amount of folic acid administered and apparently reveals a "floor effect" for folic acid-preventable NTD. [7] Studies of gene-nutrient interactions in association with NTDs would be particularly valuable in India, as would studies of deficiencies of vitamin B12 and zinc, both of which are essential for fetal growth and development. [8] Although fortification of folic acid is beginning to take place in India, concurrent Vitamin B12 deficiencies have not been addressed which might produce inaccurate results when determining the success of folic acid fortification on the reduction of NTD cases.

Although these issues may appear as daunting upon first reading, they may also be regarded as challenges which can be overcome if organizations such as FOGSI and the Indian College of Obstetrics and Gynaecology continue their much appreciated role advising the government and its agencies regarding optimizing maternal and child health.

The following are important points to remember:
All women capable of becoming pregnant should be advised of the following:

1. An adequate level of folic acid is necessary to prevent a NTD when pregnancy ensues.
2. Taking folic acid in pregnancy alone cannot prevent NTDs, as the neural tube is formed by the 28th day after conception.
3. Real prevention can be most easily accomplished by having an adequate folic acid level at the start of pregnancy.
4. Pre-pregnancy supplementation is the ONLY known means to ensure this, as India's folic acid fortification process is not as yet implemented nationally.

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Please note that this MCQ is only for academic value. There will be no ICOG Credit Points awarded for attempting this. *(Ans. on page 15)*

1. Closure of the neural tube occurs on which day after conception?
a. 0
b. 10
c. 18
d. 28
e. 90

2. Neural Tube Deficiencies are caused only by deficiency of folic acid.
True / False

3. The dose required for prevention of NTDs is how many times higher than the dose required for prevention of first occurrence?
a. 2-fold
b. 5x
c. 10
d. 20

4. The internationally recommended standard dose for prevention of first occurrence of an NTD is
a. 100 mug
b. 200 mug
c. 400 mug
d. 800 mug

5. It is easy for a woman to obtain her daily recommended allowance of folic acid throughout her pregnancy from green leafy vegetables.
True / False

6. Modern food production systems do what to the micronutrient of a given vegetable?
a. No effect
b. Some effect
c. Enhanced
d. Diminish

7. The method of food preparation has no effect on the availability of folic acid on the table
True / False

8. India's present plan to fortify food includes which two of the following:
a. Vitamin A
b. Iron
c. Folic acid
d. Selenium

9. Which of the following foods is naturally good source of folic acid?
a. Meat
b. Green leafy vegetables
c. Liver
d. Nuts and Grains
e. Milk

10. Pre-pregnancy supplementation is the ONLY known means to ensure NTD prevention because:
a. India's folic acid fortification is not universal
b. Women should not take folic acid once they become pregnant
c. Folic acid is toxic to the fetus

Multiple Pregnancy and Subfertility Treatment

Prof. P. C. Ho
Department of Obstetrics and Gynaecology
The University of Hong Kong, Pokfulam Road,
Hong Kong, China

In the recent three decades, there was a significant increase in the number of multiple pregnancies in many countries. One of the important contributing factors is the treatment of subfertility. Multiple pregnancies are associated with a significant increase in obstetric complications such as preterm labour, intrauterine growth retardation, hypertension of pregnancy, antepartum and postpartum haemorrhage. These will lead to a significant increase in perinatal morbidity and mortality. There is an increase in congenital abnormalities, cerebral palsy and other long term medical problems in the children. The parents have to look after two or more children and there may be a higher risk of social, financial and psychological problems. There is a need to reduce the risk of multiple pregnancies in subfertility treatment.

Ovulation Induction

The use of drugs for induction of ovulation is usually associated with an increase in multiple ovulation, with a resultant increase in multiple pregnancy. Even with the use of clomiphene citrate, there is an increase in the rate of multiple pregnancy. Therefore, all ovulation induction drugs should be used with caution. If the woman with subfertility due to anovulation is obese, reduction in body weight may lead to return of spontaneous ovulation, obviating the need for the use of drugs and thereby reducing the risk of multiple pregnancy. When clomiphene citrate is used for induction of ovulation, it has been recommended that at least in the first cycle, the ovarian response should be monitored with pelvic ultrasound in the periovulatory period 1. The cycle may be cancelled if the number of follicles is more than 3. This may help to reduce the multiple pregnancy rate.

In women with polycystic ovaries syndrome (PCOS) and resistance to clomiphene citrate, there are two possible options: induction of ovulation with gonadotrophins or ovarian electrocautery. The Cochrane database review2 showed that they are probably equally effective in induction of ovulation but the use of gonadotrophins is associated with a higher incidence of multiple pregnancy. The use of electrocautery is also more cost-effective than induction of ovulation with gonadotrophins. The disadvantages of ovarian electrocautery include the risks of general anaesthesia, laparoscopy, the electrocautery damage to intra-abdominal organs, formation of post-cautery adhesions and damage to the ovaries. There is also concern on the possibility of early ovarian failure due to the damage to the ovaries, though there is as yet no long-term data on this risk. The risk of complications will probably vary with the experience and competence of the gynaecologist. Therefore, when the surgical expertise is available, the option of ovarian electrocautery will be offered and discussed with women with PCOS requiring induction of ovulation with gonadotrophins due to resistance to clomiphene citrate.

Induction of ovulation with goandotrophins, especially in women with PCOS, requires careful monitoring to minimize the risks of multiple pregnancy and ovarian hyperstimulation syndrome (OHSS). It should only be performed in centres with adequate facilities and expertise. The use of chronic low dose regimen has been shown to yield good results even in women with PCOS3. The starting dose is usually 37.5-75 iu daily. The women are monitored with regular pelvic ultrasound. The dose should be maintained if there is ovarian response. If there is no ovarian response after two weeks, the dose may be increased by 50% and maintained for at least one week. The dose may be increased further if there is no response. There should be strict criteria for cancellation of cycles. For example, if the number of mature follicles is more than 3, the cycle should be cancelled. Alternatively, the cycle may be changed to treatment with IVF. With the chronic low dose step up regimen, good results can be expected in experienced hands: 70% monoovulatory rate, 20% pregnancy rate and multiple pregnancy less than 6%4 (Homberg and Howles 1999).

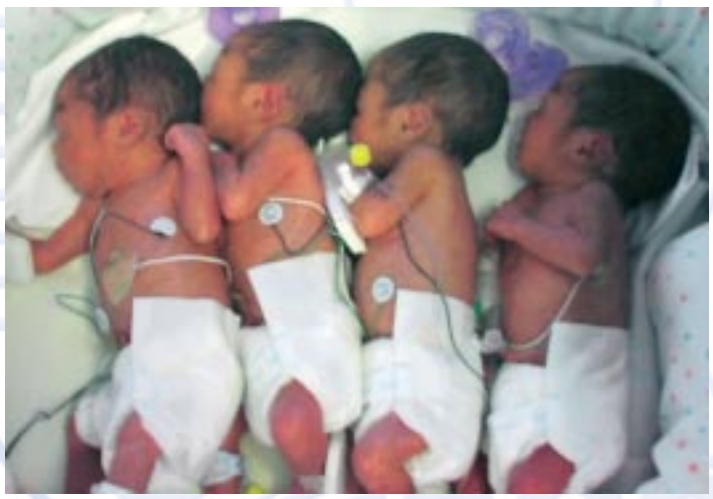
In women with hypothalamic amenorrhoea requiring ovulation induction, the use of gonadotrophin releasing hormone (GnRH) may be more physiological than the use of gonadotrophins. The incidence of multiple pregnancy and OHSS may be lower. However, GnRH has to be given in a pulsatile manner: once every 90-120 minutes. The woman has to carry a mini-pump which makes it less convenient to the women. Pulsatile GnRH is less effective in women with PCOS and the number of women with hypothalamic amenorrhoea is relatively few. It is more difficult for most centres to gain adequate experience to use it effectively. Therefore, despite its obvious advantages in reducing the incidence of multiple pregnancy and OHSS, it is used in only a few centres.

Ovarian stimulation and intrauterine insemination

In women with ovulatory cycles and patent fallopian tubes, but subfertile due to male factor or unexplained subfertility, ovarian stimulation and intrauterine insemination (IUI) is often used to increase the number of oocytes released in order to increase the chance of pregnancy. Therefore, unlike induction of ovulation in women with anovulation where the purpose is to induce a single follicle to ovulate, the strategy in ovarian stimulation and IUI is to stimulate the ovulation of 2-3 oocytes. Therefore, a higher incidence of multiple pregnancy is to be expected. Because of the concerns of the increased risk of multiple pregnancy, the NICE guidelines do not recommend the use of ovarian stimulation when IUI is performed for unexplained subfertility or male factor subfertility1. If ovarian stimulation is used with IUI, the women should be informed of the risks of multiple pregnancy and OHSS. The ovarian stimulation should be monitored with pelvic ultrasound. Excessive stimulation should be avoided and the treatment cycle should be cancelled if there are more than 3 mature follicles. The number of intermediate size follicles should also be taken into consideration when deciding whether to cancel the cycles.

In-vitro fertilization and embryo transfer

The first IVF pregnancy was conceived by natural cycle IVF. Subsequently, it was shown that replacement of more than one embryo could increase the pregnancy rate. Therefore, ovarian stimulation was used to stimulate the development of multiple follicles leading to the retrieval of multiple oocytes, and multiple embryos were obtained. The replacement of multiple embryos is associated with a higher pregnancy rate but it also leads to a higher incidence of multiple pregnancy. With the development of cryopreservation, excess embryos can be frozen for subsequent replacement if the replacement of fresh embryos fails to achieve a pregnancy. This has led to a progressive reduction



in the number of embryos replaced. It has been shown that the cumulative live birth rate with the transfer of two fresh embryos is not significantly different from that of the transfer of a single fresh embryo followed by the transfer of a frozen thawed embryo if the women fail to conceive in the fresh cycle, while the multiple pregnancy rate was significantly reduced with the latter approach5. However, for a variety of reasons, many women and IVF centres are often reluctant to accept elective single embryo transfer (SET) or reduction in the number of embryos replaced.

In many countries, IVF is not funded by the government and many women cannot afford to have repeated cycles of IVF. Even in countries where IVF is funded by the government, many women also found the psychological stress difficult to cope with. Many of them are not fully aware of the risks of multiple pregnancies. Therefore, many women are reluctant to accept elective single embryo transfer as it requires more cycles of treatment to achieve the same cumulative live birth rate. For the IVF centres, the reduction in the number of embryos replaced may lead to the reduction of the pregnancy rate per cycle which is often considered to be an indicator of the quality of the IVF program. Cumulative live birth rates from a single cycle of oocyte retrieval are seldom reported. The pressure to succeed is also a factor not conducive to the reduction of number of embryos replaced. Therefore, to make the reduction of the number of embryos replaced acceptable to women, it is necessary to address these issues.

First of all, women need to be educated on the risks and complications of multiple pregnancy. Secondly, it is necessary to have a good IVF program and a good cryopreservation program so that the cumulative pregnancy rates with sequential replacement of a single or reduced number of embryos will be similar to those of replacement of a large number of fresh embryos. It is also necessary to make the treatment more convenient and less stressful to the women so that they are more likely to accept the need for an increased number of treatment cycles to reduce the risks of multiple pregnancies. There is some evidence that the use of milder forms of ovarian stimulation may reduce the number of dropouts from treatment6. It will also be ideal if the IVF treatment can be funded by public funding. Government authorities should be advised that the increase in multiple pregnancies will inevitably lead to higher costs for the government if it has to care for the babies born from multiple pregnancies. There has also been discussion on the definitions of success in IVF. The use of cumulative singleton live birth rates over a period of time has been proposed in order to reduce the pressure of trying to increase the pregnancy rates per cycle of fresh embryo transfer by replacing a large number of embryos.

Another strategy is to improve the ability to identify the best quality embryos so that they can be replaced first. Currently, most centres will select embryos based on the morphological appearance. However, there are limitations with this technique as some chromosomally abnormal embryos may also appear normal morphologically. Pre-implantation genetic screening (PGS) has been proposed as a method to select the chromosomally normal embryos for replacement. However, a recent randomized trial showed that the use of PGS may in fact reduce the live birth rates of IVF treatment7. While some authorities have questioned the validity of this randomized trial, there is as yet no randomized trial showing that PGS may increase the live birth rate. Another approach is to replace embryos at the blastocyst stage. This was based on the belief that only good embryos will develop to the blastocyst stage on prolonged culture in-vitro. A recent meta-analysis showed that the transfer of blastocysts will lead to a higher live birth rate than the replacement of the same number of cleaving embryos8. However, there are some disadvantages with blastocyst transfer. Firstly, there may be a higher risk of no transfers because none of the embryos can develop to the blastocyst stage, though this is less likely with good prognosis patients. Secondly, the number of embryos available for cryopreservation is reduced. The replacement of cryopreserved embryos may negate the advantage of blastocyst transfer. Blastocyst transfer may also be associated with a higher risk of monozygotic twins which are more likely to develop complications than dizygotic twins. Therefore, usually blastocyst transfer is considered in women with good prognosis and they should be carefully counselled.

There are a number of other approaches which have potential to select the better embryos such as the use of trophectoderm biopsy, metabolomics etc. While the preliminary results are encouraging, these methods need to be validated before they can be used in clinical practice.

In conclusion, while it is impossible to eliminate multiple pregnancies in subfertility treatment, there are a number of strategies available to reduce the chance of multiple pregnancies in the various forms of subfertility treatment and guidelines are available from a number of professional bodies. Both health care providers and women have to be fully aware of all the potential complications of multiple pregnancies. Strict compliance with the guidelines should be observed so that the risk of multiple pregnancies can be reduced.

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Newer Delivery Systems in Contraception

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Despite considerable advances in contraceptive technologies in the 20th century, unintended pregnancies remain a substantial public health issue globally. With the advent of the 21st century, women gained access to multitude of contraceptive options. Educating and helping women choose a contraceptive agent that best suits their needs will improve compliance and contraceptive efficacy. The ongoing research is leading to improved types of contraceptive hormones, reduced dosage and the development of innovative new methods of delivery.

The newer delivery systems should have the following criteria:

1. Should be more effective
2. Have fewer side effects
3. Should be less costly to manufacture
4. Should be easier to deliver than current options
5. Should be reversible

Various newer delivery systems available or under trial are:

1. Implantable Hormonal Devices(sub dermal implants)
2. Vaginal Rings
3. Transdermal contraception

Implantable Hormonal Devices

Long acting contraceptives such as sub dermal implants have gained popularity because they do not require frequent administration and are independent of sexual act. Research of contraceptive implants was initiated during 1960's by Croxatto et al and a breakthrough was reached by 1978 when Population Council demonstrated the feasibility of a new contraceptive implant system consisting of six levonorgestrel containing capsules 'Norplant'. First introduced in Finland in 1983. Norplant lost its popularity due to removal. Later, reduction in the number of capsules and making them smaller & stiffer so that insertion and removal is easier was done. Two new implants Jadelle (two LNG rods) and Implanon (single ENG rod) have been widely used.

A number of progestational agents including Megestrol acetate, Norethendione, Norgestrienone and levonorgestrel were tried. Levonorgestrel was used was used for two reasons:

1. sustained release could be maintained for 5 years.
2. extensive safety data was available.

In 1990 FDA approved use of levonorgestrel in sub dermal implants. Recently, etonorgestrel is used for this purpose. Implants contain a progestogen in a slow-release carrier, made either of dimethylsiloxane as in Jadelle with two implants or ethylene vinyl acetate (EVA) as in Implanon, a single rod.

Implanon:

Is a single rod implant, made of ethinyl vinyl acetate with a length of 40 mm and diameter of 2 mm containing 68 mg of Etonogestrel, the chief active metabolite of desogestrel, releasing during 3 years. First launched by Organon in 1998 after 12 years of research.

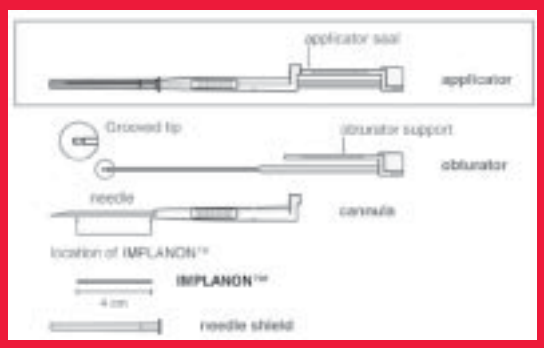
Mechanism of action- prevents pregnancy by:

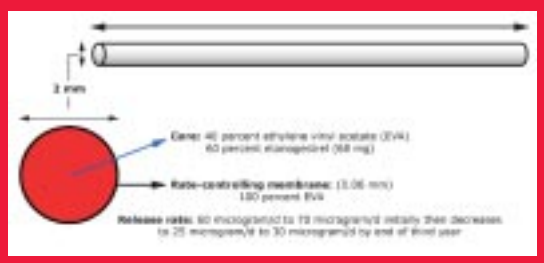
1. inhibiting ovulation. Occurs within one day of insertion.
2. Increases viscosity of cervical mucus which impedes the passage of sperms.
3. Induces endometrial atrophy.

Administration:

1. Inserted sub dermally but very superficially under the skin over the biceps, medially in the upper arm i.e. at the inner side of the non dominant upper arm about 8-10 cm above the medial epicondyle under aseptic conditions.

2. Area is anaesthetized with an anaesthetic spray or with 2 ml of lidocaine (1%) applied just under the skin along the 'insertion canal'.
3. Special training is essential on 'model arm' although insertion and removal is easy.





Time of insertion:

1. No preceding hormonal contraceptive use- Implanon should be inserted on day 1-5 of the woman's natural cycle(day 1 is the first day of her menstrual bleeding).
2. Changing from combined hormonal contraceptives (COC)- preferably on the day after the last active tablet of COC. And in case of vaginal ring/transdermal patch it is inserted preferably on the day of removal.
3. Changing from progestogen-only method- any day when a woman is switching from a minipill or on the same day as removal of another implant or IUS. If switching from an injectable, Implanon is inserted when the next injection is due.
4. Following childbirth- to be inserted on day 21-28 after delivery.
5. Following first-trimester abortion- inserted immediately.

Effectiveness: 0.3 to 1.1 pregnancies per 100 women in the first year of use as typically used.

Adverse Effects:

1. Bleeding pattern- continuous progestogen contraceptive use changes vaginal bleeding pattern: amenorrhoea irregular bleeding, and or prolonged bleeding may occur. Bleeding irregularities are the main reason for discontinuation, thus extensive counselling is of paramount importance.
2. Other adverse effects- acne, headache, nausea, breast pain, emotional lability, weight gain, dysmenorrhoea and depression is observed.
3. Implant site symptoms- mild pain for short duration in <5%.

Non-contraceptive benefits of Implanon:

1. Relieves dysmenorrhoea
2. Helps in menorrhagia
3. Improves anaemia
4. Treats DUB
5. Decreases functional ovarian cysts
6. Protection against ectopic pregnancy risk, fibroadenoma and fibrocystic breast changes
7. May decrease rate of PID

Contraindications:

Progestogen-only contraceptives should not be used in the presence of any of the following condition listed below-

1 Known or suspected pregnancy
2 Active venous thromboembolic disorder
3 Presence or history of severe hepatic disease
4 Progestogen dependent tumours
5 Undiagnosed vaginal bleeding
6 Hypersensitivity to active substance or to any of the excipients of Implanon.

Other Newer Implants:

1. Uniplant – single implant containing 38 mg normegestrol acetate in 4 silastic tubes with a 100 microgram per day release. Provides contraception for one year.
2. ST-1435 – single rod implant containing a new progestogen ST-1435. Contraceptive property & side effects similar to those of levonorgestrel.

Biodegradable Implants:

1. Capronor - is a single capsule, biodegradable, levonorgestrel releasing subdermal implant composed of polymer E-Caprolactone. Provides contraception for one year. When exposed to tissue fluids E-caprolactone slowly breaks into E-hydroxycaproic acid and then finally to carbondioxide and water. After 12 months capsule begins to disappear.
2. Anuelle - is a biodegradable norethindrone pellet.
3. Nestorone - a single rod implant contains nestorone. Still under trial.

Vaginal Contraceptive Rings

Vaginal ring is a novel technology designed to release daily doses hormones into the blood stream to prevent pregnancy. It is seen that combined oestrogen and progestin ring offers good cycle control and deliver hormones more steadily than combined oral contraceptives.

There are two types of vaginal rings:

1. Progestin-only
2. Combined formulation- containing progestin and an oestrogen

Advantages of Vaginal rings:

- Self controlled by the women
- Diffuse continuous release of hormones
- No daily attention required

Progestin-only Rings

Two types are available or in development:

1. Progering - containing natural progesterone hormone.
2. Ring containing synthetic progestin Nestorone- yet to be named.

Mechanism of action- mainly by

1. thickening of cervical mucus to prevent sperm penetration
2. inhibits ovulation to some extent
3. endometrial atrophy

Indication:

- Postpartum period
- Breast feeding because they do not contain oestrogen

Side effects – mainly bleeding disturbances and the most likely reason for discontinuation.

1. Progesterone Rings: They were first registered and approved in Chile and Peru in 1998 for use by breast feeding women. Each ring releases 10 mg of progesterone daily and lasts for 3 months. Women can use these rings continuously for up to one year, after which effectiveness declines.

Side effects: vaginal discharge, urinary discomfort, bleeding disturbances and reproductive tract infection are noticed.

2. Nestorone Rings: Developed by Population Council are similar to progesterone rings but rely on ST-1435, a more potent synthetic progestin. Ring releases 50, 75 or 100 micrograms of Nestorone per day. These rings provide effective protection from pregnancy for lactating women for up to one year.

Combined Vaginal Rings: There are two types of combined formula vaginal rings available.

1. NuvaRing: is the first vaginal ring widely introduced. This has US FDA approval since 2001. Research product of Organon, Now available in India also. Nuva ring releases 120 micrograms of the proestin etonogestrel and 15 micrograms of the oestrogen ethinyl estradiol per day through a flexible ring inserted vaginally. The hormones are absorbed through the vaginal epithelium, bypassing the first-pass effect on the liver. Serum concentrations of hormone are lower for women using a vaginal ring than those observed with the oral contraceptives. The vaginal ring provides good cycle control, with break through bleeding reported in less than 1.1% cycles.

Design, Composition & Use:

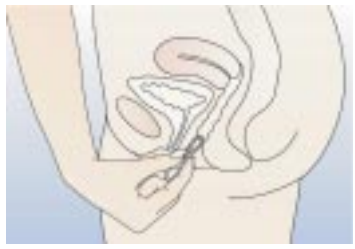
NuvaRing is a flexible, soft transparent, ring measuring 5.4 mm in diameter and 4 mm in thickness. The ring is made of ethylene vinyl acetate, in which the hormones ethinyl estradiol and etonogestrel are equally dispersed. Once inserted, each ring releases 15 micrograms EE and 120 micrograms ENG per day, and these hormones are then continuously absorbed through vaginal epithelium. One ring provides contraceptive protection or one cycle.

Regime:

Three weeks of ring use followed by one ring-free week, during which a withdrawal bleeding normally occurs. A new NuvaRing is needed for each four-week cycle. Thus a woman requires 13 rings per year.

Insertion of NuvaRing:

Ring can be easily inserted and removed by the woman herself. For insertion, NuvaRing is compressed and inserted into the vagina. The ring should sit comfortably in the vagina. If it feels uncomfortable, it might be necessary to gently push it in a little further. Exact position of NuvaRing in the vagina is not critical for efficacy. The ring is easily removed by hooking the index finger around the ring or grasping the ring between the index finger and the middle finger and just pulling it out.



Mechanism of action:

a. Completely inhibits ovulation during recommended and extended use up to 28 days.
b. Atrophic endometrial changes.
c. Thickening of cervical mucus.

Reversibility: Rapid return to ovulation after ceasing use.

Adverse Effect:

1. Incidence of oestrogen related adverse events - breast tenderness, headache & nausea is low.
2. Incidence of local adverse events such as leucorrhoea, vaginal discomfort, vaginitis & ring related events such as foreign body sensation, coital problems & explusion.
3. Irregular bleeding/ spotting is rare.
4. Weight gain - no relevant changes in mean weight is seen.
5. PMS and dysmenorrhoea - decreased.

2. Another ring: combination of 150 microgram of a different progestin, Nestorone, and 15 microgram of oestrogen ethinyl estradiol per day. Still in clinical trial.

Effectiveness of vaginal rings: 1.2 to 1.5 pregnancies in first year as typically used.

Transdermal Contraception:

A new hormonal contraceptive method, works transdermally by slowly releasing a combination of progestin & oestrogen through the skin.

Types

A. Patch **B.** Sprays **C.** Gel

A. Trandermal Patch: Approved for use in United States in 2001. The only contraceptive patch on market today is Ortho Evra. It delivers continuously daily doses of 150 microgram norelgestromin and 20 microgram ethinyl estradiol.

Method of use

A user wears a patch for one week, after which she must replace it with a new one each week for a total of three weeks followed by one week with no patch.

Mechanism of action:

1. Preventing ovulation
2. Thickening cervical mucus
3. Suppressing endometrial growth

Description:

Each patch has a contact surface area of 20 sq cm. and measuring 4.5 sq cm. containing 6.00 mg. norelgestromin (NGMN) and 0.75 mg ethinyl estradiol, delivering continuous systemic dosage of 150 µg & 20 µg EE per day.

It is thin, matrix - type transdermal contraceptive patch consisting of -

1. The backing layer - composed of beige flexible film, provides structural support & protects the middle adhesive layer from the environment.
2. The middle layer - active component in this layer are the hormones, NGMN & EE.
3. The third layer is the release liner. Protects the adhesive layer during storage and is removed just prior to application

Sites of application:

Buttocks, upper outer arm, back, lower abdomen or upper torso (excluding breast).

Advantages:

1. Weekly application encourages complains
2. Easy verification of presence reassures user of continued protection
3. Does not requires vaginal insertion
4. Contraceptive effects are rapidly reversible
5. Excellent cycle control after three months

Disadvantages:

Application site reaction

1 Not as effective in women more than 198 pounds
2 Side effects similar to oral contraceptives except for
- High rates of breast pain during first two months
- Higher rate dysmenorrhea

3 May be difficult to conceal
4 No protection against HIV or STD.

Effectiveness: 0.8 to 1.3 pregnancies per 100 women in first year as typically used.

B. Spray-On contraception: Spray-on approach is a new technique for transferring a preset dose of fast-drying hormones onto the skin. The progestin Nestorone can be delivered through a spray or gel. It is appropriate for breast feeding women. The spray is absorbed instantaneously. The hormones collects as a reservoir within the skin from which it then slowly diffusing into the blood stream. Phase I clinical trials of Nestorone Metered Dose Transdermal System, a daily progestin-only spray-on contraceptive began in Australia in 2004.

C. Contraceptive Gel: Clinical trial of Nestorone gel is applied to the skin daily for three months, suppressed ovulation in 83% of participants apply 1.2 mg per day.

Conclusion: Contraception is an important topic for women of reproductive age. An armamentarium of agents is available to provide a menu of contraceptive options. Women can make informed decisions and select contraception that is safe, effective, and convenient and has a low adverse effects profile. Clinicians providing primary care to women must be well informed about the various hormonal contraceptive options and work with each woman to find her optimal regime.

ICOG CME

2 Credit Points are awarded to all attempting this CME

Non Stress Test

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The most important objective of prenatal care is timely detection of morbid changes in the fetal status and appropriate intervention to prevent fetal death . Fetal death rate is lower in population undergoing ante partum testing as compared to untested general population.

An ideal test for antepartum fetal surveillance should fulfill following criteria -

1. The test should reliably predict the fetus at risk for hypoxia.
2. The test should reduce the risk of fetal death.
3. If an abnormality is detected by the test, treatment options must be available.
4. A false positive test should not materially increase risk of poor outcome to the woman or fetus.
5. The information should be helpful for management.
6. The test should provide information not already apparent from the patient's clinical status.

The invention of Electronic Fetal heart Monitoring (EFM) 40 years ago has brought a revolution in obstetric world. Heart is controlled in a complex way by neurological, endocrine, and local mechanisms. The neurological control is mediated by interactions within the brainstem between afferent sensory system e.g. baro and chemoreceptors, higher centres (affected by behavioural states), centers controlling other vital systems e.g. respiratory and thermoregulatory system and the efferents via sympathetic and parasympathetic nervous system. Even with precise understanding of the response of a single system it can be difficult to predict how the heart will respond. However, some general rules are known about fetal response to hypoxia and this knowledge is employed logically in interpretation of heart recordings. To date EFM remains the mainstay of fetal surveillance, major part of interpretation coming from rules drawn from empirical correlation of fetal heart rate pattern. The widespread use of ante partum fetal surveillance is primarily based on circumstantial evidence because there have been no definitive randomized clinical trials.

Ideally Non stress Test i.e. NST and Contraction Stress Test i.e. CST. were brought into practice to diagnose fetal hypoxia and prevent further neurological damage. Today, though various other methods like BPP, MBPP, umbilical, uterine, cerebral and venous Doppler, and per cutaneous umbilical blood sampling are also used for detecting severity of fetal hypoxia, cardiotocography still remains the mainstay of fetal surveillance.

Non Stress Test (NST)

Non Stress test is based on the hypothesis that the heart rate of fetus who is well oxygenated , not acidotic , non impaired will temporarily accelerate its heart rate in response to movement.

NST can identify sub optimally oxygenated fetus and thus provide an opportunity for intervention before progressive metabolic acidosis results in morbidity or death.

Non Stress Test was introduced by Freman (1975) and Lee and colleagues (1975) to describe fetal heart acceleration in response to fetal movement (as a sign of fetal health).

The acceleration is caused by interaction of sympathetic or parasympathetic nervous system as a result of increase in metabolic demand during an active phase.

Today, NST is a primary method of testing fetal health as it is a simple and non invasive test which is easy to perform, acceptable to patient and easy to interpret. It is a test of fetal condition and it differs from CST which is a test of uteroplacental function.

How to perform NST and how to interpret?

Place the patient in semi Fowlers position. Use pillows under one of the hips to displace the weight of uterus away from IVC . Take patient's BP every 10-15 minutes during procedure as supine hypotension may cause a non reactive result.

Apply the tococardiographic equipment to the maternal abdomen and observe uterine activity and FHR for 20 min.

Instruct the woman to push the calibration button of uterine contraction tracing every time she feels fetal movement.

A reactive test is present when 2 or more FHR accelerations are clearly recorded during 20 minute period each of 15 or more beats per minutes (bpm) from baseline and lasting for 15 or more seconds, occurring simultaneous with episodes of fetal activity.

A Non reactive test is present where less than 2 fetal movements occur during 20 min period and there is no associated fetal heart acceleration.

ACOG (2007) recommended that for a reactive test result, even acceleration with or without fetal movement be accepted and the tracing should be carried on for 40 minutes or longer to account for fetal sleep cycles. Miller and colleagues (1996), reviewed outcomes in fetuses with non reactive NST because of only one acceleration and they concluded that one acceleration is just as reliable as two in predicting fetal health status.

Reproducibility of interpretation of NST tracing is problematic because of subjective variation in interpretation. Computerized analysis of NST is a better option to reduce the confusion.

At what gestation should one start doing NST? How frequently should NST be performed?

NST is usually recommended after 30-32 wks. Gestational age influences acceleration or reactivity of fetal heart rate. The percentage of body movements associated with acceleration and amplitude of these accelerations increase with gestational age. It has been observed that only 70% of normal fetuses between 26 to 28 wks gestation show reactive NST that is two accelerations of 15 beats minute fer 15 seconds, but 90% of normal fetuses demonstrate reactive. NST with lesser degree of acceleration ie. 10 bpm. (Guinn and colleagues,1998)

Thus according to National Institute of Child Health and Human Development Fetal Monitoring Workshop(1997), before 32 wks, accelerations are defined as having an acme of 10 bpm or more above baseline for 10 sec or longer. Before 32 wks NST will serve the purpose only if NICU facility to tackle such low birth weight babies is available. NST is not recommended before 26 wks.

If NST is reactive, it is recommended to perform it weekly or biweekly depending upon the indication for which it is done. The interval between tests can be shortened to even daily or more frequent NST in some conditions like severe PET remote from term.

- The frequency of still birth with reactive NST performed every week is 6.1/1000 and when this frequency is increased to twice weekly, the frequency of false negatives is reduced to 1.9/1000 (Boehm et al, 1986)

What are the indications for NST?

Patients with risk factor for uteroplacental insufficiency like :

Hypertensive disorders, IUGR, Postdatism ,Rh sensitization, Diabetes mellitus ,Antiphospholipid antibody syndrome , Poorly controlled hyperthyroidism, SLE, Hemoglobinopathies, Chronic renal disease, Decreased fetal movements , Oligo or Poly hydromnios, BOH etc should be subjected to NST.

False Negative Non Stress Test

False negative rate of NST (Reactive NST in a fetus who is actually in distress) is 3.2/1000 which is very low and thus NST is considered as a good predictor of fetal health.

False positive Non Stress test

The False positive rate (non reactive results in normal patients) for NST is very high and ranges between 65-70% . This indicates that even when the NST is non reactive, probability of serious fetal problem is low and it is necessary to use other additional tests before intervention.

The high false positive rate of NST is because interpretation of NST relies only on one variable and that is presence of accelerations of FHR associated with fetal movement. It ignores other important information on CTG. Ideally, NST should be analysed taking into consideration all other factors that provide information about fetal well being on CTG such as -

Basic patterns:	Baseline fetal heart rate
	Variability
Periodic changes:	Accelerations
	Decelerations

Variability represents the constant interaction of sympathetic and parasympathetic nervous system as they determine the appropriate heart rate and cardiac output in response to constant minor changes in venous return and metabolic demands of the fetus.

Normal variability (5 to 15 bpm) represents an intact nervous pathway through the cerebral cortex , midbrain, vagus nerve and cardiac conduction system. Variability is influenced by gestational age , fetal sleep , maternal medications , fetal anomalies, fetal acidosis and fetal tachycardia.

A non reactive NST in presense of normal beat to beat variability usually corresponds to false positive results .

The presence of acceleration of FHR associated with fetal movement or in response to fetal stimulation is a reliable sign of fetal health but it should be remembered that absence of acceleration may be because of fetal sleep and a healthy fetus may not move for period of upto 75 minutes.

Brown and Patrick (1981) considered that a longer duration of non stress testing might increase the positive predictive value of an abnormal non reactive test.

Absence of decelerations in the NST is reassuring but the presence of spontaneous severe variable or late deceleration is abnormal .

Mild non repetitive decelerations less than 30 sec do not suggest compromised fetus , repetitive variable deceleration , atleast 3 in 20 minutes even if mild have been associated with increased risk of fetal distress(ACOG 2007).. Deceleration for more than 1 minute carries worst prognosis for baby (.Bourgeois,1984)

VAS (Vibro Acoustic stimulation)

VAS is an acoustic stimulated NST. It uses stimulation of fetus with an artificial larynx over the fetal head during 1-3 seconds. The instrument produces vibratory acoustic stimulus of approx. 80 hz and 82 lb.

A healthy fetus will respond with sudden movement (startle response) followed by acceleration of FHR.

VAS was designed to reduce time spent in performing NST. Today NST with VAS has become predominant method to perform NST. Even if mother does not perceive fetal movement but fetal heart acceleration is seen, the test is considered normal.

Conclusion

Thus in conclusion it can be said that in the existing system, NST plays a major role in antepartum care. Low false negative rates of NST indicate NST to be a good predictor of fetal outcome. Diagnostic value of NST will improve provided other parameters on CTG such as baseline FHR , presence or absence of deceleration and presence or absence of beat to beat variability is also considered during interpretation of NST. In Non Reactive tests, adjunctive tests like BPP, Doppler should be used to improve further obstetric outcome.

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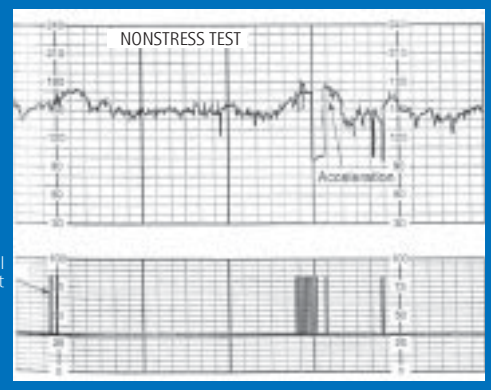
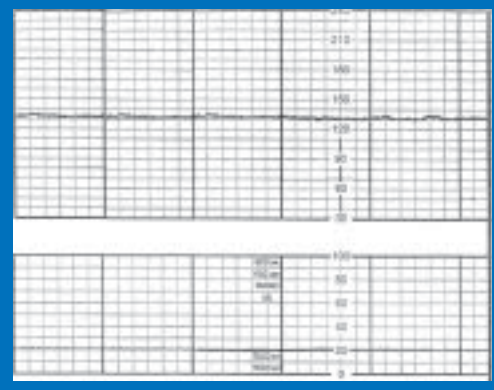
Reactive nonstress test



Non Reactive nonstress test



Questions for CME Credit Points (More than one answer may be correct. Please refer to the answers which will be printed in the following issue of the newsletter.)

Mail your answers to ICOG office at icogcme@gmail.com (Credit Point Max 2)

MCQ for CME: Non Strees Test

1. False negative rate of NST performed biweekly is -
- a. 2/1000
- b. 6/1000
- c. 8/1000
- d. 10/1000

2. False positive rate of NST is
- a. 10-15%
- b. 20 to 30 %
- c. 40 to 50%
- d.60 to 75%

3. At 34 weeks, an acceleration is defined as increase in fetal heart rate by ---- beats per minet and lasting for ---- seconds
- a. 5,10
- b. 10,10
- c. 10,15
- d. 15,15

4. Before 32 weeks of gestation, an acceleration is defined as increase in fetal heart rate by ---- beats per minet and lasting for ---- seconds
- a. 5,10
- b. 0,10
- c. 10,15
- d. 15,15

5. Which of the following tests should be done if NST is nonreactive?
- a. Serum alpha feto protein
- b. Scalp blood PH
- c. BPP
- d. Fetal kick count

6. Which of the following statement is correct?
- a. Non reactive NST and beat to beat variability of 2-3 bpm carry good prognosis
- b. Non reactive NST and beat to beat variability of 2-3 bpm carry poor prognosis
- c. Non reactive NST and spontaneous decelerations carry good prognosis
- d. Non reactive NST , reactive on VAS carry poor prognosis

7. Healthy fetus may not move for a period of upto - minutes
- a. 25
- b. 50
- c. 75
- d. 100

8. Beat to beat variability is influenced by -
- a. Fetal sleep
- b. Maternal medications
- c. Fetal acidosis
- d. All of the above

Answers: Issue 3 CME MCQ on Role of Calcium and Vit D in Postmenopausal Osteoporosis

1. c	5. d
2. c	6. c
3. d	7. b
4. a	8. a
9. b	10. d

ICOG Convocation at Guwahati – AICOG 2010

By Dr. Mandakini Parihar and Dr. Suchitra Pandit

The ICOG CONVOCATION was held on 21st January 2010 at 5.00 p.m. at Hall "1" at the Sarusajai National Games Stadium, Guwahati, during the Annual Conference of FOGSI2010.

The Convocation began with the ceremonial Convocation parade led by Dr. Sanjay Gupte, President FOGSI &ICOG and Dr. Duru Shah, Chairman of ICOG. They were followed by the Chief Guest and other dignitaries of ICOG and all the new members, fellows & credit point winners along with the international fellows.

Once all the guests were seated, the convocation process began with Welcome address from Dr. Hema Divakar, secretary ICOG. She also outlined all the different advantages of becoming a member/fellow of the ICOG and gave a brief overview of the activities of ICOG. Dr. Sanjay Gupte, President FOGSI gave his presidential address and outlined his vision for 2010 and how ICOG can play a part in creating awareness and education. Dr. Duru Shah, chairman ICOG, gave the convocation address. She spoke on how education was the only way forward if we as a country need to progress and how it was a herculean task to have an education system that could reach out to the millions of children in our country. She mentioned that the greatest human achievement was in reducing suffering through quality healthcare and strong public education. She mentioned that The Indian College of Obstetricians and Gynecologists is playing an important role in strengthening maternal healthcare in the public sector by reaching out to the most distant students through the internet and through various programs such as 6 months Certification Courses, Ethiskills, Satellite school which are all part of the ICOG's educative initiative.

Dr. Duru Shah also highlighted the important activities of ICOG and informed the delegates about the Current Opinion Series being started by ICOG and announced that the first one will be held in Goa on PCOS and the syndrome X, from 19th-21st March 2010 in association with AEPCOS society.

The Chief Guest for the function was Professor Liselotte Mettler. Professor Mettler was introduced to the audience by Dr. P. K. Shah, Secretary General, FOGSI. She is currently the Head of Department of Ob-Gyn at Kiel university, where she pursues her extensive clinical work in fertility preservation in young cancer survivors. In her Chief Guest's address she gave an excellent talk on the newer advances in fertility preservation and future of endocospic surgery.

The much awaited Convocation ceremony by the Members and Fellows was after her talk. The MICOG and FICOG awards were given by Presided by Dr. Sanjay Gupte, President FOGSI and Dr. Duru Shah, Chairman, ICOG. Dr. Uday Nagarsekar and Dr. Hema Divakar also participated in giving the awards to the newly inducted Members and Fellows of ICOG, as well as 2 members who were awarded credit points.

This time around, there were a record number of new entrants to the Indian College of Obstetricians and Gynecologists. There were 36 new members, 49 fellows for MICOG/ FICOG respectively. 2 members were awarded credit point for all their academic achievements in the last 2 years.

Every year ICOG recognizes the contribution of stalwarts and friends from abroad and confers an honorary Fellowship on these invited guests. **This year there were 2 international fellows, who were given the honorary Fellowship of ICOG.- Dr. Rohana Hathathowa from Sri Lanka, President of the Sri Lankan College of Obs-**

Gyn and Dr. Ajay Rane From New Zealand, with special interest in Uro-Gynecology.

The Convocation was completed with the vote of thanks being given by Dr. Uday Nagarsekar. Dr. Suchitra Pandit and Dr. Mandakini Parihar were the Master of Ceremonies. The Convocation concluded with the National Anthem. The President and Chairman of ICOG then led the Convocation Parade back and all the Office bearers and Governing Council members stood to give an ovation to the newly inducted members and fellows as they came out of the Convocation hall.

The entire Convocation was truly an experience!!

ICOG CME Akola

Report of the Programme:

Submitted by:

Dr. Rajesh Modi	**Dr. Seema Tayade**
Program Co-ordinator	President, AOGS

The programme held on **20th December 2009 in Akola Endoscopy Centre & Hotel Centre Plaza** was highly successful with total 45 delegates who attended it with a good interaction. PCOS / Contraception were the highlights. Dr. P. K. Shah, Mumbai made a good impact on the audience. The study hour of PCOS was very highly appreciated, especially with the live demonstration of PCO on USG by Dr. P. K. Shah and live laparoscopic surgical demonstration of a PCO drilling procedure.

We also had presence of respected faculties from Nagpur, Amravati and other peripheral towns around Akola.

ICOG New Initiatives

ICOG Post Graduate Residential Review Course

by Dr. Duru Shah
Chairman ICOG
chairman.icog@gmail.com

I have felt the need for a "Post Graduate Review Course" under the banner of ICOG. The objective is to standardize a Review Course which postgraduates will identify with and will attend prior to appearing for their postgraduate exams. At present, there are various such excellent programs ongoing in the country, yet there seems to be a need for more. We plan to experiment with the first one at the end of April – early May this year. If this pilot is successful, we could carry out the Course in different zones, at different times, so that maximum number of students could benefit from it.

The first "ICOG Postgraduate Resdential Review Course" will be held between 30th April 2010 to 2nd May 2010 in Mumbai. This will be a 3 day intensive course between 8.00am to 8.00pm with only 50 students, all staying in the same venue where the course will be held. This Residential Course has been subsidized through an educational grant by MSD and aims to allow the students to get the maximum benefit in the shortest possible time.

I would like to thank our National and Zonal Advisors for their inputs and our Course Coordinator for all the efforts they have put in to initiate this activity.

National Advisors:	**Course Co-ordinator:**
Dr. Sanjay Gupte	Dr. Geetha Balsarkar
Dr. Uday Nagarseker	
Dr. Hema Divaker	
Zonal Advisors:	
South Zone:	Dr. V. P. Paily
North Zone:	Dr. Deepika Deka
West Zone:	Dr. Pankaj Desai
East Zone:	Dr. Ashish Mukhopadhyaya

Details of the Review course are available on the ICOG website " www.icogonline.org"
Registration forms can be downloaded from the website or available at the ICOG office
Course Content: can be checked out on the ICOG website www.icogonline.org
Registration for the same are open. The course fee is Rs. 3000/- for 3 days for Course material, and Accommodation and Meals, all inclusive.

Venue: West End Hotel, Opp. Bombay Hospital, Mumbai
Dates: 30th April, 1st & 2nd May, 2010
Fee: Rs. 3000/-

Cheque in favour of "F.O.G.S.I."
Submit to the ICOG office –
Model Residency Co-Op. Hsg. Society, 605, Bapurao Jagtap Marg, Jacob Circle, Mahalaxmi East, Mumbai 400 011.
If you have any queries, please write to us at: icog2005@rediffmail.com

Dr. Duru Shah
Chairman ICOG

Answers to MCQ of Page 7

1. d	6. c
2. False	7. False
3. c	8. b,c
4. c	9. b
5. False	10. a

The ICOG Online Quiz

There are various ways in which we can educate ourselves; through lectures, workshops, seminars and by just reading. A more interesting way to learn is to attempt a Quiz- it is challenging, stimulating and exciting!!

ICOG plans to have various learning Quiz's through the ICOG website. The first Quiz will be held online between 10th April to 10th May 2010 on the subject of "Contraception"

All postgraduate students and clinicians are invited to participate in this Quiz, sitting comfortably in their libraries, clinics or homes. This will be an innovative way of learning and every member who completes the Quiz is entitled to get 2 credit hours of academics and a score based on his / her performance.

The first 3 team winners with the highest scores amongst the Postgraduates will get great prizes such as 4 GB Pendrives. These are to be won only in the first month Quiz.

This will be a wonderful opportunity for all wanting to know more on the subject of "Contraception". So, get ready to go into cyberspace, log on to www.icogonline.org and attack the "ICOG Online Quiz!" The Quiz on "Contraception" will remain open online between 10th April to 10th May 2010. All details of how to participate are available on our website under "ICOG Online Quiz"

If this experience works well, we will plan a quarterly Quiz on various subjects. I would like to personally thank Dr. Indrani Ganguly and her team for all the efforts she has put in, in helping me develop the content for this first Quiz. I also wish to thank Dr. Sarita Bhalerao for promoting the Quiz.

If you have any queries, please write to us at: icog2005@rediffmail.com

Dr. Duru Shah
Chairman ICOG

Registration Form - Post Graduate Review Course

Name:

Institute:

Address for communication:

Email id.:

Mobile No.:

Tel. No.

Fees paid:

By Cash:

By Cheque: Cheque No. :

Bank name: Dated:

Date of Arrival for the Course:

Date of Departure from the Course:

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Abridged Prescribing Information

NuvaRing® (Ethinyl estradiol Ph. Eur + Etonogestrel) Contraceptive Vaginal Ring.

Composition: Each contraceptive vaginal ring contains: Etonogestrel 11.7 mg, Ethinylestradiol Ph. Eur. 2.7 mg, and Excipients :q.s. Form: Vaginal ring. NuvaRing is a flexible, transparent, and colorless to almost colorless ring, with an outer diameter of 54 mm and a cross-sectional diameter of 4 mm. Indications: Contraception. Posology and method of administration: How to use NuvaRing - The woman herself can insert NuvaRing in the vagina. The physician should advise the woman how to insert and remove NuvaRing. For insertion the woman should choose a position that is most comfortable for her, e.g. standing with one leg up, squatting, or lying down. NuvaRing should be compressed and inserted into the vagina until it feels comfortable. The exact position of NuvaRing in the vagina is not critical for the contraceptive effect of the ring. Once NuvaRing has been inserted (see 'How to start NuvaRing') it is left in the vagina continuously for 3 weeks. It is good habit for the woman to regularly verify the presence of NuvaRing. If NuvaRing is accidentally expelled, the woman should follow the instructions given in Section 'What to do if the ring is temporary outside the vagina' (for more information, see also Section 'Expulsion' in full prescribing information). NuvaRing must be removed after 3 weeks of use on the same day of the week as the ring was inserted. After a ring-free interval of one week a new ring is inserted (e.g. when NuvaRing is inserted on a Wednesday at about 22.00 h the ring should be removed again on the Wednesday 3 weeks later at about 22.00 h. The following Wednesday a new ring should be inserted). NuvaRing can be removed by hooking the index finger under the ring or by grasping the ring between the index and middle finger and pulling it out. The used ring should be placed in the sachet (keep out of the reach of children and pets) and discarded as described in the full prescribing information. The withdrawal bleed usually starts 2-3 days after removal of NuvaRing and may not have finished completely before the next ring insertion is due. How to start NuvaRing: No hormonal contraceptive use in the preceding cycle: NuvaRing has to be inserted on the first day of the woman's natural cycle (i.e. the first day of her menstrual bleeding). Starting on days 2-5 is allowed, but during the first cycle a barrier method is recommended in addition for the first 7 days of NuvaRing use. For Changing from a combined hormonal contraceptive, progestagen-only method, Following delivery or second-trimester abortion, Following delivery or second-trimester abortion deviation from the recommended regimen and how to shift periods or how to delay period, please refer to full version of Nuvaring prescribing information. **Contraindications:** NuvaRing should not be used in the presence of any of the conditions listed below. Should any of the conditions appear for the first time during the use of NuvaRing, it should be removed immediately: Presence or history of venous thrombosis, with or without pulmonary embolism; Presence or history of arterial thrombosis (e.g. cerebrovascular accident, myocardial infarction) or prodromi of a thrombosis (e.g. angina pectoris or transient ischemic attack); Known predisposition for venous or arterial thrombosis, with or without hereditary involvement such as Activated Protein C (APC) resistance, antithrombin-III deficiency, protein C deficiency, protein S deficiency, hyperhomocysteinemia and antiphospholipid antibodies (anticardiolipin antibodies, lupus anticoagulant); History of migraine with focal neurological symptoms; Diabetes mellitus with vascular involvement; The presence of a severe or multiple risk factor(s) for venous or arterial thrombosis may also constitute a contraindication (see under 'Special warnings and precautions for use' in the full prescribing information); Pancreatitis or a history thereof if associated with severe hypertriglyceridemia; Presence or history of severe hepatic disease as long as liver function values have not returned to normal, Presence or history of liver tumors (benign or malignant); Known or suspected malignant conditions of the genital organs or the breasts, if sex steroid-influenced; Undiagnosed vaginal bleeding; Known or suspected pregnancy; Hypersensitivity to the active substances or to any of the excipients of NuvaRing. Warnings and Precautions: If any of the conditions/risk factors mentioned below is present, the benefits of the use of NuvaRing should be weighed against the possible risks for each individual woman and discussed with the woman before she decides to start using it. In the event of aggravation, exacerbation or first appearance of any of these conditions or risk factors, the woman should contact her physician. The physician should then decide on whether NuvaRing use should be discontinued. All data presented below are based upon epidemiological data obtained with combined oral contraceptives (COC). No epidemiological data are available on vaginal route of administration for the hormones but the warnings are also considered applicable to the use of NuvaRing. 1. Circulatory Disorders: Epidemiological studies have suggested an association between the use of COCs and an increased risk of arterial and venous thrombotic and thromboembolic diseases such as myocardial infarction, stroke, deep venous thrombosis, and pulmonary embolism. These events occur rarely. Use of any combined oral contraceptive carries an increased risk of venous thromboembolism (VTE) compared with no use. The excess risk of VTE is highest during the first year a woman ever uses a combined oral contraceptive. This increased risk is less than the risk of VTE associated with pregnancy which is estimated as 6 cases per 10 000 pregnancies. VTE is fatal in 1-2% of cases. It is not known how NuvaRing influences the risk compared with other combined hormonal contraceptives. Extremely rarely, thrombosis has been reported to occur in other blood vessels, e.g. hepatic, mesenteric, renal, cerebral or retinal veins and arteries, in COC users. There is no consensus as to whether the occurrence of these events is associated with the use of COCs. Symptoms of venous or arterial thrombosis can include: unusual unilateral leg pain and / or swelling; sudden severe pain in the chest, whether or not it radiates to the left arm; sudden breathlessness; sudden onset of coughing; any unusual, severe, prolonged headache; sudden partial or complete loss of vision; diplopia; slurred speech or aphasia; vertigo; collapse with or without focal seizure; weakness or very marked numbness suddenly affecting one side or one part of the body; motor disturbances; 'acute' abdomen. 2.Tumors: The most important risk factor for cervical cancer is persistent human papilloma virus (HPV) infection. Epidemiological studies have indicated that long-term use of COCs contributes to this increased risk, but there continues to be uncertainty about the extent to which this finding is attributable to confounding effects, like increased cervical screening and difference in sexual behavior including use of barrier contraceptives, or a causal association. It is unknown how this effect relates to NuvaRing. A meta-analysis from 54 epidemiological studies reported that there is a slightly increased relative risk (RR = 1.24) of having breast cancer diagnosed in women who are currently using COCs. The excess risk gradually disappears during the course of the 10 years after cessation of COC use. Because breast cancer is rare in women under 40 years of age, the excess number of breast cancer diagnoses in current and recent COC users is small in relation to the overall risk of breast cancer. The breast cancers diagnosed in ever-users tend to be less advanced clinically than the cancers diagnosed in never-users. The observed pattern of increased risk may be due to an earlier diagnosis of breast cancer in COC users, the biological effects of COCs or a combination of both. In rare cases, benign liver tumors, and even more rarely, malignant liver tumors have been reported in users of COCs. In isolated cases, these tumors have led to life-threatening intra-abdominal hemorrhages. Therefore, a hepatic tumor should be considered in the differential diagnosis when severe upper abdominal pain, liver enlargement or signs of intra-abdominal hemorrhage occur in women using NuvaRing. For other conditions, medical examinations, reduced efficacy, reduced cycle control, male exposure to ethinylestradiol and etonogetsrel, broken rings, expulsion and interactions, use during pregnancy, please refer full prescribing information. Undesirable effects: The most serious undesirable effects associated with the use of hormonal contraceptives are listed in Section warnings and precautions. Adverse drug reactions that have been reported in users of NuvaRing are listed in the full prescribing information. The common (1/100) adverse drug reactions are vaginal infection, depression, decreased libido, headache, migraine, abdominal pain, nausea, acne, breast tenderness, female genital pruritus, dysmenorrhoea, pelvic Special precautions for storage: Prior to dispensing: 36 months, store in a refrigerator (2 °C - 8 °C). At the time of dispensing: The dispenser places a date of dispensing on the packaging. The product should not be inserted after 4 months from the date of dispensing or the expiry date, whichever comes first. After dispensing: 4 months, do not store above 30 °C. pain, vaginal discharge, increased Weight, medical device discomfort, vaginal contraceptive device expulsion. For more information on undesirable effects please refer to full prescribing information.

References: 1. Timmer CJ et al. Clin Pharmacokinet. 2000;39:233-242 **2.** Szarewski A. Eur J Contracept Reprod Health Care. 2022;7(suppl 1):31-36

To receive the NuvaRing product sample and information booklet, contact our customer service.

Customer Service : Call 1800 209 7464 (Toll- free) | SMS RING to 56070 | www.nuvaring.md

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