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MEDICAL NEWS

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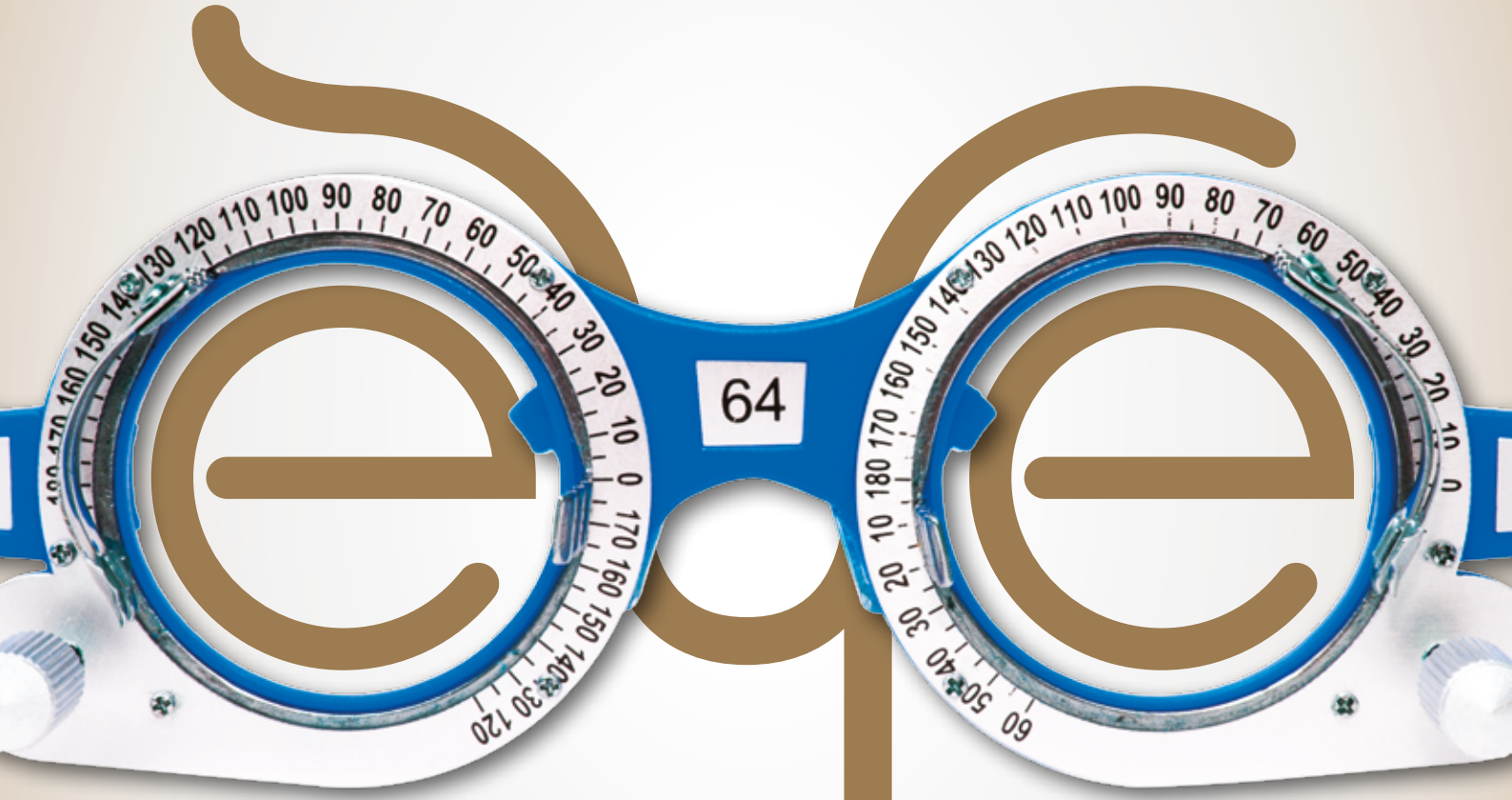

FOCUS: EYE

- Updates in Detection and Treatment of Diabetic Retinopathy in Singapore
- Thyroid Eye Disease: A Brief Overview
- Childhood Myopia and the Use of Atropine Eye Drops

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Updates in Detection and Treatment of Diabetic Retinopathy in Singapore

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Diabetes affects approximately 1 in 12 Singaporeans aged 18 to 69 years, and in absolute terms there are more than 300,000 persons with this chronic debilitating disease. This figure is likely to increase further because of Singapore's ageing population and increasing prevalence of diabetes risk factors, such as obesity and sedentary practices.

Diabetic Retinopathy (DR) is the most common microvascular complication of diabetes and the leading cause of vision loss in working-aged adults worldwide. Diabetic retinopathy is characterised by changes in the retina including haemorrhages, microaneurysms, arteriolar and venular dilatation. These have a progressive nature eventually leading to areas of retinal non-perfusion, increased vasopermeability with retinal oedema and exudates, and pathologic proliferative of intraocular blood vessels resulting in haemorrhage, tractional retinal detachment or neovascular glaucoma all of which contribute to visual impairment and blindness.

EPIDEMIOLOGY OF DIABETIC RETINOPATHY

The Singapore Epidemiology of Eye Diseases (SEED) study group consisted of three population-based eye studies that examined the epidemiology of eye diseases in the three major ethnic groups, the Malays (SiMES), the Indians (SINDI) and the Chinese (SCES). The overall age-standardised prevalence figures of any DR, and other more severe stages of DR such as diabetic macular oedema (DME), and vision-threatening retinopathy (VTDR), were found to be 28.2%, 7.6%, and 7.7% respectively, among persons with diabetes.

Comparing the prevalence of DR between ethnic groups, Indians with diabetes were found to have a high prevalence of DR and DME *(Table 1)*. Even after adjusting for known risk factors for DR and socioeconomic status, Indians had a 50% higher risk of diabetic retinopathy (p=0.002) compared to Chinese with diabetes.

Vision loss from DR is largely related to two late-stage conditions: diabetic macular oedema (DME) and proliferative diabetic retinopathy (PDR). However, the number of people with PDR has markedly reduced over the last three decades due to improved systemic management of diabetes, early detection of retinopathy through screening programs, and timely laser treatment.

Thus, DME has now overtaken PDR as the most frequent cause of visual impairment among persons with diabetes in developed countries. In our own study population, 7.6% of diabetics had DME compared with 3.8% for PDR.

Table 1
Age-standardised prevalence of Diabetic Retinopathy from the Singapore Epidemiology of Eye Diseases Study

	Overall (n=2,874)	Chinese (n=581)	Malay (n=1,006)	Indian (n=1,287)	p
Any DR	**28.2**	**26.1**	**25.2**	**30.2**	**0.020**
Proliferative DR	3.8	3.5	3.3	3.7	–
CSME	**6.4**	**5.9**	**4.6**	**7.2**	**0.027**
VTDR	7.7	6.9	6.2	8.5	0.098
DME	**7.6**	**6.0**	**5.4**	**9.3**	**0.001**

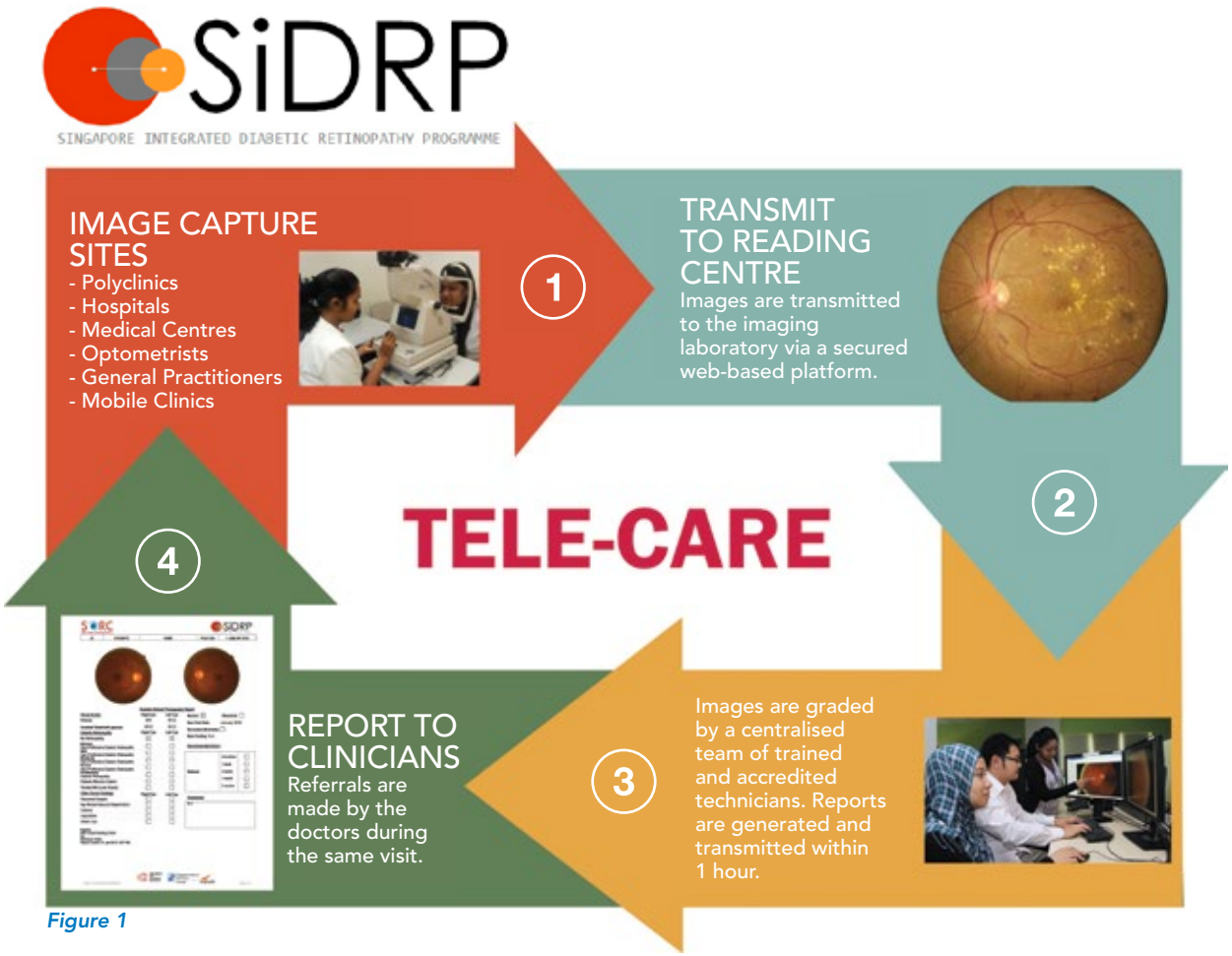

Figure 1

SCREENING FOR DIABETIC RETINOPATHY

Regular retinal examination is the cornerstone of effective diabetes management aiming to detect DR before it causes visual loss so that effective treatment can be given.

Studies in Sweden, Iceland and the United Kingdom have found as much as a two-thirds reduction of diabetes-related blindness after implementation of a national diabetic retinopathy screening program. The Singapore Ministry of Health (MOH) guidelines recommend that people with diabetes be screened annually for diabetic eye disease, or referred for tertiary care for those with evidence of the disease.

Retinal photography is the main screening tool used for diabetic retinopathy, since it would not be feasible to have all 300,000 diabetics visit an ophthalmologist annually. The diabetic retinal photography program in Singapore was implemented in the polyclinics in 1990. These early cameras provided a single-field printed photograph of posterior pole of the retina, which was read by family physicians.

The Singapore Integrated Diabetic Retinopathy Programme (SiDRP) was implemented as an innovative telemedicine model to optimise screening for DR at the primary care level. The SiDRP uses digital cameras to capture two-field retinal photographs for each eye which are transmitted electronically to a reading centre.

The images are then graded by a centralised team of trained and accredited technicians, and reports are generated within an hour and sent to the patients' clinician who will subsequently make appropriate referrals to tertiary eye care based on the findings and recommendations *(Figure 1)*.

The SiDRP program started out initially as a pilot project in Outram and Bukit Merah Polyclinic in 2010 with one reading centre at Singapore National Eye Centre (SNEC) / Singapore Eye Research Institute (SERI). It has subsequently been expanded to all 18 clinics nationwide with two reading centres, one at SNEC and the other at the National Healthcare Group (NHG) Eye Institute in 2016.

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Tighter control of glycaemia (HbA1c 7%) reduces the risk of development and progression of diabetic retinopathy in both type 1 and type 2 diabetes.

In addition, today, we provide telemedicine diabetic retinopathy grading service for other primary healthcare facilities including the six community health centres, family medicine centres, Endocrinology clinics at restructured hospitals [Changi General Hospital (CGH), KK Women's and Children's Hospital (KKH), National University Hospital (NUH) and Singapore General Hospital (SGH)] and other organisations such as the Diabetic Society of Singapore and Singapore Anti-Tuberculosis Association (SATA), which provide access to patients who receive their diabetes care outside of the polyclinic network.

CHANGES IN THE TREATMENT PARADIGM

Systemic Treatment

The most effective treatment for diabetic retinopathy is prevention and this involves the optimisation of systemic risk factors. Hyperglycaemia is the key initiator in the pathogenesis and development of diabetic retinopathy.

The Diabetes Control and Complications Trial (DCCT) and the United Kingdom Prospective Diabetes Study (UKPDS) are the key studies providing definitive evidence that tighter control of glycaemia (HbA1c 7%) reduces the risk of development and progression of diabetic retinopathy in both type 1 and type 2 diabetes, with each percent reduction in HbA1c (e.g. from 9% to 8%) lowering the risk of retinopathy by 30% to 40%.

Recent analysis from the UKPDS and DCCT have suggested that the protective effect of intensified blood glucose control, especially early in disease, has a sustained effect over time. This 'metabolic memory' effect persists even if glycaemic control is less intensive later in the course of disease.

In the UKPDS, at 10 years after the end of the trial, although the between group differences in glycated haemoglobin levels were lost after the first years, in the intensively treated group, the relative risk reduction persisted at 24% for microvascular disease compared with the less intensive group.

Blood pressure control remains the second key pillar of DR prevention with each 10 mmHg increase in systolic blood pressure associated with an approximately 10% excess risk of early diabetic retinopathy and a 15% excess risk of proliferative retinopathy, and in the UKPDS, tighter blood pressure control reduced the risks of retinopathy progression by about one-third, visual loss by half, and need for laser treatment by one-third in people with type 2 diabetes.

Clinical trials have shown that renin-angiotensin system inhibitors may reduce the incidence and progression of diabetic retinopathy beyond their blood pressure-lowering effects compared with other anti-hypertensive drugs.

Observational studies support a role for dyslipidaemia in the pathogenesis of diabetic retinopathy. The Fenofibrate Intervention and Event Lowering in Diabetes (FIELD) trial showed that fenofibrate, a lipid-modifying agent, reduced the need for laser treatment of vision-threatening diabetic retinopathy by 31% in patients with type 2 diabetes over five years.

The Action to Control Cardiovascular Risk in Diabetes (ACCORD) study reported a 40% reduction in the odds of having progression of retinopathy over four years afforded by fenofibrate combined with simvastatin, compared with simvastatin alone, further supporting the efficacy of fenofibrate in reducing the progression of diabetic retinopathy. Importantly, these effects were independent of the changes to the lipid profile.

In Singapore, the MOH diabetes clinical guidelines recommend consideration be given to the use of fenofibrate to retard diabetic retinopathy (level B evidence). The Health Sciences Authority also recently approved micronised fenofibrate (Lipanthyl, Abbott) for the indication of reduction in the progression of diabetic retinopathy in patients with type 2 diabetes and existing diabetic retinopathy.

Management of DME and DR

DME is characterised by exudative fluid accumulation at the macula, the area of the retina responsible for sharp central vision. DME can occur at any stage of DR, although the risk of DME increases with increasing DR severity. The clinical signs of DME include hard exudates with microaneurysms and blot haemorrhages within one disc diameter of the centre of the macula *(Figure 2)*.

Optical Coherence Tomography (OCT) is a new imaging modality using low coherence interferometry to provide a non-contact non-invasive optical 'biopsy' of the retina, allowing objective qualitative and quantitative assessment of DME. OCT presents data on retinal thickness *(Figure 2)*, and can also be used to qualitatively identify DME based on morphological features, such as intraretinal fluid, intraretinal cysts, and subretinal fluid. OCT is better than clinical slit lamp biomicroscopy and fundus photography for the assessment of mild DME and has become the standard for diagnosis and monitoring of DME.

Since the ETDRS study was published in the 1990s, macular focal/grid laser therapy has been the gold-standard treatment for DME. In the past decade, Vascular endothelial growth factor (VEGF) has been found to be a key mediator of DR and DME. With the emergence of anti-VEGF drugs, there has been a major paradigm shift in the ocular management of DME.

Monthly intraocular injections of drugs targeting VEGF have been shown in a number of randomised controlled trials to conclusively result in better visual outcomes than that of traditional laser therapy for centre involving DME.

There are currently three commonly used anti-VEGF drugs with efficacy proven in clinical trials for treating DME, ranibizumab, aflibercept and bevacizumab, which are injected trans-sclerally (trans pars plana) into the vitreous cavity with a

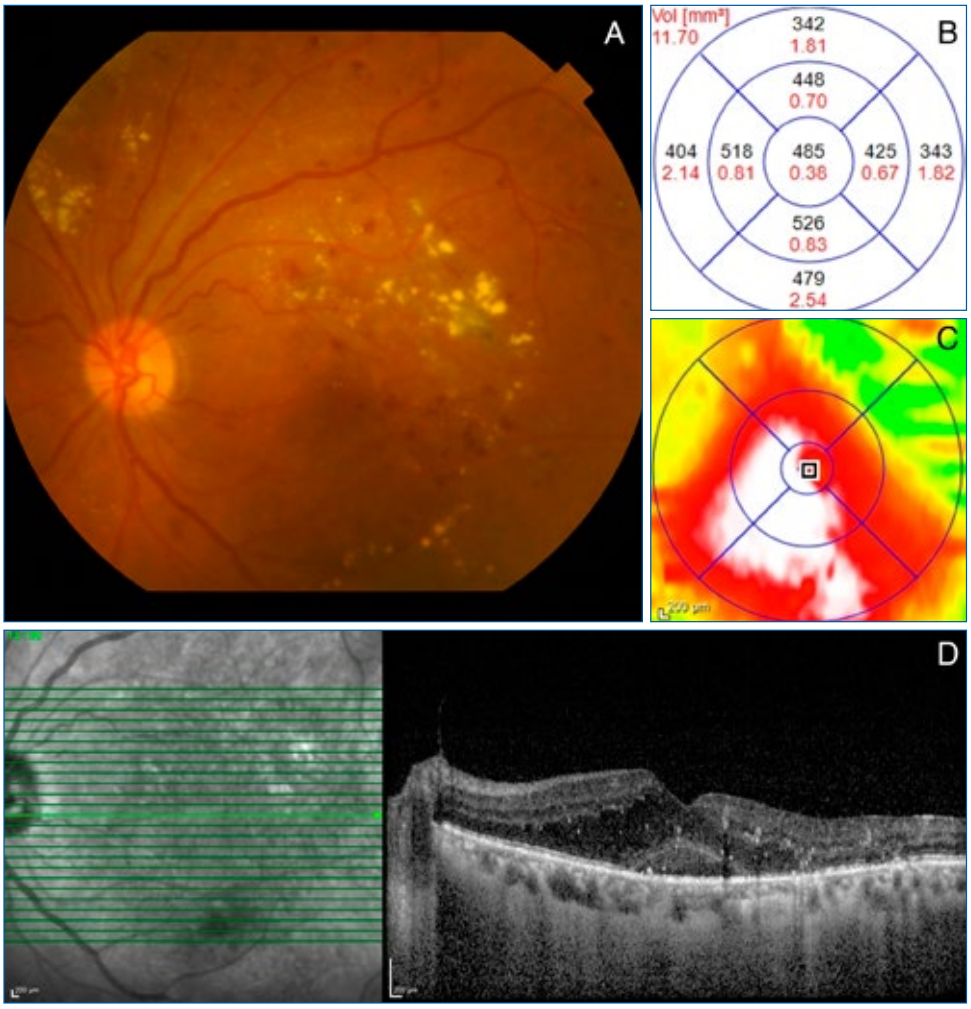

Figure 2

Panel A: Clinical and OCT features of DME: Diabetic macular oedema is a clinical diagnosis based on stereoscopic examination of the macula identifying retinal thickening, hard exudates, microaneurysms, dot and blot haemorrhages. DME can be quantitatively assessed using optical coherence tomography.

Panel B: Quantitative thickness and volume map of macula.

Panel C: Overall topography of the macula.

Panel D: Horizontal cross-sectional images of the macula demonstrating intraretinal thickening and subretinal fluid.

small gauge needle. The former two drugs were specifically designed and approved for ocular use, while the latter is a cancer drug used on an off-label basis for the treatment of retinal vascular diseases.

Although, the use of bevacizumab is off-label, it is one of the most widely-used anti-VEGF drugs globally for ocular diseases, because it has proven efficacy for DME and age-related macular degeneration in randomised control trials and it is far cheaper than the other alternatives.

Multiple monthly injections are usually required to treat the oedema, and laser can be used as an adjuvant treatment *(Figure 3)*. A recent randomised control trial compared the efficacy of the three commonly used anti-VEGF agents for DME and found that at one year and two years, all three drugs were effective with improvement of visual acuity from baseline and a decreased number of injections in year 2. Among eyes with worse vision at the start of the study, aflibercept had superior two-year visual outcomes compared with bevacizumab.

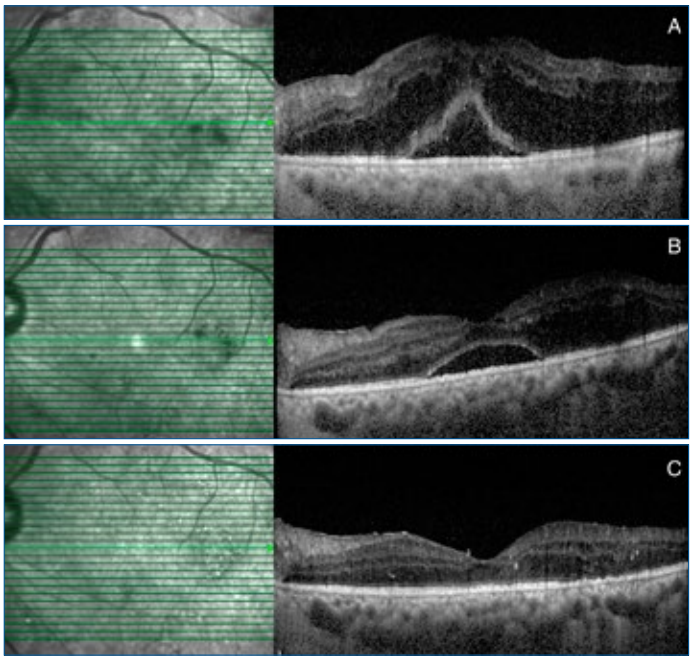

Figure 3
Panel A: OCT changes in response to anti-VEGF treatment: Centre involving diabetic macular oedema. Intraretinal and subretinal fluid pre-treatment.

Panel B: Reduction in retinal fluid and thickness after the first intravitreal anti-VEGF injection.

Panel C: Resolution of central macular thickening after six injections and deferred macular laser.

Anti-VEGF are an effective treatment for DME – however, the cost of treatment, which is up to thousands of dollars per injection, and the burden of monthly intravitreal injections remain significant. Laser will still have a role in the treatment of non-centre involving DME and as an adjuvant to intravitreal anti-VEGF injections.

There is recent evidence that anti-VEGF injections can reduce the progression of DR and even lead to regression of DR when used in the treatment of DME. A randomised clinical trial comparing pan retinal photocoagulation (PRP) and intravitreal ranibizumab found that among eyes with proliferative diabetic retinopathy, treatment with ranibizumab resulted in visual acuity that was non-inferior to (not worse than) PRP treatment at two years.

However, the ranibizumab group required a median of 10 injections over two years compared with one to three sessions of laser in the PRP group, and there is no evidence to when anti-VEGF injection can be stopped, and what will happen to the DR after stopping injections. The significant cost and burden of such intravitreal injections make it currently unlikely that it will replace PRP as the standard of care.

CONCLUSION

Diabetic retinopathy is an important cause of visual loss in Singapore and affects 30% of those with diabetes. Prevention of DR with systemic control remains key and the addition of fenofibrate may play a role.

Screening for DR in diabetics is essential to prevent visual loss. The SiDRP, a new telemedicine DR screening program should improve access to DR screening across Singapore.

Intraocular injections of anti-VEGF drugs have emerged as the gold standard for the treatment of centre involving DME, however, the cost and burden of monthly treatment is a significant public health issue and a barrier to optimal care.

Dr Gavin Tan is a Consultant in the Surgical Retina Department and Retina Centre of the Singapore National Eye Centre (SNEC). He completed multiple vitreo-retinal fellowships at SNEC, the Byers Eye Institute at Stanford University and Jules Stein Eye Institute at the University of California Los Angeles (UCLA). He is actively involved in academic research and leads multiple clinical trials at the Singapore Eye Research Institute (SERI). His major clinical and research interest is in the field of diabetic retinopathy.

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Thyroid Eye Disease: A Brief Overview

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Graves' ophthalmopathy is the most common cause of orbital disorder in adults and develops in up to 50% of patients with Graves' disease.[1] It is an autoimmune process that is progressive but self-limited, with a variable course extending over one to three years generally. Young or middle-aged women are typically affected and the orbital disease usually develops within one year from the onset of hyperthyroidism *(Figure 1)*.[2]

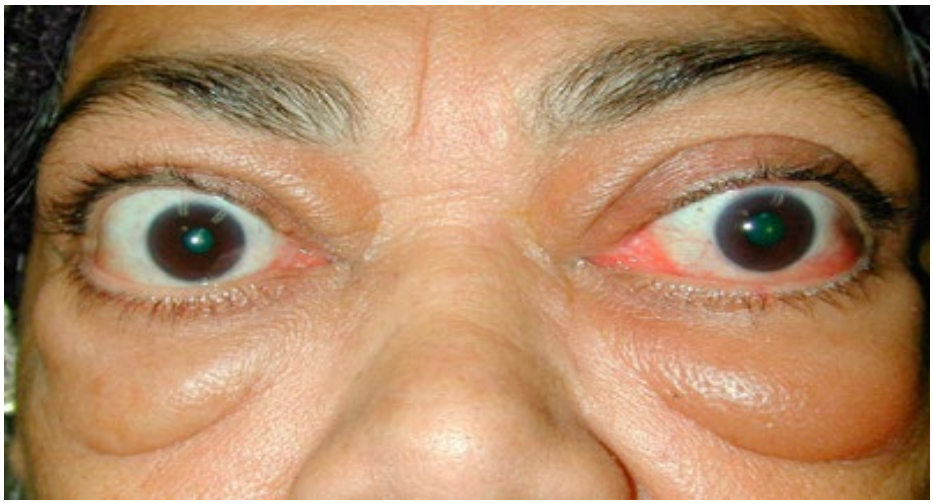

Figure 1 Clinical signs of thyroid eye disease – proptosis, upper and lower eye lid retraction and swelling.

Young or middle-aged women are typically affected and the orbital disease usually develops within one year from the onset of hyperthyroidism.

Most Graves' ophthalmopathy (GO) patients can be managed medically. Surgery has a specific role with regards to rehabilitation and in vision-threatening cases refractory to medical therapy.[2]

PATHOPHYSIOLOGY OF DISEASE

GO is composed of mechanical, immunological and cellular processes, each having an effect on the other in a cyclical manner. The associated histopathologic changes seen in GO are as follows: there is increased volume of the extraocular muscles, orbital connective tissue and orbital fat.[3] The extraocular muscles are oedematous due to increased production of glycosaminoglycans (GAGs), in particular hyaluronanic acid[4] within the orbital tissue; a marked infiltration of immunocompetent cells (predominantly T lymphocytes, macrophages and to a lesser extent, B lymphocytes) is detectable.[5] Infiltrating T lymphocytes are mainly T helper cells (CD4+).[6]

According to a widely-accepted pathogenetic hypothesis[3], autoreactive T lymphocytes, recognising an antigen shared by the thyroid and the orbit, infiltrate the orbital tissue and the extraocular muscles. The TSH-receptor (TSH-R) has been isolated in the orbital fibroblasts of normal individuals and patients with GO.[7] The primary cellular function of fibroblasts appears to be synthesis of GAGs and enzymes necessary for GAG remodelling and degradation.[8]

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ASSESSMENT AND TREATMENT OF THYROID EYE DISEASE

In the early stages of the condition, patients may only complain of dry eyes, eye lid swelling or puffiness. An early sign of GO is upper or lower eye lid retraction. As the condition progresses, patients can subsequently develop proptosis and a squint (from enlargement and restriction of the recti muscles) *(Figure 2)*.

The diagnosis of GO is made from a combination of the clinical signs elicited, the results of the thyroid function tests, the thyroid autoantibodies, as well as the findings of the orbital computed tomography scan in a patient with Graves' disease *(Figure 3)*.

For the ophthalmic assessment of a patient with GO, it is paramount to first determine the visual function of the patient. This includes checking the visual acuity using the Snellen chart, pupillary light reflexes, colour vision and visual fields.

The clinical activity score for the patient is collated by looking at the parameters of lid swelling and injection, chemosis and conjunctival injection, caruncular swelling, pain on eye movement and pain at rest. Each of these individual parameters is given one point and if the patient has a total score of 4 or more, the inflammation in the orbit is active and the patient will be indicated for pulsed intravenous methylprednisolone therapy.

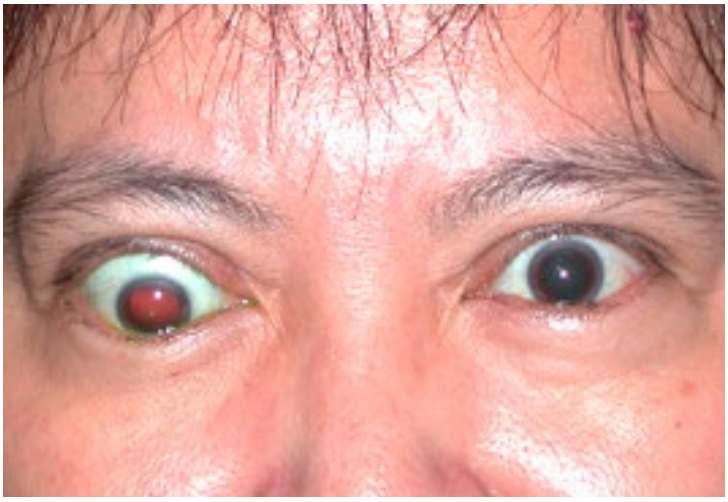

Figure 2
Patient with proptosis, eye lid retraction and strabismus due to thyroid eye disease.

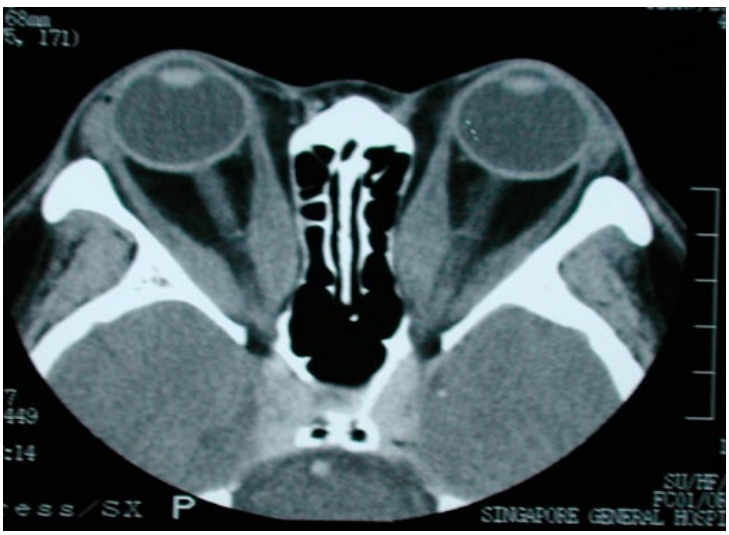

Figure 3
Computed tomography scan of the orbits showing enlarged recti muscle bellies typically seen in thyroid eye disease.

During the active phase of the disease, sight-threatening complications such as compressive optic neuropathy, glaucoma and corneal ulcers due to exposure will be actively excluded and if present, aggressively managed. When the patient enters the quiescent phase of the disease, the functional status and the cosmetic appearance of the patient will be thoroughly evaluated.

Surgical rehabilitation including orbital decompression for disfiguring proptosis, squint surgery for double vision, and eye lid surgery for lid retractions can be considered. Patients with mild disease such as dry eyes will only require ocular lubricants and conservative measures.

For the patient's systemic control, maintenance of the euthyroid state is important to prevent progression of GO.[9] Radioactive Iodine therapy may carry a small risk of the development or worsening of GO, particularly in susceptible patients.[10] These adverse effects can be prevented with the concomitant administration of oral steroids.[9] A three-month course of oral prednisolone is recommended for patients with high-risk profiles.

Finally, all patients with Graves' disease who are smokers should be strongly encouraged to stop smoking. There is strong evidence that smoking cessation is useful in the primary, secondary and tertiary prevention of Graves' ophthalmopathy as it can profoundly influence the occurrence and the course of eye disease, and also impair its response to treatment.[11-15]

WHEN TO REFER TO A SPECIALIST

Dry eyes and lid puffiness are the most common manifestations of thyroid eye disease, and can be managed expectantly or with symptomatic treatment (such as artificial tears).

However, active orbital inflammation, or moderate to severe thyroid eye disease would warrant a referral to the ophthalmologist for assessment and further treatment. Maintenance of euthyroid status and smoking cessation are important to control thyroid eye disease.

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Childhood Myopia and the Use of Atropine Eye Drops

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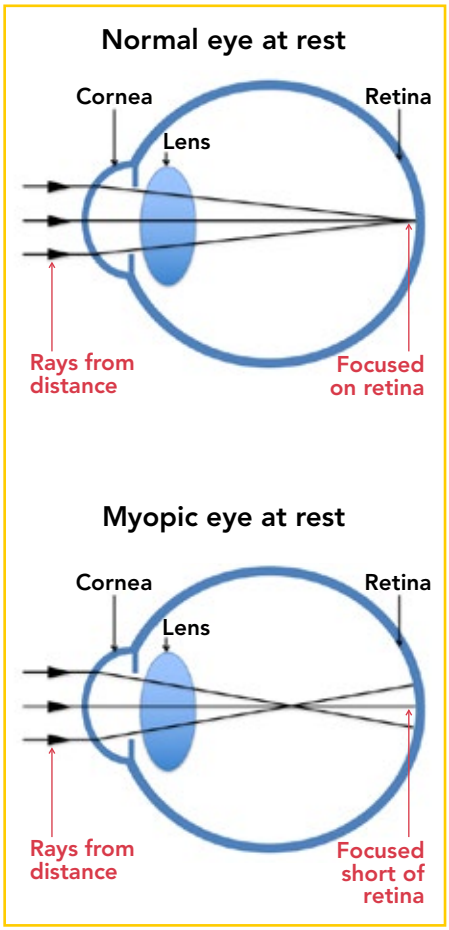
Childhood myopia, otherwise known as short-sightedness or near-sightedness, is the condition of the eye when distance vision is more blurred compared with near vision. It tends to increase rapidly between 5 and 15 years old, and usually stabilises by the early twenties. In Singapore, 10% of kindergarten children, 60% of primary 6 students, and 80% of 18-year-olds are myopic.

WHAT CAUSES MYOPIA?

Myopia arises from the excessive growth with elongation of the eyeball. This results in light rays from distant objects focusing in front of the retina instead of on the retina. Distant objects are thus seen to be blurred but near objects remain clear.



MYOPIA: RISK FACTORS AND COMPLICATIONS

The exact cause of myopia is not known, but certain risk factors increase the likelihood of myopia, such as:

- **Genetics**. The risk of developing myopia is higher if one (2 times more) or both (8 times more) parents are myopic. In addition, increasing severity of parental myopia leads to a greater risk of myopia.[1,2]

- **Environmental.** Lack of outdoor activities and excessive near work like reading, playing games on handheld electronic devices or computers, and watching television expose one to the risk of developing myopia.[3]

Other than the inconvenience of having to wear spectacles, myopia may be associated with complications such as:

1. **Retinal tears and detachment.** The eye with high myopia is excessively elongated, resulting in thinner retina. This puts the eye at greater risk of developing a retinal tear, hole or detachment. Retinal detachment requires urgent treatment, as unless the detached retina is promptly reattached, there can be permanent loss of vision in the affected eye.

2. **Macular degeneration.** Severe myopia such as more than 10 dioptres (1,000 degrees) may be associated with macular degeneration. The macula is the central part of the retina that gives the clearest vision. Macular degeneration causes difficulties with reading, watching TV and recognising people's faces.

3. **Cataract.** Myopia is associated with earlier onset of cataract, which is opacity or *clouding of the lens* that causes blurring of vision.

4. **Glaucoma.** Glaucoma is associated with *increased fluid pressure* within the eyeball. Severe myopia increases the risk of developing glaucoma, which left untreated over time can cause blindness. Glaucoma is often symptomless; causing poor vision gradually, and therefore called a 'thief of sight'.

PREVENTION OF MYOPIA AND MYOPIC PROGRESSION

Spectacles, contact lenses and refractive surgery can help to bring distant objects into focus. However, they do not cure myopia, as the eye is still elongated, retaining the same risk of retinal detachment, macular degeneration, etc. Therefore, prevention of myopia and delaying its progression early in life are important steps in management of myopia.

Environmental modification

Children should be encouraged to adopt good eye care habits from a young age, even before they develop myopia. It is important to restrict time spent on near work and to take frequent 'eye breaks' by looking out into the far distance every 20 to 30 minutes. This breaks any accommodative (focusing for near) spasm and helps relax the eyes.[4] Outdoor activities should be en-

couraged as natural daylight appears to be protective against myopia, and children who spend plenty of time outdoors are less likely to be myopic.[3]

Use of atropine eye drops

There is currently no cure for myopia, but atropine eye drops have been prescribed for slowing down the progression of myopia in children since the 1960s. Higher-dose 1% atropine eye drops have been used to treat myopia at the Singapore National Eye Centre (SNEC) since the 1990s.

Studies have shown that it slows myopia progression by 80% over a two-year period, but is also associated with uncomfortable side effects like glare and blurring of near vision due to dilation of the pupils and paralysis of the ciliary muscle of the eye.

As a result, children on 1% atropine eye drop treatment often require photochromatic or sunglasses with UV filter, and a progressive or reading add in their glasses. Other possible side effects are often mild and temporary e.g. dry eyes and eye allergy. The more severe systemic side effects of atropine like palpitations, confusion, dry mouth, high fever, etc are extremely rare.

More recently, **low-dose 0.01% atropine eye drops have been shown to be effective in slowing down myopia by 50% to 60% over two years** *(Figure 1)*.[5] The effect of low-dose atropine appears to build up over time, with more profound effects in the second year than the first.

At five years, it has been shown to be more effective in slowing down myopia progression with less visual side effects compared to the higher doses of atropine eye drops.[6] As it causes minimal increase in pupil size, children do not require tinted or reading add in their glasses. They are also less likely to have the other side effects associated with the higher-dose atropine.

However, myopia progression may still occur in some children, and if rapid, they may then need to be converted to a higher dose of atropine. Unfortunately, in 10% of children, myopia may continue to progress rapidly even with the higher-dose atropine.

Figure 1 Low-dose atropine 0.01% eye drops that are used to slow down myopia progression at the Singapore National Eye Centre.

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Dr Deborah Tan is currently an Associate Consultant at the Singapore National Eye Centre (SNEC). She graduated from the Yong Loo Lin School of Medicine at the National University of Singapore and completed her ophthalmology residency at SNEC. She has been elected as a Fellow of the College of Surgeons of Edinburgh and Fellow of Academy of Medicine of Singapore, and is currently undergoing fellowship training in Paediatric Ophthalmology at SNEC.

GPs can call for appointments through the GP Appointment Hotline at **6322 9399** or scan the QR code for more information.

Liver Transplant Programme at SingHealth Transplant

The first liver transplant at the Singapore General Hospital was performed on 15 February 2006. One of nine transplant programmes under SingHealth Transplant, the Liver Transplant Programme has since then grown to become an established clinical programme. The services include deceased-donor liver transplants as well as living-donor liver transplants. To-date, the service has performed more than 80 life-saving transplants for patients with acute liver failure, end-stage liver disease and liver cancer (hepatocellular carcinoma).

In addition, the liver transplant team cares for and manages the health of more than 110 pre- and post-transplant patients. With the dedication and hard work of the multidisciplinary team, most patients are able to return to work and lead good quality lives.

TYPES OF LIVER TRANSPLANTATION

Deceased-donor liver transplant

A deceased-donor liver transplantation is when the recipient's diseased liver will be replaced entirely by whole liver from a recently deceased donor.

Living-donor liver transplant

A living-donor liver transplantation is when a live person donates part of his/her healthy liver to replace the recipient's diseased liver. After the transplant, the liver in both the donor and recipient will regenerate itself, close to full size.

OUR SERVICES

- Pre-transplant evaluation and care of recipients and living donors
- Adult deceased-donor liver transplant
- Adult living-donor liver transplant
- Post-transplant care of recipients and living donors

INDICATIONS FOR LIVER TRANSPLANT

Indications for liver transplant include:

- Acute Liver Failure
- Liver Malignancy
- Chronic Non-Cholestatic Liver Diseases
- Chronic Cholestatic Liver Diseases
- Metabolic Liver Diseases
- Biliary Atresia

WHAT DOES THE TRANSPLANT OPERATION INVOLVE?

Recipient: The diseased liver (end-stage liver failure from cirrhosis, fulminant liver failure, liver cancer) is removed and a healthy liver is transplanted in its place. Sophisticated monitoring and anaesthesia and surgical techniques have evolved to ensure 85% to 90% success rate in liver transplantation. All recipients will require immunosuppression to prevent rejection of the new liver graft and by one year are on monotherapy for the prevention of rejection.

Donor (for living-donor liver transplant): The donor's liver is split by the surgeons and one portion is removed for transplant into the recipient. Donor's liver will regenerate to full size a couple of weeks after surgery. There is no long-term risk of impaired liver function for the donor. Donors usually spend a week in the hospital to recover. Full recovery will take up to three months.

The SingHealth Duke-NUS Liver Transplant Centre

The SingHealth Duke-NUS Liver Transplant Centre was established in 2015 to further clinical service, education and research in liver transplant.

Led by Dr Jeyaraj Prema Raj, the centre brings together specialists from Singapore General Hospital (SGH) and National Cancer Centre Singapore (NCCS) into an integrated condition-based multidisciplinary centre. It brings together specialists from General Surgery/Hepato-Pancreato-Biliary Surgery, Gastroenterology and Hepatology, and allied health specialists, dedicated to enhancing care for liver transplant patients.

For more information, please contact
SingHealth Transplant at:

Tel: **6326 5194**
Fax: **6220 0730**
Email: **singhealth.transplant@singhealth.com.sg**
Website: **www.singhealth.com.sg/transplant**

More than Meets the Eye

Aside from lubricants, dry eye patients need a holistic management

Dry Eye Syndrome (DES) is a prevalent ophthalmic condition adversely affecting up to 80 per cent of the population over the age of 80. It has potential debilitating effects on specific segments of the population such as contact lens wearers, postmenopausal women, and patients who have undergone refractive surgeries or who suffer from autoimmune disorders.

Patients are likely to have the symptoms but not all will be aware that they are suffering from dry eyes. That is because dry eye symptoms may be as varied as dryness, redness, heavy eyelids, blurry vision, grittiness, watery eyes, discomfort in air-conditioned places and tiredness following prolonged visual tasks.

Assoc Prof Louis Tong, Senior Consultant, Corneal and External Eye Disease Service, Singapore National Eye Centre (SNEC) and his team studied more than 3,000 participants who were given standardised questionnaires and clinical examinations, which revealed that about half the Malay population in Singapore have meibomian gland dysfunction, a cause of symptomatic dry eyes. The study also found that people with dry eyes have more difficulty with daily tasks such as recognising friends, reading road signs and driving at night than those who did not.

The dry eye study was done as part of the Singapore Malay Eye Study, with similar studies on Singapore Chinese and Indians still being analysed. Assoc Prof Tong, who is also a clinical scientist at Singapore Eye Research Institute, said he would not be surprised if the findings of all races are similar. This urges the need for primary care providers to take a vested approach in treating this condition as it is highly prevalent in the local Asian population and heavily affects the patient's quality of life.

Once a patient is identified with dry eye, primary care physicians should take a holistic approach in managing these patients as the condition can often only be controlled rather than cured, and patients need to develop realistic expectations from the treatment, believes Assoc Prof Tong.

In a review article in the Proceedings of Singapore Healthcare, Assoc Prof Tong gives a breakdown of the benefits and limitations of the various over-the-counter lubricants which is the mainstay first line treatment for dry eye. He also highlights the importance of minimising lifestyle triggers such as contact lens wear, smoking and alcohol consumption as well as spending less time in air-conditioned or dry places. Poor sleep is also associated with dry eyes.

When recommending topically-administered lubricants, because there is a wide range in the market, each differing in viscosity, osmolarity, pH and presence of preservative, a 'trial-and-error' approach may be necessary to find one that is most suited for a patient. Recalcitrant cases where symptoms don't improve however should be referred to an ophthalmologist.

"General practitioners should also be on the lookout for and refer patients with common systemic illnesses that could worsen dry eye. Red flags such as an acute history, persistent/profound visual loss and associated diplopia should also be referred," said Assoc Prof Tong. Primary care physicians are actually best placed to ensure patient compliance in using the lubricants, added Assoc Prof Tong.

"They can advise patients to continue the drops to alleviate the symptoms, and explain to them that the drops do not cure their condition. They can also stock up on preservative-free eye drops if possible as these may cause less irritation and therefore aid compliance."

SINGAPORE GENERAL HOSPITAL

Appointments: 6321 4402
Email: appointments@sgh.com.sg

APPOINTMENT - SENIOR CONSULTANT

Dr Sivanathan Chandramohan
Senior Consultant
Dept
Diagnostic Radiology
Sub-specialty
Interventional Radiology

APPOINTMENTS - CONSULTANTS

Dr Ngo Nye Thane
Consultant
Dept
Pathology
Sub-specialty
Gastrointestinal Pathology and Uropathology

Dr Mathew Ronnie
Consultant
Dept
Colorectal Surgery

APPOINTMENTS - ASSOCIATE CONSULTANTS

Dr Tan Kwong Wei Emile John
Associate Consultant
Dept
Colorectal Surgery

Dr Mathini Jayaballa
Associate Consultant
Dept
Renal Medicine
Sub-specialty
General Nephrology

PROMOTIONS

Dr Wong Jolin
Associate Consultant
Dept
Anaesthesiology

Dr Viswanath Anand Chidambaram
Associate Consultant
Dept
Diagnostic Radiology
Sub-specialty
Body Imaging

Dr Tan Bee Xian Jamie
Associate Consultant
Dept
Pathology

Dr Lee Cheah Hooi Ken
Associate Consultant
Dept
Respiratory & Critical Care Medicine

Dr Phoon Hui Yi Priscilla
Associate Consultant
Dept
Anaesthesiology

Dr Xing Jieyin
Associate Consultant
Dept
Anaesthesiology

Dr Swee Du Soon
Associate Consultant
Dept
Endocrinology

PROMOTIONS

Dr Chng Tze Wei
Associate Consultant
Dept
Pathology

Dr Lim Kok Hing
Associate Consultant
Dept
Pathology

Dr Wong Shing Lih
Associate Consultant
Dept
Pathology

KK WOMEN'S AND CHILDREN'S HOSPITAL

Appointments: 6294 4050
Email: centralappt@kkh.com.sg

APPOINTMENTS

Dr Tay Ghim Hoon Ellen
Consultant
Dept
Child Development

Dr Yung Chee Fu
Consultant
Dept
Paediatrics (Infectious Disease Service)

Dr Ilka Tan
Associate Consultant
Dept
Obstetrics & Gynaecology

PROMOTIONS

Dr Satish Kumar Reddy Challa
Associate Consultant
Dept
Paediatric Anaesthesia

Dr Lim Lan Fern Michele
Associate Consultant
Dept
Women's Anaesthesia

NEW APPOINTMENTS

Adj Assoc Prof Lim Sok Bee
Senior Mentor, Community Services
Dept
Child Development

Adj Assoc Prof Lourdes Mary Daniel
Head
Dept
Child Development

Dr Lee Khai Pin
Head
Dept
Emergency Medicine

Adj Prof Phua Kong Boo
Emeritus Consultant

Clin Prof Ho Tew Hong
Emeritus Consultant

NATIONAL NEUROSCIENCE INSTITUTE

Appointments: 6357 7095
Email: appointments@nni.com.sg

PROMOTION

Dr Pang Yee Hau
Associate Consultant
Dept
Neurology (SGH Campus)

NEW APPOINTMENTS

Assoc Prof Au Wing Lok
Deputy Medical Director (Clinical)
Head & Senior Consultant
Dept
Neurology (TTSH Campus)
Sub-specialty
Parkinson's Disease, Movement Disorders

Assoc Prof Seow Wan Tew
Deputy Medical Director (Academic Affairs)
Head & Senior Consultant
Dept
Neurosurgery (TTSH Campus)
Sub-specialty
Paediatric Neurosurgery, Neurotrauma

Assoc Prof Sitoh Yih Yian
Deputy Medical Director
(Medical Affairs & Quality Management)
Head & Senior Consultant
Dept
Neuroradiology (TTSH Campus)

SENGKANG HEALTH

Appointments: 6472 2000
Email: ah.appointment@skh.com.sg

APPOINTMENTS

Dr Chua Peng Wei Melvin
Senior Consultant
Dept
Internal Medicine

Dr Lee Lianne Ai Ling
Consultant
Dept
Pathology

Dr Oliver James Nickalls
Associate Consultant
Dept
Radiology

Dr Sandeep Halagatti Venkatesh
Associate Consultant
Dept
Radiology

Dr Tarun Mohan Mirpuri
Associate Consultant
Dept
Radiology

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If you are a qualified doctor/dentist, a challenging career awaits you at SingHealth. We seek suitably qualified candidates to join us as:

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- REGISTRARS / STAFF REGISTRARS

Interested applicants to email CV with full personal particulars, educational and professional qualifications (including housemanship details), career history, present and expected salary, names of at least two professional references, contact numbers and e-mail address together with a non-returnable photograph.

Please email your CV to the respective institutions' email addresses/online career portals below with the Reference Number MN1604.

SingHealth

Singapore Health Services (SingHealth), Singapore's largest Academic Medical Centre, is committed to providing affordable and accessible quality healthcare to patients. With a total of 42 clinical specialties, its network of 3 Hospitals, 5 National Specialty Centres, 9 Polyclinics and a Community Hospital delivers a comprehensive range of multidisciplinary and integrated medical care.

SingHealth is responsible for developing Sengkang Health, a new healthcare system to deliver patient-centric care to the community in the north-east of Singapore. By 2018, a general hospital and a community hospital will be fully operational in Sengkang. Sengkang Health is currently operating in Alexandra Hospital, prior to the completion of its new hospitals. The collective strengths of SingHealth and Duke-NUS, its partner in research and medical education, pave the way for the transformation of healthcare.

Singapore General Hospital

Departments seeking Resident Physicians and Registrars:

- Anaesthesiology
- Colorectal Surgery
- Diagnostic Radiology
- Emergency Medicine
- Family Medicine & Continuing Care
- Gastroenterology & Hepatology
- General Surgery
- Geriatric Medicine
- Haematology
- Hand Surgery
- Infectious Diseases
- Internal Medicine
- Neonatal & Developmental Medicine
- Nuclear Medicine & PET
- Obstetrics & Gynaecology
- Occupational Medicine
- Orthopaedic Surgery
- Otolaryngology
- Plastic, Reconstructive & Aesthetic Surgery
- Renal Medicine
- Rehabilitation Medicine
- Respiratory & Critical Care Medicine
- Rheumatology & Immunology
- Urology
- Staff Clinic

Website: www.sgh.com.sg
Career Portal: www.sgh.com.sg/subsites/sgh-careers/medical/pages/career-opportunites.aspx
Email: careers.medical@sgh.com.sg

KK Women's and Children's Hospital

Departments seeking Resident Physicians:

- Obstetric Anaesthesia
- Emergency Medicine
- Neonatology

Website: www.kkh.com.sg
Email: medical.hr@kkh.com.sg

Sengkang Health

Departments seeking Resident Physicians and Staff Registrars:

- Anaesthesiology
- Emergency Medicine
- Family Medicine
- General Surgery
- Internal Medicine
- Orthopaedic Surgery
- Rehabilitation Medicine

Website: www.singhealth.com.sg/AboutSingHealth/CorporateOverview/sengkang-health/pages/home.aspx
Email: careers@skh.com.sg

National Dental Centre Singapore

Seeking Dental Surgeons

Website: www.ndcs.com.sg
Email: careers.clinical@ndcs.com.sg

National Heart Centre Singapore

Departments seeking Registrars:

- Cardiothoracic Surgery

Website: www.nhcs.com.sg
Email: hr_mgr@nhcs.com.sg

National Neuroscience Institute

Department seeking Resident Physicians:

- Neurosurgery

Website: www.nni.com.sg
Email: nni_hr@nni.com.sg

Singapore National Eye Centre

Seeking Resident Physicians and Registrars

Website: www.snec.com.sg
Email: recruitment@snec.com.sg

SingHealth Polyclinics

Department seeking Resident Physicians and Family Physicians:

- Polyclinic (Family Medicine)

Website: http://polyclinic.singhealth.com.sg
Email: hr_admin@singhealth.com.sg

Corneal and Refractive Surgery Updates

This is a two-hour course that will provide Family Physicians with updates and practical information on the following topics:

- Update on Refractive Surgery
- Dry Eyes and Ocular Allergy
- Infective Keratitis
- Corneal Diseases and Transplantation Techniques
- Management of Contact Lens Complications

Date
9 July 2016 (Saturday)

Time
2.00 pm – 4.00 pm

Venue
Auditorium, Level 4
Tower Block
Singapore National Eye Centre

CME Points
2 points

Fee
Waived

Contact
Training & Education Department
Singapore National Eye Centre
11 Third Hospital Avenue
Singapore 168751
Tel: 6322 9432
Fax: 6226 3395
Email: meet@snec.com.sg

Registrations by 24 June 2016.
To register, visit **www.snecmeetings.org**

Course Directors
- Adj Assoc Prof Lim Li
- Assoc Prof Jodhbir S Mehta

Faculty
- Dr Marcus Ang
- Dr Anshu Arundhati
- Dr Jean Chai
- Dr Khor Wei Boon
- Dr Mohamad Rosman
- Dr Ti Seng Ei
- Assoc Prof Louis Tong

A signature event in Singapore's healthcare industry, the biennial SingHealth Duke-NUS Scientific Congress brings together thought leaders and healthcare professionals in Singapore and around the region to share insights on care improvement, research and education to improve patients' outcomes.

The SingHealth Duke-NUS Scientific Congress 2016 will be held on 23 & 24 September at Academia (located in Singapore General Hospital). Themed ***Today's Research and Education for Tomorrow's Healthcare***, this year's Congress will showcase transformative discoveries and findings that will lay the foundation for tomorrow's healthcare.

EARLY-BIRD REGISTRATION
Register by 30 June 2016 for discounted rate off the regular price!

SUBMIT ABSTRACTS BY 8 JULY
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Don't miss your chance to hear from healthcare thought leaders and distinguished speakers who will bring us insights on the latest developments in clinical care, research and healthcare education!

For more information, visit *www.singhealthacademy.edu.sg/sdc2016*.

Date
23 – 24 September 2016,
(Friday to Saturday)

Venue
Academia, Singapore
20 College Road
Singapore 169856

Who should attend
- Healthcare professionals
- Researchers
- Faculty Members
- Students

National Neuroscience Institute
SingHealth

7th SINGAPORE INTERNATIONAL PARKINSON DISEASE & MOVEMENT DISORDERS SYMPOSIUM

29 SEPTEMBER – 1 OCTOBER 2016

THE ACADEMIA
20 COLLEGE ROAD, SINGAPORE 169856

SYMPOSIUM HIGHLIGHTS

Plenary Sessions

- Update on the Genetics of Parkinson Disease/Parkinsonism
- Prodromal Parkinson Disease: Does It Exist?
- Huntington's Disease: Updates in Management
- Movement Disorders in Sleep
- Efficacy of Progressive Aerobic and High Amplitude Exercise in Parkinson Disease
- Integrated Care Models for Parkinson Disease
- Management of Motor Complications in Parkinson Disease
- Emerging New Therapies in Parkinson Disease
- Role of Cerebrovascular Disease in Parkinson Disease: Cognitive and Neuroimaging Findings
- Management of Parkinson Disease Patients with Cognitive Impairment

Parallel Sessions

- Movement Disorder Teaching Course
- Deep Brain Stimulation (DBS) Surgery
- Community Care for Parkinson Disease and Parkinsonism
- Cognition in Parkinsonism
- Use of Botulinum Toxin for the Management of Movement Disorders
- Rehabilitation for Parkinson Disease

Pre-Symposium Seminar on Translational Research in Parkinson Disease and Movement Disorders

PROGRAMME AND REGISTRATION

Scan the QR Code to find out about the Symposium or visit http://www.nni.com.sg/Education/Documents/7PDMDS.html

CALL FOR ABSTRACTS OR VIDEO PRESENTATIONS

Closing Date: 10 July 2016

Abstract Submission Form can be downloaded from the event website.

OVERSEAS FACULTY

Prof Jean-Marc BURGUNDER
University of Bern, Switzerland

Prof David J. BURN
Newcastle University, United Kingdom

Prof CHEN Shengdi
Rui Jin Hospital, Shanghai Jiao Tong University School of Medicine, China

Dr Claire MCLEAN
Parkinson Wellness Recovery, United States of America

Prof Olivier RASCOL
Toulouse University Hospital, France

Prof Claudia TRENKWALDER
University Medical Center of Goettingen, Germany

Prof Zbigniew K. WSZOLEK
Mayo Clinic, United States of America

REGISTRATION FEES

(Amount payable in Singapore Dollars and inclusive of GST)

Registration Closes On 9 September 2016.

Registration Category	Early Registration Before 24 July 2016	Normal Registration Before 9 September 2016	On-site Registration After 9 September 2016
A) Main Symposium (30 September - 1 October 2016)			
Physicians and Researchers	S$220.00	S$270.00	S$320.00
Trainees, Nurses, Allied Health Professionals and other Medical Professionals	S$140.00	S$190.00	S$240.00
NNI-CCPP Partners	S$100.00	Follow rates of respective categories	
B) Pre-Symposium Seminar on Translational Research in Parkinson Disease and Movement Disorders (29 September 2016)			
With registration for Main Symposium	S$30.00		
Without registration for Main Symposium	S$60.00		

ENQUIRY & SECRETARIAT

7th Singapore International Parkinson Disease and Movement Disorders Symposium Secretariat

National Neuroscience Institute
11 Jalan Tan Tock Seng,
Singapore 308433

Tel: (+65) 6357 7163/7640
Fax: (+65) 6256 4755
Email: nni_secretariat@nni.com.sg
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Courses

11th Gynaecological & Early Pregnancy Ultrasound Workshop

Topics

- Ultrasound Machine Made Easy
- Application of Doppler in Pelvic Ultrasound
- The Role of Ultrasound in the Diagnosis of Endometriosis
- Assessing An Ovarian Mass for Malignancy Using the IOTA Scoring System
- Pregnancy Failure & First Trimester Variations
- Ectopic Pregnancy – Ultrasonographic Approach
- Hands-on Session (afternoon)

Fee

	Morning Lectures	Full Day Session (Limited to 24 pax)
SingHealth Staff	$110	$230
Non-SingHealth Staff	$120	$250

Note: Price is inclusive of 7% GST

Date
6 August 2016 (Saturday)

Time
9.00 am – 4.00 pm
(Registration starts at 8.45 am)

Venue
Lectures:
The Academia (SGH Campus)
L1-S4 (Level 1)
20 College Road
Singapore 169856

Practical:
SGH O&G Centre
Block 5, Level 1

CME Points
4 points

Contact
Ms Grace Ang
SGH Postgraduate Medical Institute
Tel: 6321 4078
Fax: 6223 9789
Email: pgmi.courses@sgh.com.sg

Registrations by 15 July 2016.
For more information or to register, please visit **www.pgmi.com.sg**

SingHealth
www.singhealth.com.sg

GP FAST TRACK APPOINTMENT HOTLINES

Singapore General Hospital	6321 4402
KK Women's and Children's Hospital	6294 4050
Sengkang Health	6472 2000
National Cancer Centre Singapore	6436 8288
National Dental Centre Singapore	6324 8798
National Heart Centre Singapore	6704 2222
National Neuroscience Institute	6321 4402/ 6357 7095
Singapore National Eye Centre	6322 9399

DIRECT WARD REFERRAL CONTACT NUMBERS

Singapore General Hospital	6321 4822
KK Women's and Children's Hospital	6394 1180

SINGHEALTH DUKE-NUS ACADEMIC MEDICAL CENTRE

- Singapore General Hospital
- KK Women's and Children's Hospital
- Sengkang Health
- National Cancer Centre Singapore
- National Dental Centre Singapore
- National Heart Centre Singapore
- National Neuroscience Institute
- Singapore National Eye Centre
- Polyclinics SingHealth
- Bright Vision Hospital

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