

George's Anatomy, a carrier of our ideas and philanthropic pursuits, sustained by puns and pop-culture references. A page or two even come alive in the dark. Slip into our mind.

Lien Foundation Report 2016-17

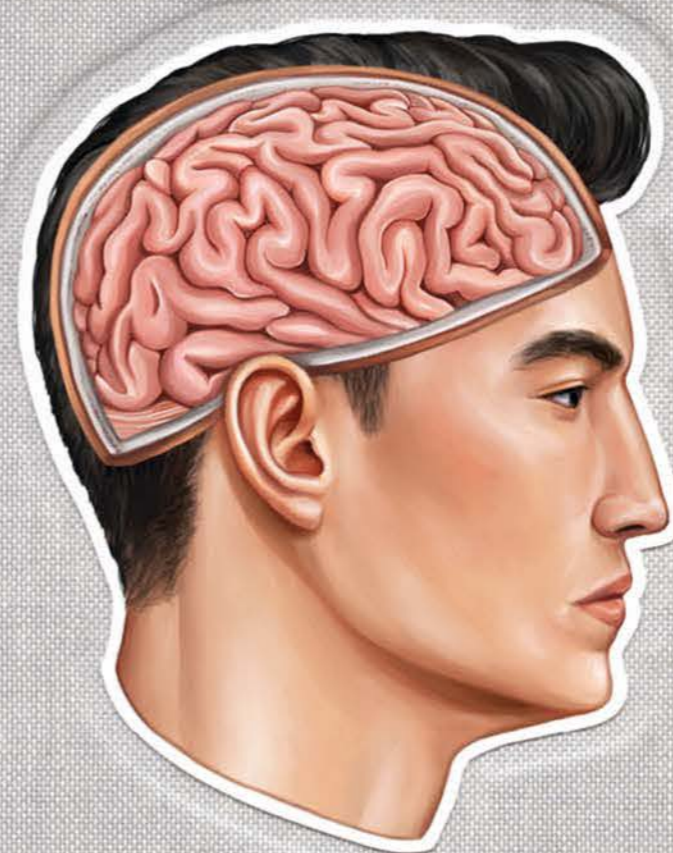
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GEORGE'S
ANATOMY

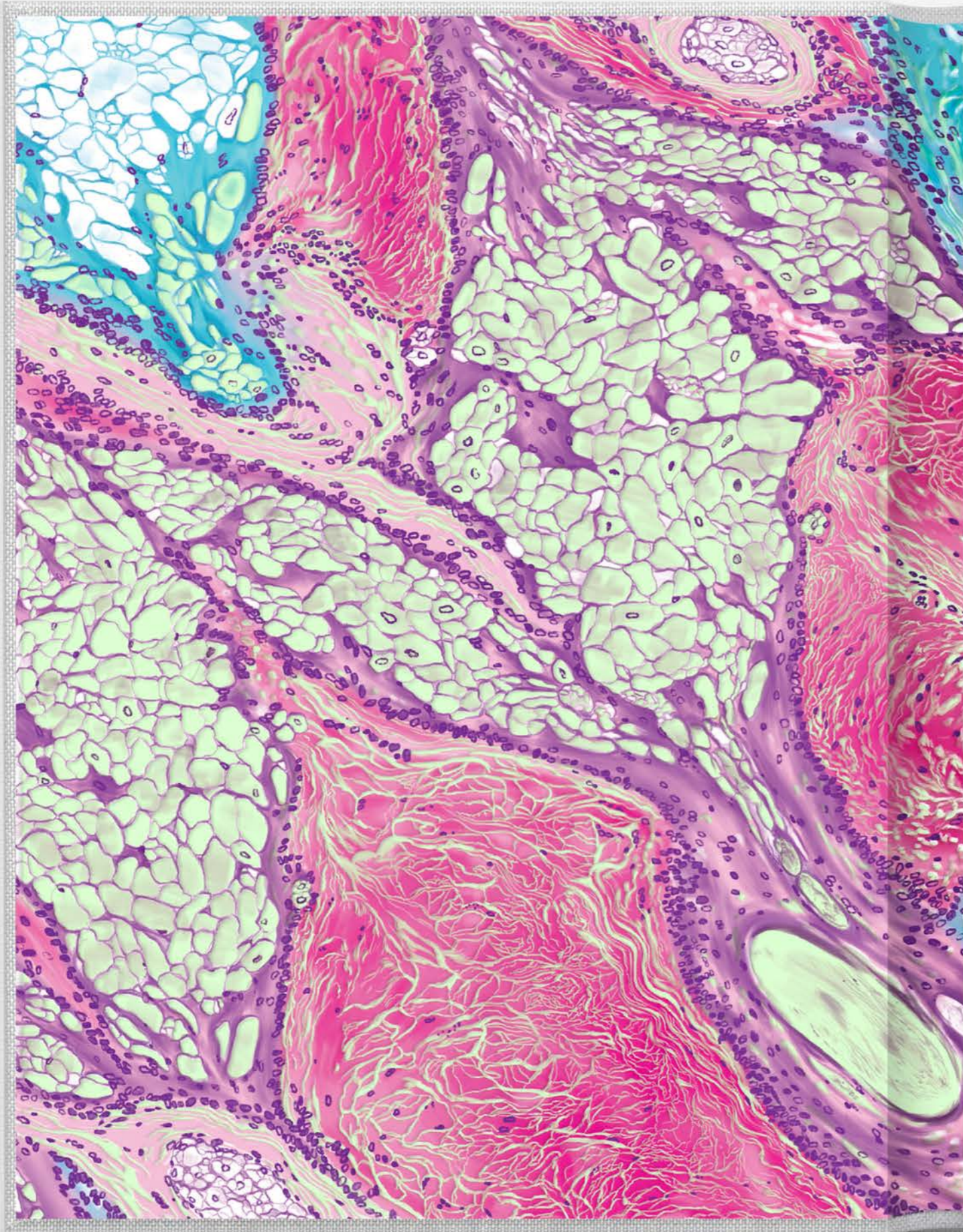
LIEN FOUNDATION
2016 - 2017
REPORT

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GEORGE'S
ANATOMY





GEORGE'S

A N A T O M Y



GEORGE'S
ANATOMY

table of
contents

Section	Article Title	Page
THE SYSTEMS THAT KEEP US ALIVE (A)	Circle of Care	14
	Kindle Garden	15
	Inclusive Attitudes Survey	18
	Superhero Me	19
	Principal Matters	24
	My First School	25
	Hack Our Play	25
	Australia's Preschools	25
	Cradle to Grave	26
	The Anygdala Hijack	26
THE ESSENCE OF SENESCENCE	Master the Monkey Mind	28
	The Essence of Senescence	36
	The Complexity of Frailty	38
	Incontinence & Sleep	40
	Falls & Fractures	41
	Exercise as Polypill	42
	Economics of Singapore Nursing Home Care	44
	Gym Tonic	44
	Supporting Aspirations in Aged Care	48
	Safe But Soulless	49
MICHELANGELO'S MUSCULAR MODEL	Anita's Nursing Home Stay	49
	Genki Kaki Eldercare in Japan	50
	Jade Circle	51
	Ingot PCC	52
	Bioethics Casebook	52
	Second Beginnings	53
	Darn Dementia	54
	Forget Us Not	56
	Apex Harmony	57
	Lien Aid	58
THE GUT DIGEST	Lien Environmental Fellowship	59
	Mysteries of the Microbiome	60
	Germination of Societal Diseases	68
	Suffering at the End of Life	76
	The Body After Death	78
	Skeletal Secrets	79
	Death of Death?	80
	Breakthroughs of Mice, Men and Medical	86
	Legacy Relationship	86
	Lien Care	87
PHILANTHROPIC PORTFOLIO	Life Asked and Answered	87
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
STAFF & VOLUNTEERS	Life Asked and Answered	87
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
THE INSTRUMENTALISTS	Life Asked and Answered	87
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80
	Legacy Relationship	80

GEORGE'S

A N A T O M Y

This is our body of work, with insights drawn from *Physiology* and *Pathology*, fused with our *Philosophy* and *Philanthropic* pursuits.

Through *Growth*, *Ageing*, *Sickness* and *Death*, the human body undergoes a constant process of change within as neurons fire, tissues wither, pathogens multiply and cells die. Follow George on an odyssey through this most intimate landscape and marvel at the struggles of simply being human.

THE SYSTEMS THAT KEEP US ALIVE



I.
**Integumentary
SYSTEM**

Acts as a protective barrier against injury, infection and fluid loss.



II.
**Nervous
SYSTEM**

The communication network that relays messages to all parts of the body.



III.
**Muscular
SYSTEM**

Enables movement and maintains posture.



IV.
**Endocrine
SYSTEM**

A set of glands that secretes hormones to regulate metabolism, reproduction, mood and so forth.



V.
**Circulatory
SYSTEM**

The body's lifeline delivering oxygen, nutrients and other substances to cells through blood flow.



VI.
**Respiratory
SYSTEM**

The pathways that enable gas exchange, taking in oxygen and expelling waste gases.



VII.
**Lymphatic
SYSTEM**

The main line of defence against foreign pathogens, playing a key role in immunity.



VIII.
**Digestive
SYSTEM**

Breaks food down into nutrients the body needs for survival.



IX.
**Urinary
SYSTEM**

Regulates blood composition and volume by eliminating waste through urine.



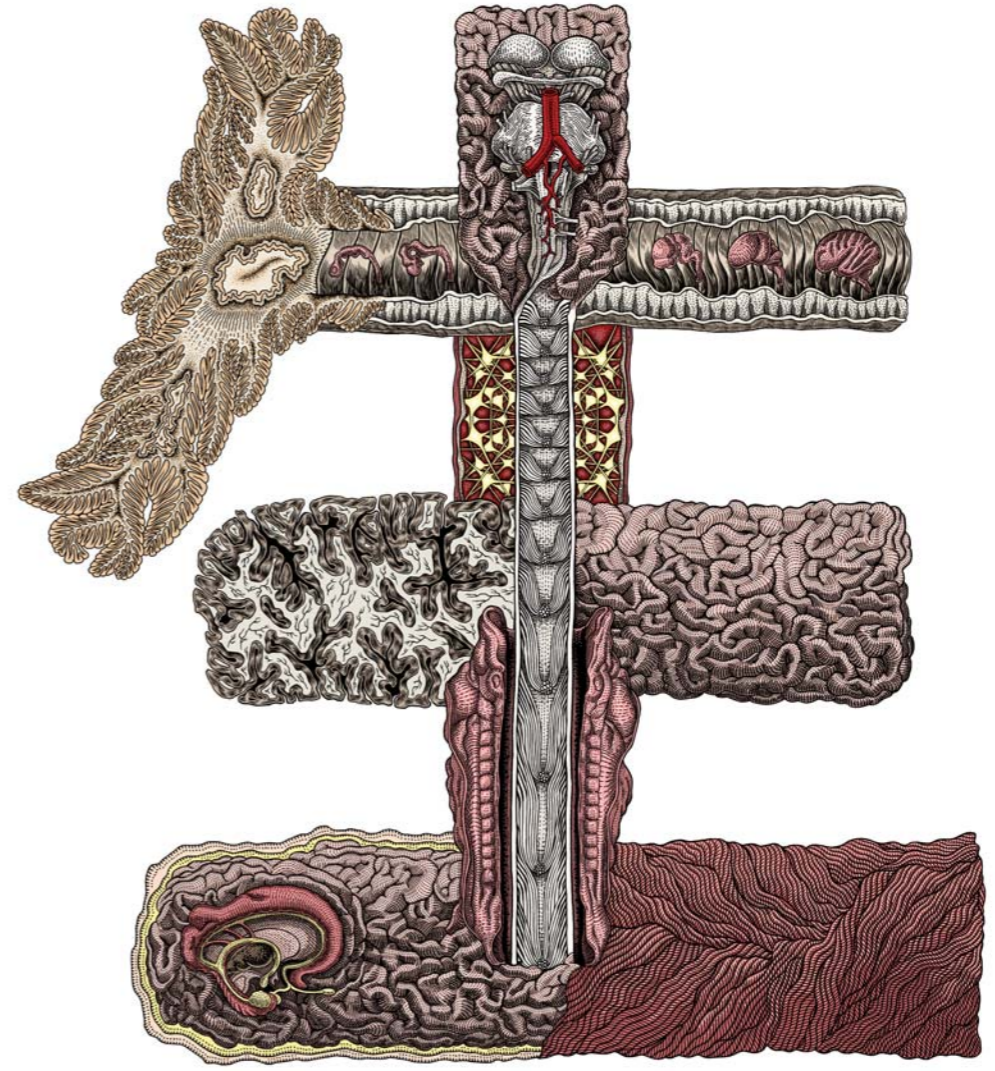
X.
**Reproductive
SYSTEM**

Produces the eggs and sperm needed for procreation.

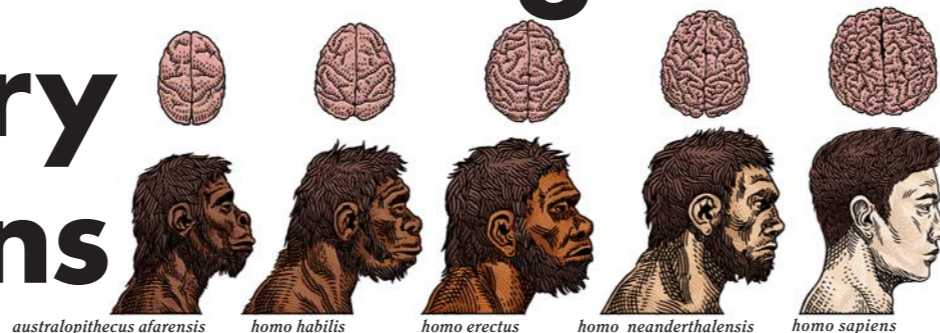
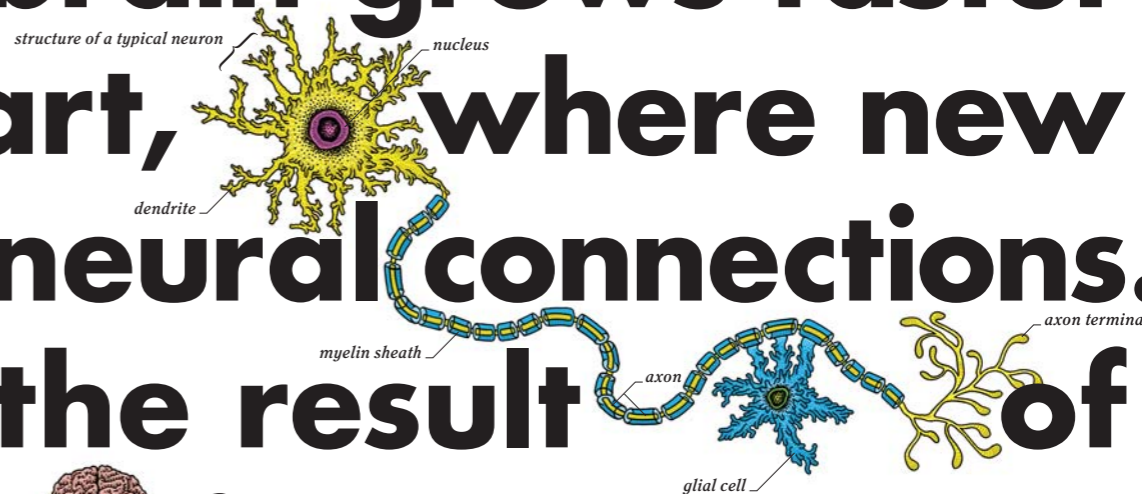
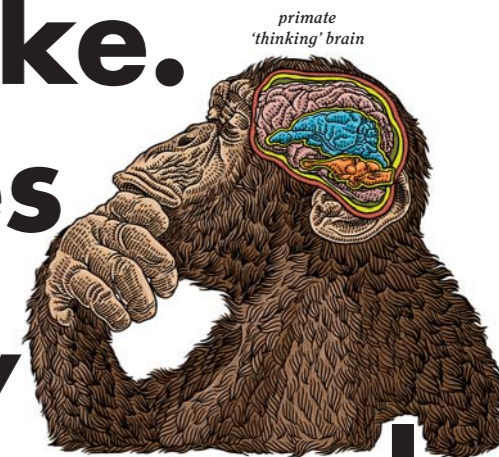
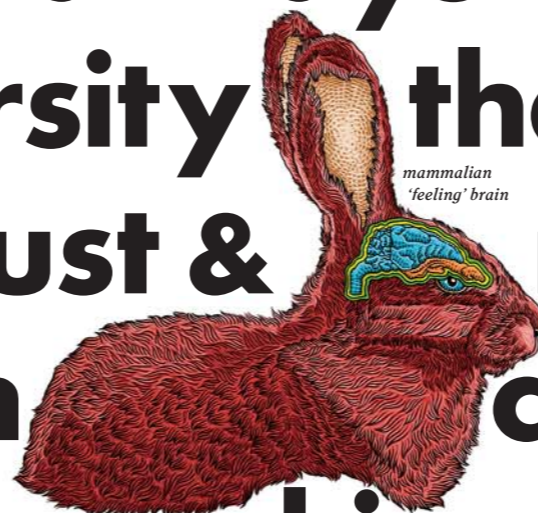
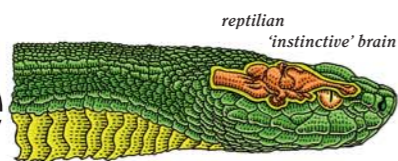


XI.
**Skeletal
SYSTEM**

The framework that provides structure, protects internal organs and acts as levers for movement.



Great minds don't always think alike. Like biodiversity that makes the rainforest robust & neurodiversity can convey unusual talents and inspire new ways of thinking and learning. In a child's early years, the brain grows faster than any other body part, where new experiences drive new neural connections. This complex wiring is the result of evolutionary forces that give us the brains we have today.



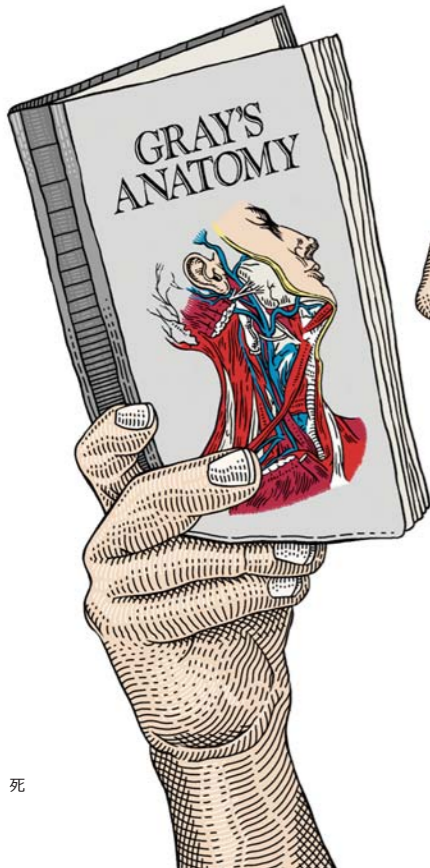
Brain Matters

The brain develops the fastest in the first three months after birth, growing by about 64%, with the cerebellum involved in movement having the most rapid growth. By age three, it will have reached 80% of its adult size.

There are about 86 billion neurons, and each neuron is connected to about 10,000 others, passing signals via synaptic connections in an elaborate network known as the brain's wiring. It is estimated this most complex organ of ours is able to store about a million gigabytes of memory—the equivalent of 4.7 billion books.

Progressively, the process of synaptic pruning will weed out the weaker connections even as it forms new ones based on experiences.

GEORGE'S ANATOMY



b. broca's area: Produces speech

Frontal Lobe

Involved in executive functions like planning, judgment, problem solving, attention span and inhibition.

o. olfactory bulb: Processes odours

Basal Ganglia *b.*

Plans and initiates desired action.

Thalamus *t.*

Relays sensory impulses from body to cortex.

Hippocampus *h.*

Organises and stores memories.

Amygdala *a.*

Controls emotional responses.

Hypothalamus *ht.*

Maintains homeostasis, controls pituitary gland.

Pituitary Gland *p.*

Produces important hormones.

Brainstem

Responsible for basic survival functions and consciousness.

m. motor cortex: Controls movement

s. somatosensory cortex: Processes body sensations

g. gustatory cortex: Detects taste

a. auditory cortex: Processes sound

Parietal Lobe

Integrates sensations, involved in spatial awareness and perception.

Temporal Lobe

Processes memories, emotions and language.

Occipital Lobe

Processes visual information from the eyes.

Cerebellum

Coordinates voluntary movements, maintains posture and balance.

Poverty Impoverishes the Brain

Childhood poverty is a toxin that shrinks brains from birth. While more wealth isn't linked to better brains, chronic poverty and its accompanying conditions of abuse, neglect, instability and malnutrition can affect the formation and pruning of connections in a young brain and impede development of the prefrontal cortex.

The more severe the predicament, the less grey matter and more shrivelled the brain. This results in lower executive functioning skills and cognitive abilities that can invite a cascade of physical and psychological problems in the future.

But it's not a life sentence. Neuroplasticity allows for the brain to rewire itself. Building resilience through supportive relationships, coping skills and positive experiences can remedy some of the harm caused by childhood stress and promote new connections in the brain, leading to gains in learning and behaviour.

GEORGE'S ANATOMY



Cain, 6, lives in constant chaos.



Abel, 6, lives in a stable, protected and responsive environment.



Circle of Care

extending the sphere of influence

Conceived in 2012 together with Care Corner Singapore to tackle the complex issues faced by underprivileged preschoolers, our Circle of Care (CoC) programme is a growing child that we will continue to nurture. It combines social work and learning support with health services and guided involvement for parents.

An interdisciplinary team, with the social worker playing a key role in building relationships with the family, weaves a stronger system of support around children who face an opportunity gap because of financial or family circumstances. Parents are also engaged through home visits and workshops. Five years on, parent involvement has increased, preschool attendance rates have gone up and children have improved their reading and numeracy skills.

From two pilot preschools, the child-centric programme has expanded its network to 10 with our partners PAP Community Foundation, Singapore Muslim Women's Association and MY World Preschools. They encompass more than 1,700 children, of which 27 per cent require social work intervention. CoC also extended its reach into two primary schools, Gan Eng Seng and Lakeside Primary, to build on the early gains made. This network is poised to grow as CoC engages more preschools and primary schools.

Child portfolios

Each child has a portfolio drawn up by preschool teachers, educational therapists and social workers summarising his/her strengths, needs and learning trajectory. Parents are continually engaged in the process, particularly in their child's transition to primary school, where information

about administration and other concerns are addressed. This is then shared with counsellors, teachers and allied educators in the primary school so they can provide better support for the child up to the third year.

Health and development screening

We broadened the concept of care to include doctors and nurses from NUHkids, the paediatric arm of the National University Hospital, who conduct regular health and development checks for the children in a natural preschool setting. By doing so, detected problems can be addressed in a timely manner. This also bridges the physical and psychological barriers that families at risk may have towards seeking early intervention.

Building a community of practice

Workshops and training sessions are held for different professionals including social workers, therapists, teachers and even primary school principals to share experiences, build a common knowledge base and promote ongoing learning from one another. The CoC team also received training from medical specialists on the Brazelton Touchpoints approach, where they are guided to cultivate healthy habits of building positive relationships with parents.

Much of what we do aims to rewrite the future for children and families at risk. Research has shown that some of the most rigorously implemented and evaluated preschool intervention programmes in the US produce benefits that persist well into adulthood, debunking earlier notions that gains fade out by third grade. We need to recognise that quality intervention programmes are a necessary and long-term investment that will reap enduring benefits in years to come.



Kindle Garden

pioneering preschool inclusion

An inclusive education values children as individuals and enables them to belong, participate and achieve their full potential regardless of their learning differences. It is the basic building block of an inclusive society. Often, many children with special needs lead lives of minimal promise and thwarted potential as they struggle to find acceptance in a high-achieving country, where children are lauded for stellar academic achievements.

Kindle Garden, Singapore's first purpose-built inclusive preschool at Enabling Village, was conceived in partnership with AWWA to demonstrate the possibilities when children with and without special needs learn, play and grow together in a non-discriminatory environment.

Thirty per cent of its children have conditions like Autism Spectrum Disorder, Down Syndrome, Cerebral Palsy and Global Developmental Delay but are not defined by their special needs. Instead, the preschool's philosophy is to find and nurture the unique strengths and abilities in each child through personalised learning plans. A multidisciplinary team of preschool teachers, early interventionists and therapists are also on hand to facilitate learning and socialisation among peers.

The success of Kindle Garden has inspired the government to do more. After a year in operation, the Ministry of Social and Family Development announced it was exploring the feasibility of setting up more inclusive preschools.

Kindling Inclusion: A documentary

Two years into this journey, what have we learnt? Have those with special needs adapted well? Did other children have to slow down their pace of learning? Can friendships bloom despite their differing abilities?

The essence of our discovery is condensed into a two-part documentary that offers a rare glimpse into the inner workings of the preschool. Unscripted, intimate and moving, we see it as a vital part of our larger efforts to inspire change through public discourse and shine a light on the powerful promise of an inclusive childhood.

Parents can become powerful agents of change in the movement to kindle inclusion. Besides interviews with teachers and children, parents that are part of this pioneering movement spoke up too. Darren, whose daughter Phoebe has Down Syndrome, shared that she was turned down by ten preschools before Kindle Garden took her in. Since then, Phoebe has managed to make many friends. He noticed marked improvements in her learning abilities as well. As the films show, the children are trailblazers who celebrate strengths and work on weaknesses together. Above all, they learn to understand and live with differences and help each other along.

Beyond efforts to change attitudes towards children with special needs, it is also time to consider educational reform and overhaul the one-size-fits-all approach so that all children are well supported within a system that is empowering and inclusive.



An Inclusive Classroom

Early childhood years are an opportune time to educate children about diversity. Those in inclusive classrooms typically score higher on social and emotional behaviours.

Down Syndrome

Affectionate and sociable. Carol loves to hug her classmates and helps the teacher clean the classroom. She can be stubborn at times and takes a longer time to learn new things. Typical of children with Down Syndrome, she has low muscle tone, which is evident in her posture and movement.

Brittle Bones Disease

Jeremy may be six years old, but his body is the size of a toddler. Born with fragile bones that break easily, he sits on a specially designed chair and plays with toys that are light weight and soft to touch. His classmates are careful when playing with him.

Autism

Emma likes to be in her imaginary world. Like Julia, the muppet from Sesame Street which has autism, she's contented playing on her own but has slowly started to engage with her classmates. While she still has the occasional meltdown when things don't go her way, she is learning how to calm herself with deep breathing.

Lele tends to flap his hands when excited and covers his ears when certain noises get to him.

Cerebral Palsy

Her lack of motor skills means that Megan has difficulty writing and speaking. Sometimes she gets into a fit if she's too excited.

Global Developmental Delay

As his classmates sing and sign nursery rhymes, Ben fumbles for words and is unable to follow the moves. He has difficulty with coordination, such as catching a ball and holding a pencil. But with more time and opportunities to practise, he will pick up these skills.

Typically Developing

Attending school with friends of diverse abilities has helped Alfred develop empathy, creativity and social skills. He is sensitive to the needs of others and able to help and include his friends in play and group work.

Moebius Syndrome

The weakening of Xin En's face and throat muscles due to this rare neurological disorder makes it hard for her to smile, frown or swallow. She is fed blended food from a tube that goes directly into her stomach. Xin En also carries a bottle to hold her spit. While her speech may be unclear, it does not affect her intelligence.

Sensory Impaired

Sophia was born with cone rod dystrophy, which results in progressive vision loss. Her eyes are sensitive to light and it may be hard to differentiate colours. She delights in a routine that gives her confidence. Belle has profound hearing loss and may appear inattentive. A cochlear implant stimulates the auditory nerve and exposes her to sounds which help her acquire speech.

ADHD and Dyslexia

Mikey may appear inattentive and disobedient because of his frequent chatter and constant fidgeting. However, these little movements, as well as a daily dose of outdoor play, help to expend his excess energy. While reading requires more effort because it demands him to focus and make sense of words, he loves spelling games where he jumps on alphabet cards laid out on the classroom floor.



Early Childhood Holistic Outcomes (ECHO)

an improved approach to early intervention

Children learn best through everyday experiences and interactions with familiar people and situations. To optimise the potential of children with special needs, we pioneered a family-centred approach to early intervention that harnesses opportunities in natural daily routines to practise and improve their functional skills.

Developed by KKH and Thye Hua Kwan Moral Charities with the support of NUH, ECHO provides a unified framework for early intervention service providers to measure functional outcomes for children and their families, such as positive social relationships and self-help behaviour. This marks a shift from the traditional model which measures skills or behaviours in isolation. For instance, instead of assessing a child's pincer grip – indicative of fine motor development – in a classroom or therapy setting, professionals and caregivers would encourage the child to use the technique to finger-feed himself during snack time.

Families are recognised as equal partners in the early intervention process. Professionals make home visits and work in concert with families to come up with goals that each child and family can work towards. They can also better tailor intervention strategies to specific needs.

ECHO has been implemented across all four Thye Hua Kwan EIPIC Centres with more than 300 professionals trained and over 800 children benefitting from it. The team also came up with a manual to share simple strategies parents can use with their children of varying developmental abilities. These were distributed to hospitals and various early intervention centres.



Inclusive Attitudes Survey

the elusive goal in early childhood

How welcoming are Singaporeans towards children with special needs?

We commissioned a two-part survey polling more than 1,000 members of the public as well as 800 parents of children with special needs. It revealed that we are not as 'inclusive' as we think:

- i. Only 3 in 10 Singaporeans agree that we are an inclusive society.
- ii. Nearly two-thirds polled are willing to share public spaces with children with special needs, but not willing to interact with them.
- iii. About 7 in 10 Singaporeans are supportive of inclusive education, but only half are comfortable having their child seated next to a child with special needs in class.
- iv. Only 1 in 10 Singaporeans is confident of interacting with children with special needs.
- v. Among parents of children with special needs, less than half feel their children in preschools are adequately supported by teachers, curriculum and facilities.

We need to close the gap between what we believe in and how we act. A key cause for low acceptance of children with special needs is the general lack of interaction with them. While laws and policies, such as one that guarantees inclusive education, are helpful, we can all be more welcoming in our own ways. Here are some tips:

- i. A friendly smile or nod of acknowledgment is usually appreciated.
- ii. Ask how you can help or what they need instead of staring at a situation.
- iii. Not all disabilities are visible, so always respond kindly.
- iv. Playdates or excursions allow children to interact and broaden their social skills while having fun.



Superhero Me

an inclusive arts movement

Inclusion broadens the repertoire of the human experience and is ultimately a wildly creative act. Since its birth in 2014 working with a class of preschoolers in Lengkok Bahru, Superhero Me (SHM) has evolved into a ground-up inclusive arts movement that has reached out to more than 12,000 people through a myriad of efforts.

It thrives on harnessing creativity through the arts to empower children from less privileged backgrounds and special needs communities to become self advocates. It focusses on inclusive programming, advocacy and partnerships to shape the narrative of inclusion in Singapore.

Seeding change

The National Arts Council has committed a three-year funding to grow the initiative, whose allies span a network of special education schools, mainstream preschools, arts institutions, government agencies, parent groups, artists and the public. Our earlier survey on inclusive attitudes found that a key cause for apprehension of children with special needs is the lack of interaction between the public and such children. We aspire to create more opportunities for socialisation because inclusion benefits everyone, not just those with special needs. Typically-developing children develop empathy, creative confidence and learn to work with others different from them.

SHM aims to develop a community of arts facilitators who are confident of practising inclusion and advocating for the movement. The 'Captains Programme' has trained over 50 people from all walks of life, including artists, people with special needs, educators, architects and lawyers. The initiative was chosen as the face of the SGfuture

campaign by Ministry of Culture, Community and Youth, which was broadcasted on television and received a million views online.

Artistic journeys

We rolled out inclusive arts experiences at Objectifs Centre for Photography and Film. 'Planet of Possibility' was an ambitious undertaking by more than 60 children from Cerebral Palsy Alliance Singapore School, Kindle Garden, MINDS Lee Kong Chian Gardens School, Pathlight School and children from Circle of Care. In the course of five months, they co-created artwork that was exhibited at the gallery. Responding to a strong demand, we launched 'Who is Coming to Dinner?' an inclusive arts workshop series partnering 1,500 children from preschools and special education schools.

In between both art shows, the initiative experimented with new ways of outreach. This included taking art to Bishan Park with Let's Play Lah!, a group of volunteer special educators and co-organising 'Project Infinitude', a music education effort with the Yong Siew Toh Conservatory of Music and Mahler Foundation where children were mentored by the conservatory's students over three months. More recently, SHM was commissioned to produce a show for Singapore Art Week. 'Is Anyone Home?' featured five multi-media art installations on childhood created by seven children and five artists.

PRINCETON HOSPITAL,
18 APRIL 1955

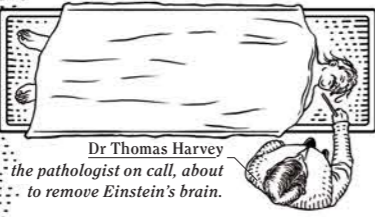
WITHIN 7.5 HOURS OF
EINSTEIN'S DEATH...

Odyssey of Einstein's Stolen Brain

The New York Times

Einstein Dies at 76

BRAIN OF EMINENT SCIENTIST WHO WORKED OUT THE THEORY OF RELATIVITY STOLEN BY PATHOLOGIST DURING AUTOPSY

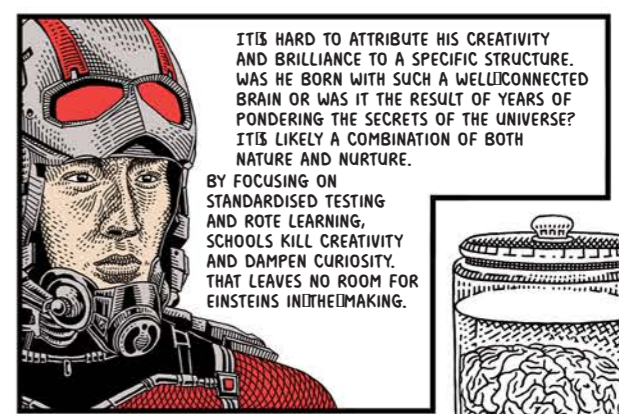
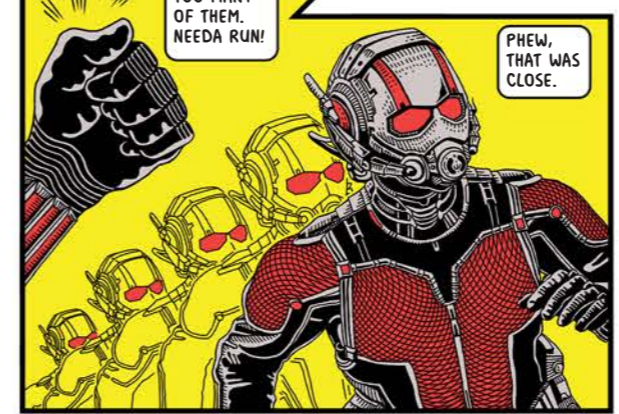
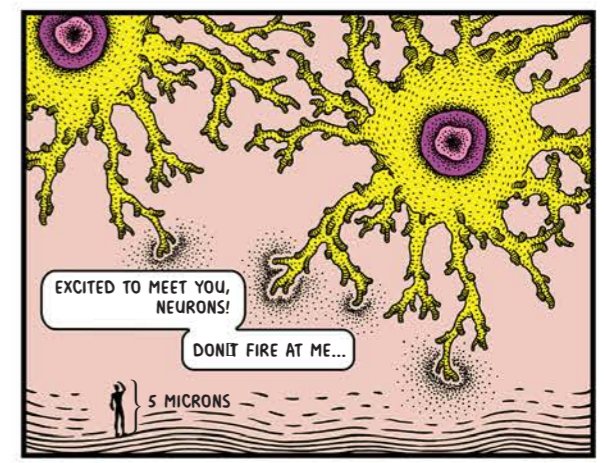
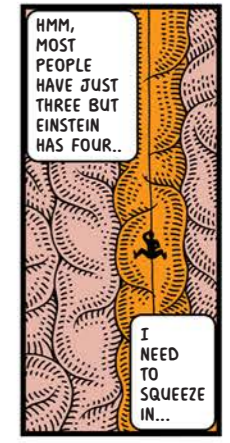
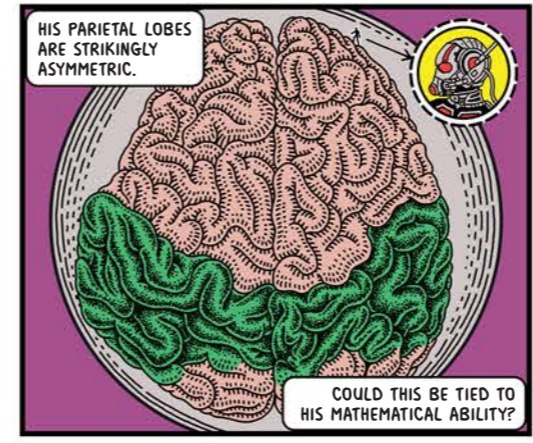
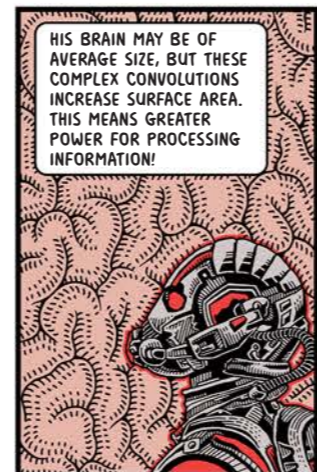
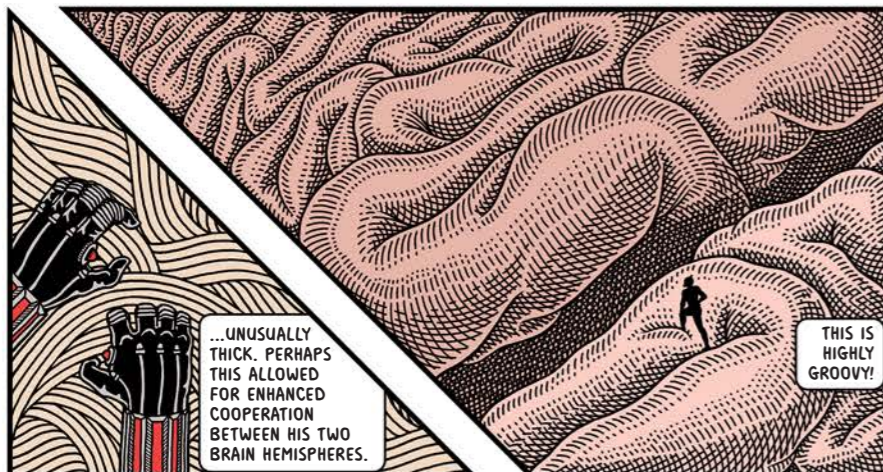
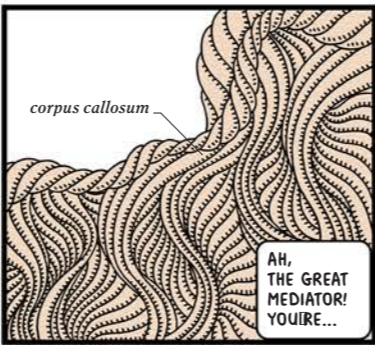
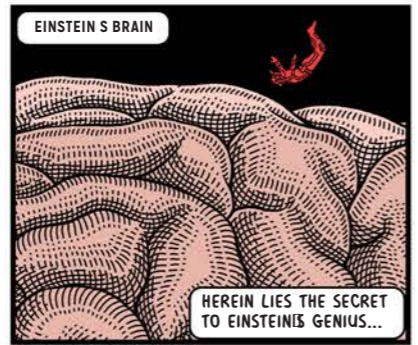
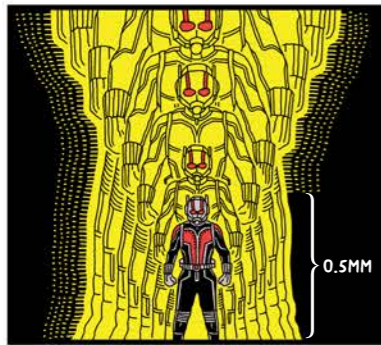



PERHAPS EINSTEIN'S BRAIN WILL REVEAL CLUES TO HIS CREATIVITY AND BRILLIANCE...

OH NO, I NEED TO GET THERE QUICKLY BEFORE HARVEY TAKES IT AWAY AND TURNS IT INTO PIECES OF RELICS!



GEORGE'S ANATOMY



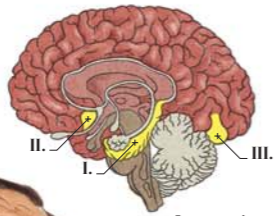
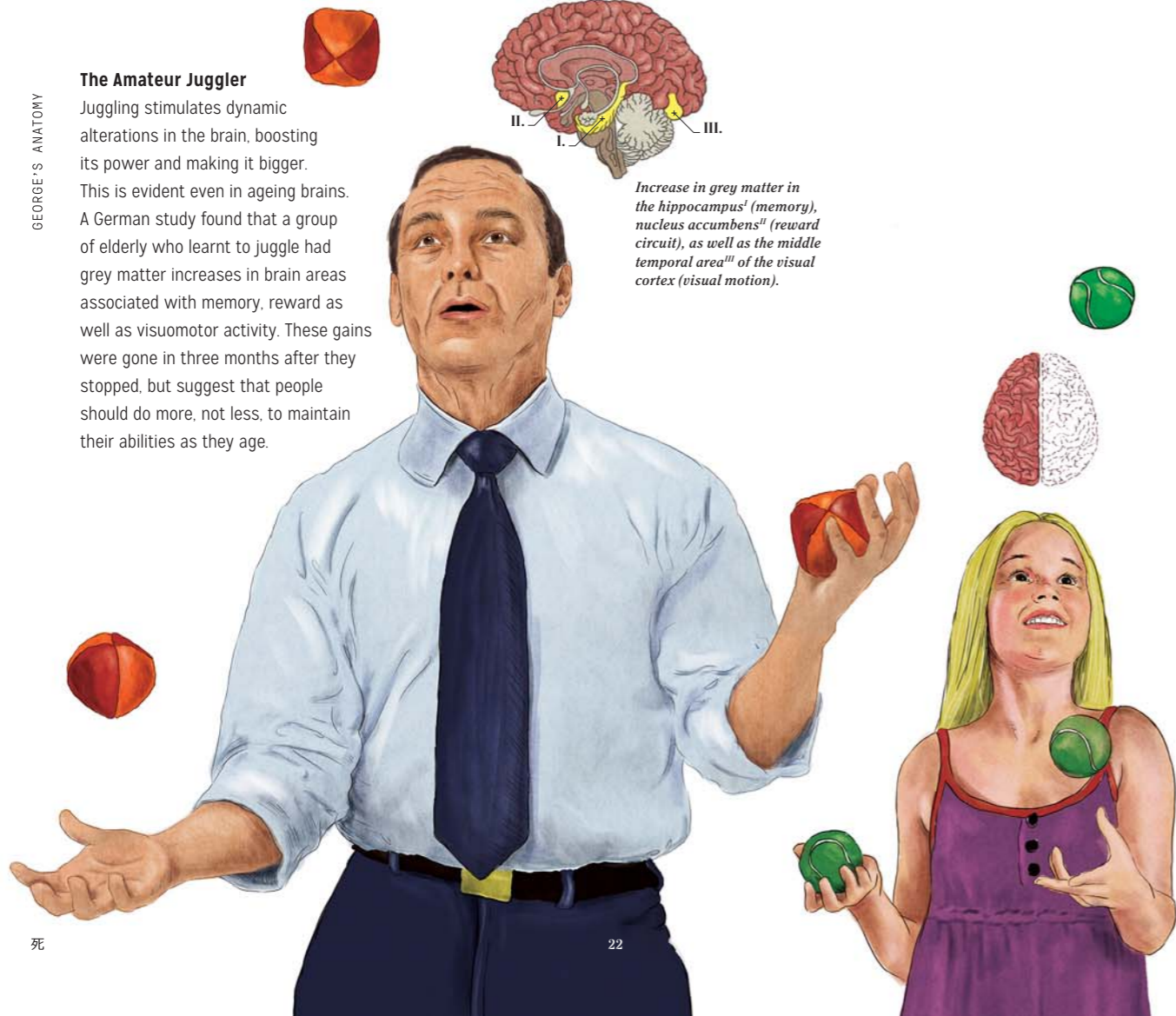
Cradle to Grave Neuroplasticity

The brain is like a muscle and we need to exercise it accordingly. It is malleable and designed to keep learning, the act of which forms new circuits or strengthens existing ones for as long as we live. This plasticity is what makes our brain so resilient, allowing it to change its structure and function in response to activity and experience. It explains why people do recover from strokes and injuries, and how those whose brains are ravaged by neurological diseases can still be cognitively intact and capable of high level functioning. Harnessing neuroplasticity holds immense promise as new therapies and brain exercises tailored to the individual could be as useful as drugs in treating a range of conditions from Parkinson's disease, to stroke, to traumatic head injury.

GEORGE'S ANATOMY

The Amateur Juggler

Juggling stimulates dynamic alterations in the brain, boosting its power and making it bigger. This is evident even in ageing brains. A German study found that a group of elderly who learnt to juggle had grey matter increases in brain areas associated with memory, reward as well as visuomotor activity. These gains were gone in three months after they stopped, but suggest that people should do more, not less, to maintain their abilities as they age.



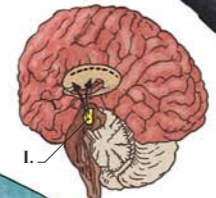
Increase in grey matter in the hippocampus^I (memory), nucleus accumbens^{II} (reward circuit), as well as the middle temporal area^{III} of the visual cortex (visual motion).

The Nun who Dodged Alzheimer's

Sister Bernadette is an escapee who hardly showed signs of mental decline but turned out to have advanced Alzheimer's. Part of a long term Nun Study, her life traits and language ability offer insights on how cognitive reserve—the mind's resilience and ability to withstand brain damage—can delay or even suppress symptoms of the disease.



Lien Foundation 2016-2017 Report



The degeneration of dopamine-producing nerve cells in the substantia nigra^I triggers functional changes in the basal ganglia network, resulting in loss of control over body movements.

The Girl with Half a Brain

At age 6, Cameron Mott was having such frequent, violent seizures that she had a hemispherectomy to remove the diseased right half of her brain. That paralysed her left body at first, but her left brain started to compensate and acquire right hemisphere functions. Now a teenager, she's able to engage in sports activities and aspires to be a maths teacher.

The Man who Reversed Parkinson's

By using a different part of his brain to consciously control and retrain his movements, John Pepper overcame his debilitating symptoms and no longer needs medication. Now in his 80s, he dribbles no more, is able to bring a drink to his lips without tremor, speaks without slurring, and walks without the typical shuffling gait of someone with the disease.



Principal Matters

a leadership programme

Research has shown that principals' leadership is second only to teaching in terms of impact on child outcomes. But leaders are not born overnight. In Singapore, teachers are becoming preschool principals at a younger age – many tend to be in their late 20s – due to the ramping up of pre-schools coupled with a manpower shortage.

As available training for them is limited, we came up with Principal Matters, a six-month programme that is guided by a framework laying out attributes of successful preschool principals. It was specially developed by management consultancy firm Korn Ferry Hay Group.

SEED Institute, Singapore's largest training provider in early childhood education, leads the local leg of the programme, where participants are mentored by senior and former principals and learn to translate their vision into practice. They also attend a five-day workshop by Sequoia Group, a firm that trains corporate leaders and senior civil servants.

In a module developed by Wheelock College, one of the world's oldest leaders in early childhood education, participants also get to visit the education mecca of Boston, where they experience first-hand the best practices adopted there. The programme also offers attachments tailored to each participant's individual learning goals.

Conducted in six cohorts over three years, each graduating batch will help to mentor future participants, forming a tight-knit community of top principals over time. By 2019, Principal Matters would have groomed 150, or about 10 per cent, of Singapore's preschool principals. Singapore University of Social Sciences will follow up with a qualitative study of leadership practices of the programme's participants.



My First School

a channel 8 drama serial

To elevate the public appreciation of preschool teachers, we jointly commissioned a MediaCorp Channel 8 drama serial 快乐第一班 together with NTUC First Campus. Told through the eyes of a kindergarten teacher, the drama gave viewers a better understanding of the challenges and rewarding aspects of the profession.

This eight-episode series garnered on average about 400,000 viewers per episode when it ran from 12 April to 31 May 2016. It starred Julie Tan, Xiang Yun, Chew Chor Meng and Chen Liping, best known for her role as school teacher 'Miss Ai Yo-Yo' in the 1989 hit drama 'Good Morning, Sir!'.



Hack Our Play

reimagining childhood haunts

In Singapore, playgrounds often follow a cookie-cutter model that leave little to the imagination. Hack Our Play is an initiative that lets preschool children, educators, parents and members of the community co-create their very own play space amid growing research on the benefits of child-directed play.

To demonstrate how this could be carried out, we embarked on an eight-month discovery alongside organiser Participate in Design to hack the playground at the Gilstead Road campus of St. James' Church Kindergarten.

Children were encouraged to be creative and solve problems as they were given freedom to construct, dismantle and rebuild moveable structures made of materials not commonly found in typical playgrounds. At the same time, educators and parents enhanced their teaching and parenting skills as they facilitated children's learning through play.

Everyday materials like bottles, ropes, tyres, crates and even kitchenware were used to create diverse play experiences for the children. For instance, children discovered how to create their own music and rhythm with the hanging pots and pans and navigate new obstacles from stacking crates and barrels.

More than 400 people including architects, designers and playground suppliers gave input on various aspects such as safety and spatial-influenced behaviours. An online tool kit containing ideas, design tools and practical know-how is being developed so interested organisations will be able to create their own community-built play spaces too.



Australia's Preschools

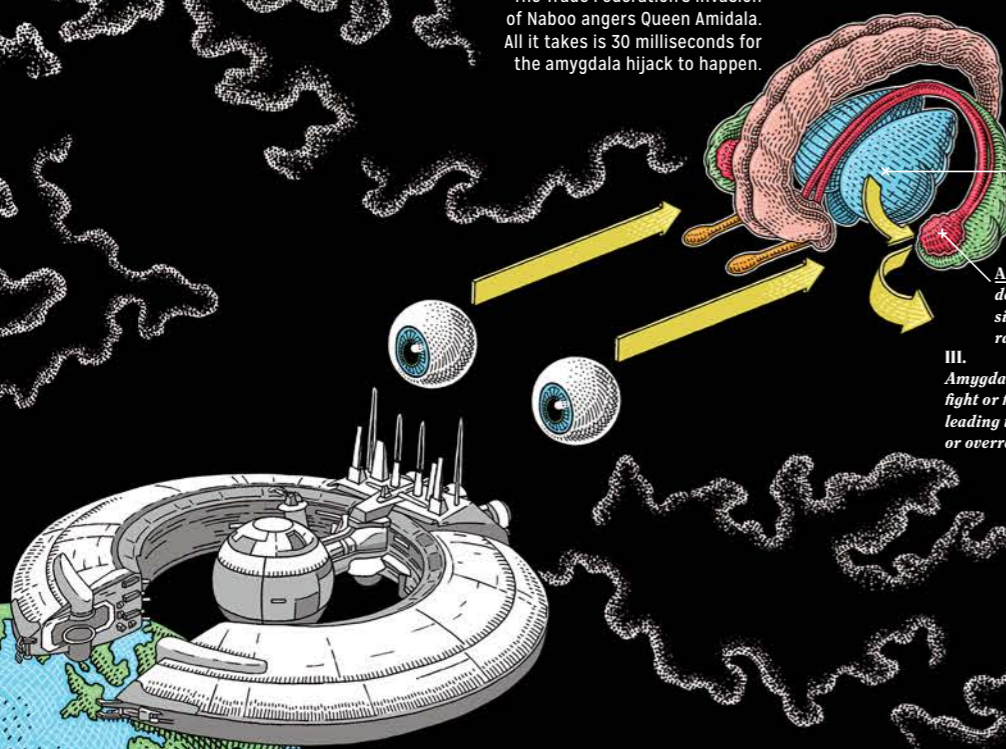
opening the mind with new insights

We took early childhood practitioners and journalists on a learning journey Down Under to preschools and government offices in Adelaide and Melbourne to understand how coordinated services can better support children and families in the early years.

Our Team Singapore included representatives from NTUC First Campus, AWWA, Circle of Care, and journalists from The Straits Times and Lianhe Zaobao. What has Australia done right? Here are three lessons that could be useful for Singapore:

- i. Besides providing kindergarten and childcare services, centres offer antenatal care for mothers-to-be, health checks and play sessions for babies and toddlers where mothers learn about the importance of play, talk and reading.
- ii. School leaders and teachers work closely to ensure children have a smooth transition to formal schooling. For instance, preschool heads and teachers visit the primary schools and share learning portfolios of children heading there, while their primary school counterparts visit preschools to align their curriculum and teaching to suit the children.
- iii. In one of the schools we visited, mindfulness programmes were conducted for children to help them regulate their emotions as well as develop concentration and self-awareness. These are just as important as literacy and numeracy skills.

The Trade Federation's invasion of Naboo angers Queen Amidala. All it takes is 30 milliseconds for the amygdala hijack to happen.



- I. Thalamus receives stimuli and relays it to neocortex and amygdala.
- II. Amygdala receives signal first and does quick threat assessment before signal reaches the neocortex, the rational thinking part of the brain.
- III. Amygdala triggers the fight or flight response, leading to an outburst or overreaction.

The Amygdala Hijack

Our survival instincts can overpower our thinking. A hijack happens when signals are short-circuited to the emotional part of the brain and it starts to call the shots, shutting down your slower, thinking brain that is the neocortex.

Blame the amygdala, two small almond-shaped nuclei behind the eyes. It is part of the limbic system, one of the oldest parts of the brain also called the 'emotional brain' where our feelings reside.

When we perceive a threat, the amygdala sounds an alarm, releasing a cascade of stress hormones into our body, triggering a fight or flight response. This was helpful to our ancestors who had to hunt and defend themselves from predators.

Destruction of the amygdala, as seen in patients with rare genetic conditions, renders them less capable of detecting danger and results in fearless and disinhibited behaviour. It could also lead to hypersexuality and hyperorality, the tendency to put things in the mouth.

In today's context, a meltdown or emotional outburst are signs of the amygdala taking over. Young children are particularly susceptible. After all, they experience everything through their emotional brain as their 'thinking brain' is still being wired.

We can, with practice, assert control over the amygdala to foil this hijack. Having a conscious awareness of your emotions gives your thinking brain the heads-up and it can then regulate that outburst.



Master the Monkey Mind

We are all victims of the monkeys within us. In our modern culture of constant distraction and instant gratification, it's the mindless mind that swings from one branch of thought to the next, all clamouring for attention.

We can train our minds to make life easier for ourselves. An ancient art that dates back thousands of years, mindfulness practices such as meditation pay attention to the breath and train the mind to distance itself from thoughts and emotions. This has lasting effects on brain function. It has shown to impact neural pathways within the brain, rewiring it to be more resilient.

Regular mindfulness practice can lessen anxiety, improve concentration, boost the immune system and even slow the age related loss of grey matter in the brain.

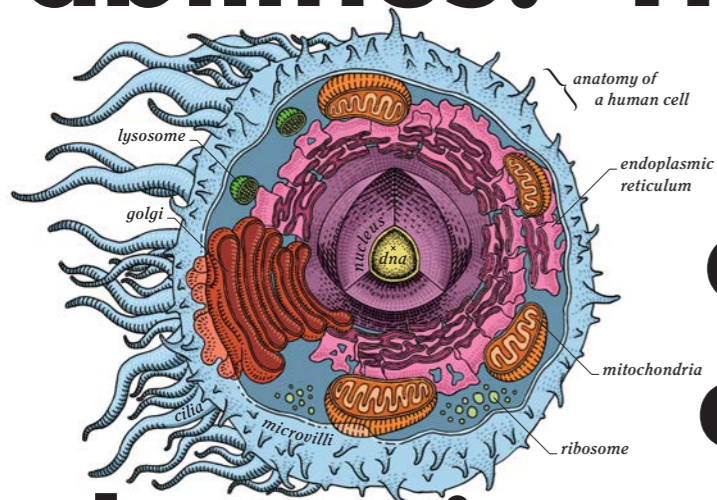
Its effects could even be more promising for young, developing brains. In one study, a district in San Francisco started a twice daily meditation programme in some of its schools with high risk children and over a four year period saw a 79% reduction in suspensions. Grades and attendance improved too. For children dealing with multiple stressors, it's not just a reprieve from their environment but an opportunity to process their feelings and manage their emotions effectively. This, in turn, leads to more responsible decision making and positive behaviour.

Famous practitioners include Lady Gaga, Oprah Winfrey, Kobe Bryant as well as the late Steve Jobs and Lee Kuan Yew.





Ageing is more than skin deep. As you gain liver spots, you lose some of your abilities. This is because we

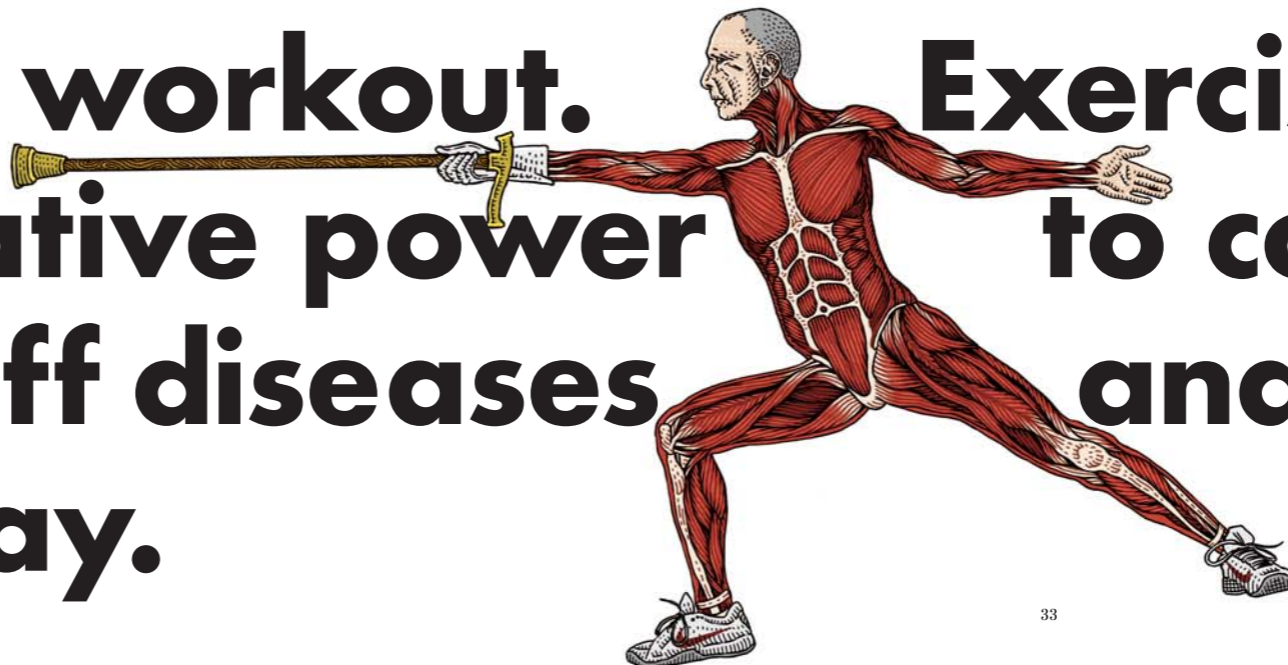


produce fewer cells as existing ones are damaged over time.



Those in search of the fountain of youth will find it in a workout. Exercise has

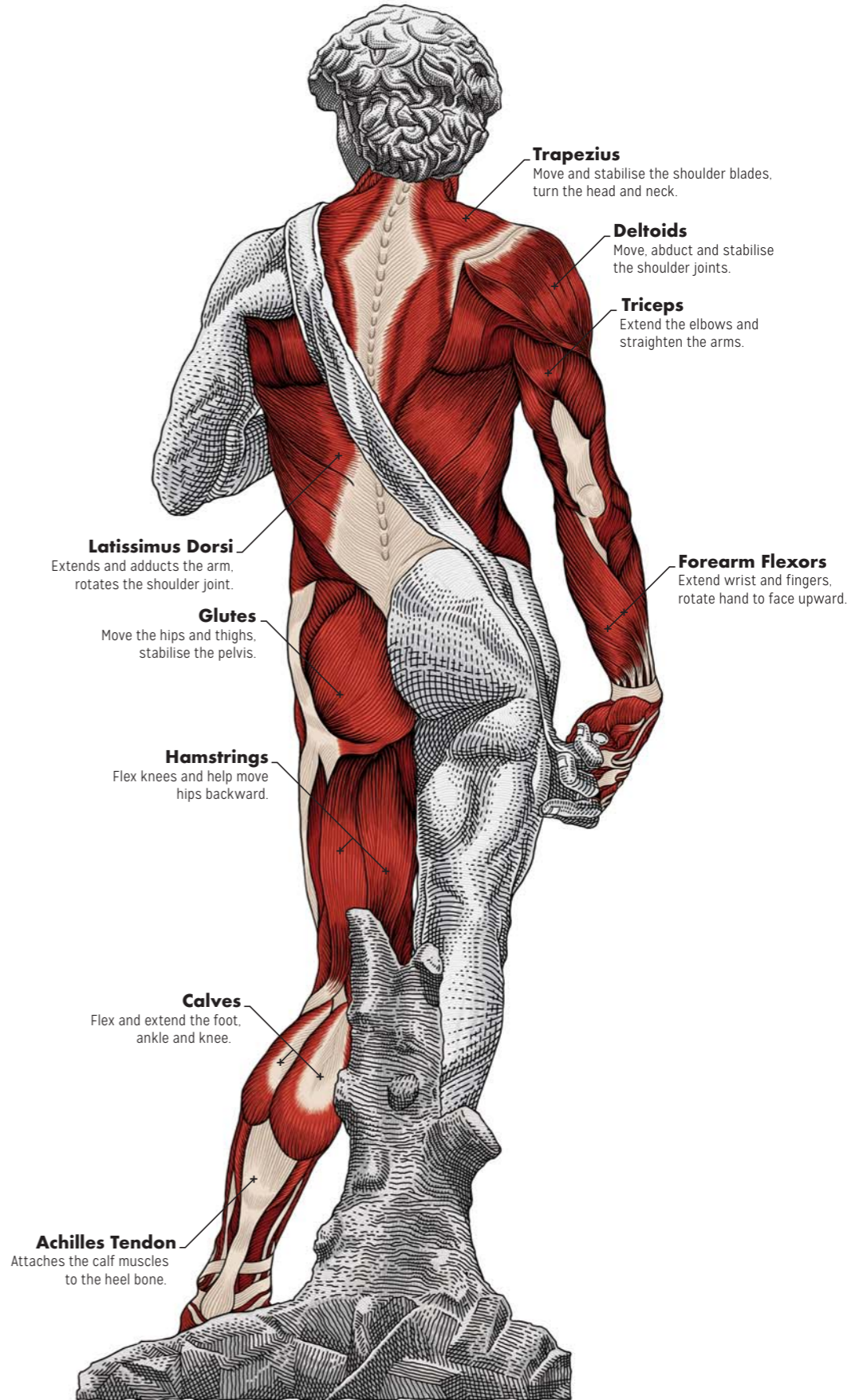
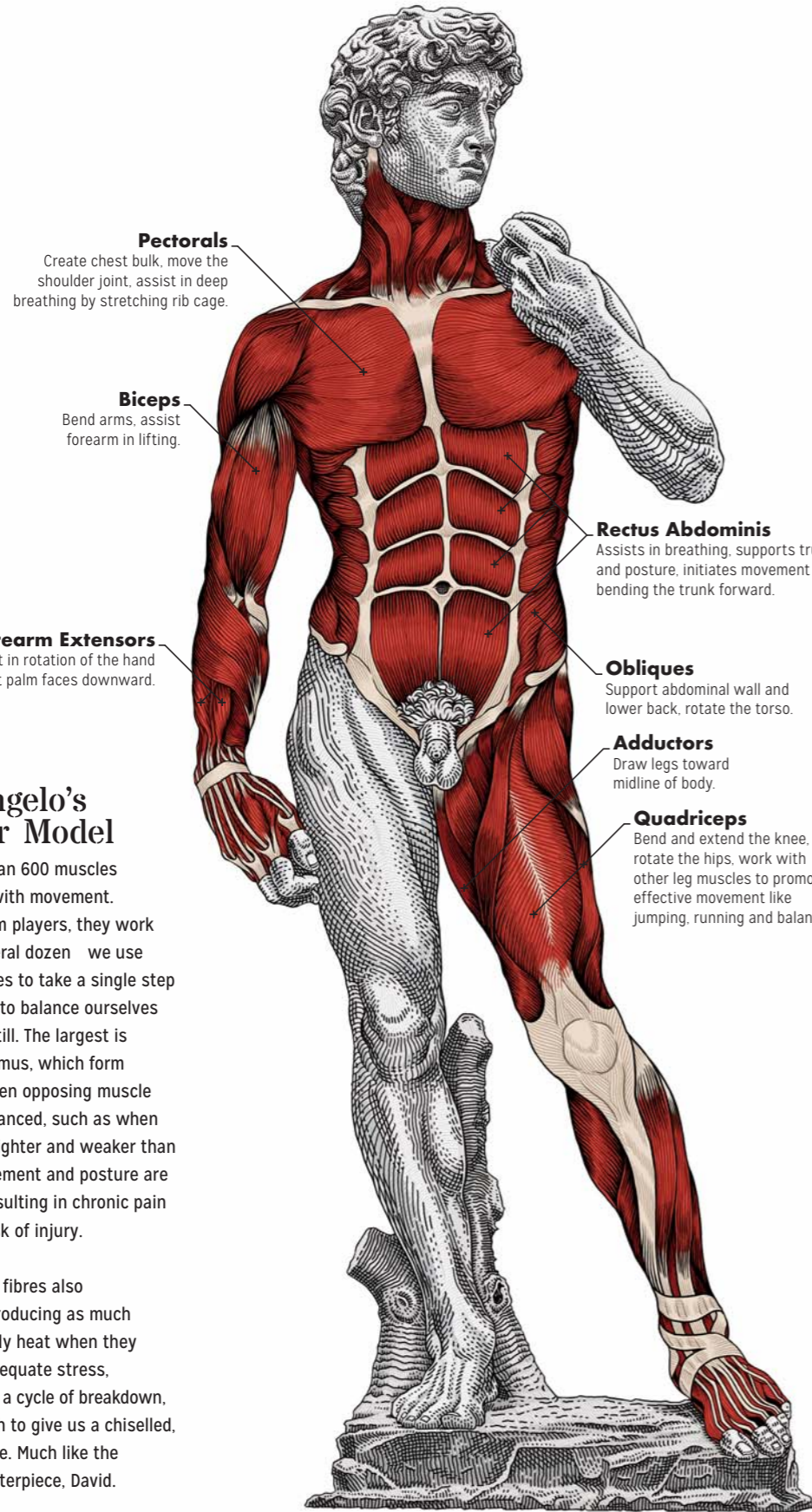
the transformative power to combat frailty, stave off diseases and keep dementia at bay.



Michelangelo's Muscular Model

We have more than 600 muscles that bestow us with movement. The ultimate team players, they work in groups of several dozen we use about 200 muscles to take a single step forward and 300 to balance ourselves while standing still. The largest is the gluteus maximus, which form the buttocks. When opposing muscle groups are imbalanced, such as when hamstrings are tighter and weaker than quadriceps, movement and posture are compromised, resulting in chronic pain and increased risk of injury.

These bundles of fibres also keep us warm, producing as much as 70% of our body heat when they contract. With adequate stress, muscles undergo a cycle of breakdown, repair and growth to give us a chiselled, sculpted physique. Much like the well defined masterpiece, David.



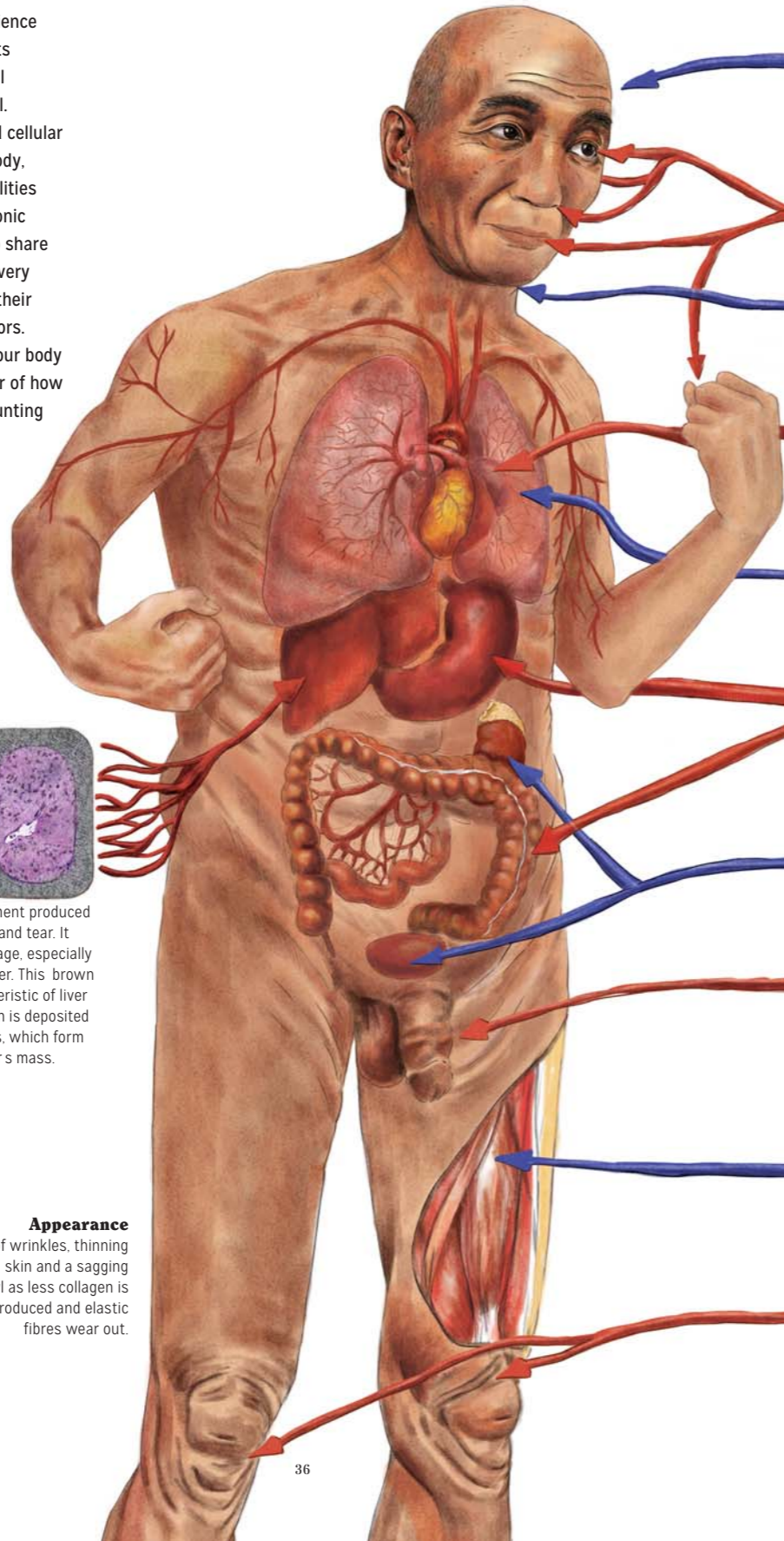
The Essence of Senescence

The physical decline we experience with the coming of age results from degeneration and gradual breakdown at the cellular level. As the years pass, genetic and cellular damage accumulates in our body, driving a loss in functional abilities and increasing the risk of chronic diseases. However, those who share the same birthday can age at very different rates, depending on their genes, lifestyle and other factors. Our biological age — how well our body is coping — is a better indicator of how old we are as compared to counting the years we live.

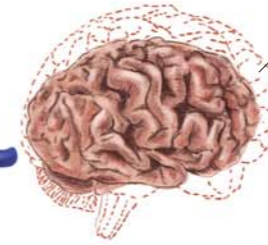


Lipofuscin is brown fatty pigment produced from cellular wear and tear. It accumulates with age, especially in the heart and liver. This brown atrophy is characteristic of liver ageing as lipofuscin is deposited within hepatocytes, which form the bulk of the liver's mass.

Appearance of wrinkles, thinning skin and a sagging jowl as less collagen is produced and elastic fibres wear out.



Brain shrinks and neurons decrease. This may affect coordination, memory and result in slower reflexes.



By age 80, the average human brain may lose 15% of its original mass. This loss is more pronounced for those with dementia, associated with a decline in neurons and the connections between them.

Five Senses in particular sight and sound, become less acute due to changes in the sensory organ as well as the central nervous system processing information. Balance, controlled in the inner ear, may decline.



By age 50, lens of the eyes lose fluid and flexibility, making it harder to focus on near objects and see in dim light. Cataracts form in the eye lens, clouding vision.

Bones lose density, mass and minerals. They become more brittle and are likely to fracture. Spinal column is compressed as intervertebral discs lose fluid and height. Posture becomes more stooped.



After age 35, bone mass tends to decrease at about 1% per year. This loss is accelerated for women after menopause.

Blood Vessels thicken and stiffen, raising blood pressure. **Heart** works harder to pump blood to other parts of the body.

Lungs lose elasticity and capacity. Number of functional alveoli (tiny air sacs responsible for efficient gas exchange in lungs) and cilia (tiny little hairs which clear our airways of mucus and dirt) is reduced.

Digestive Tract may be less efficient in breaking down food as muscle contractions are slowed and secretions are reduced. Bowel movements become less frequent and may even lead to constipation.

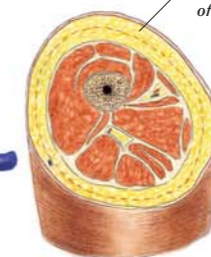
By age 60, digestive problems such as constipation become more common.

Kidneys become less efficient in removing waste from the bloodstream. **Pelvic Floor Muscles** weaken, leading to urinary incontinence.

Reproductive Organs such as the testes in males, shrink and soften. In females, ovaries stop producing eggs and become smaller.

By age 65, the bladder's capacity may be halved to about 250ml.

Muscles atrophy and lose tone. After the age of 30, we lose about 3 to 8% of our muscle every decade, and that decline becomes more pronounced in our 50s. By age 80, we may lose up to 50% of muscle mass.



By age 75, the percentage of body fat is likely to have doubled from young adulthood, with fat mainly deposited around the torso.

Joints become stiffer and less flexible. Connective tissue within ligaments and tendons become rigid.



By age 65, at least one in two people would have osteoarthritis, which is caused by cartilage degeneration.

The Complexity of Frailty

An overlooked condition that is often mistaken as an inevitable result of ageing, frailty is a state of vulnerability characterised by a marked decline in health and function. Linked to a host of medical conditions, this silent syndrome represents a huge challenge for any healthcare system. Physiological changes, such as deteriorating nerve cells, mean the nervous system is less able to activate skeletal muscles effectively, leading to a loss in strength. This can be worsened with neurological disorders such as stroke. With weakened muscles, swallowing becomes more difficult. Compounded with inadequate nutrition and exercise, a vicious cycle of frailty develops. In Singapore, close to half of community dwelling seniors are estimated to be frail or pre frail.

Malnutrition

is a growing problem among older people due to taste disturbances, reduced appetite, digestion problems and limited access to nutrient rich food. They also tend to be protein deficient as the body's ability to synthesise protein weakens with age. Hence, it is necessary to pump up protein intake to aid muscle health and function, maintain energy balance, manage weight and prevent the onset of chronic diseases.

In Singapore, separate studies have found around half of seniors in nursing homes to be malnourished. This, in turn, is linked to prolonged hospital stays and increased risk of death. Among seniors living within the community, nearly a third were found to be at risk of malnutrition. The good news is that the condition can be prevented or reversed if addressed early with the help of nutrition therapy coupled with strategies to promote optimal nutrition intake. A 5 to 10% drop in weight within six months is a warning sign that requires medical attention.

Sarcopenia

is the loss of muscle mass, strength and function. Considered a key component of frailty, it is caused by a gradual decline in muscle tissues and fibres. Weak muscles also place increased stress on certain joints, such as the knees, predisposing seniors to falls and conditions like arthritis. The loss of muscle protein, meanwhile, affects immunity and insulin absorption, and may even increase the risk of Type 2 diabetes. A recent local study has shown a high prevalence of frailty and sarcopenia among elderly patients. Researchers screened 115 patients aged 65 or older who attended outpatient clinics at NUH and found 44% of them to be sarcopenic. In this sarcopenic group, around half were frail. When examining patients who were frail, close to 9 in 10 were sarcopenic.

Dysphagia

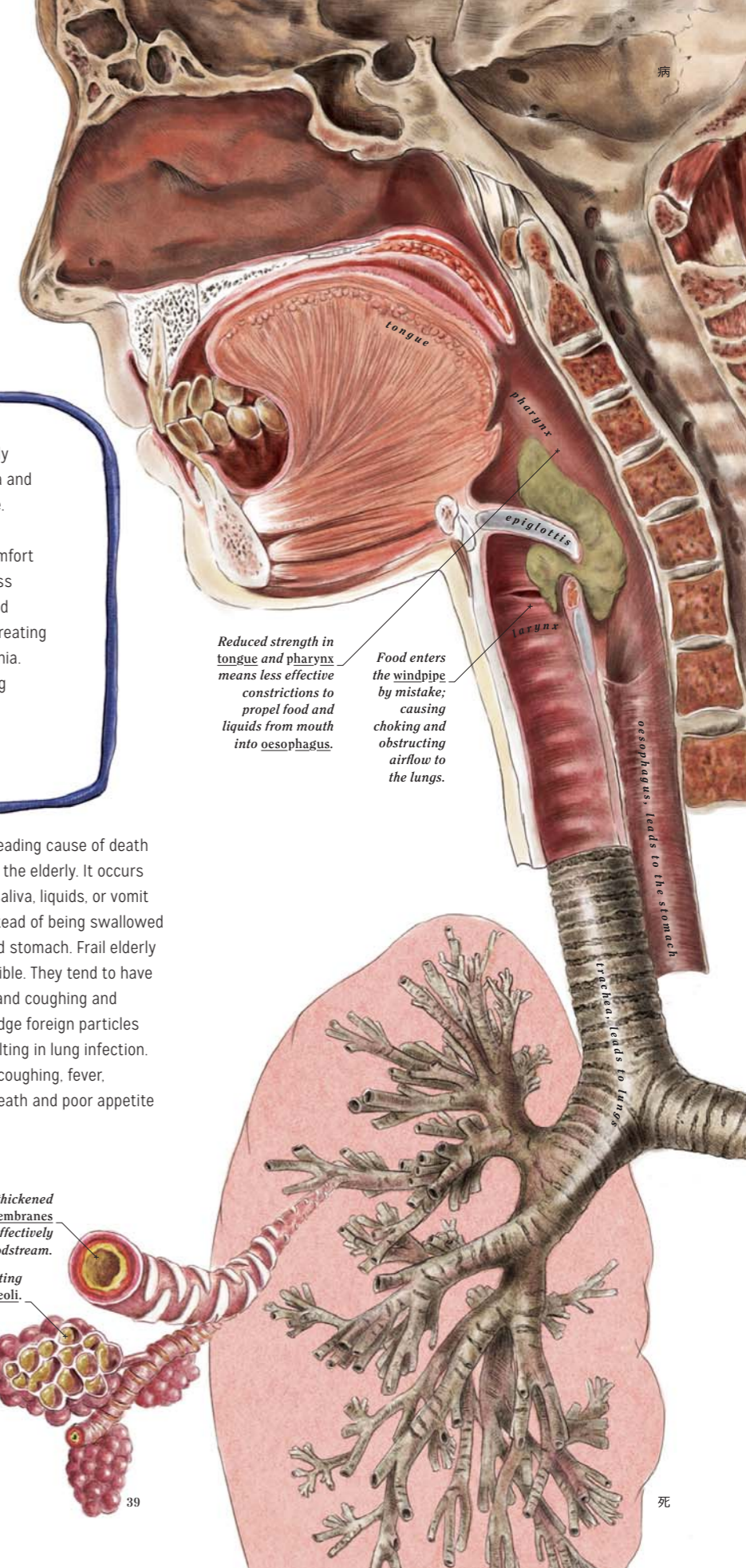
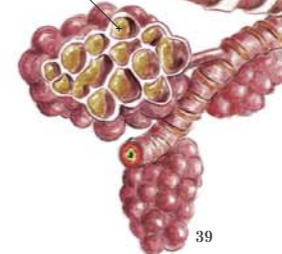
impairs our ability to swallow and is commonly associated with increased age, dementia and cerebrovascular diseases such as stroke. Seniors with dysphagia slowly lose their interest in eating because of pain, discomfort and fear of choking, triggering weight loss and malnutrition. In some cases, food and bacteria enter the windpipe and lungs, creating additional risks of infection and pneumonia. In Singapore, 30 to 50% of people needing long term care are believed to have swallowing difficulties.

Aspiration Pneumonia

is the leading cause of death among the elderly. It occurs when bacteria in food, saliva, liquids, or vomit enter into the lungs instead of being swallowed into the oesophagus and stomach. Frail elderly are particularly susceptible. They tend to have difficulties swallowing and coughing and are thus unable to dislodge foreign particles from the windpipe, resulting in lung infection. Symptoms may include coughing, fever, fatigue, shortness of breath and poor appetite or weight loss.

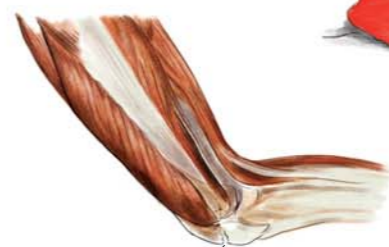
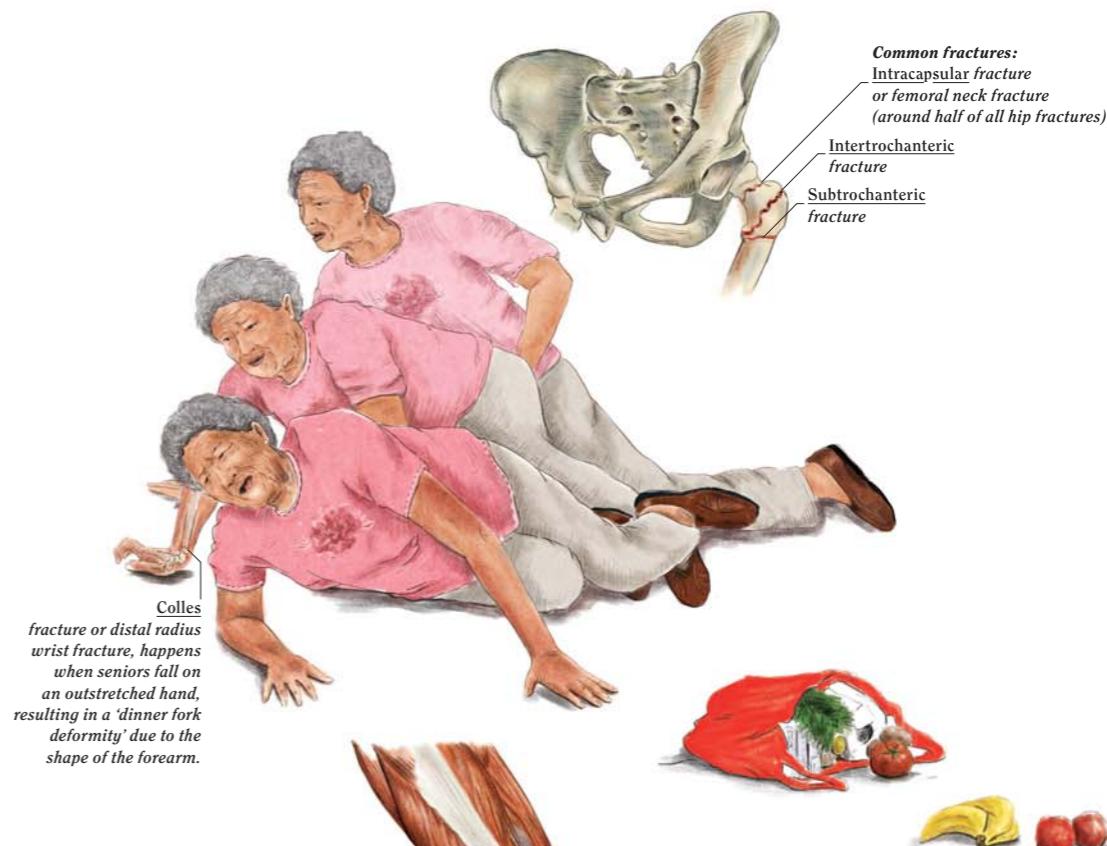
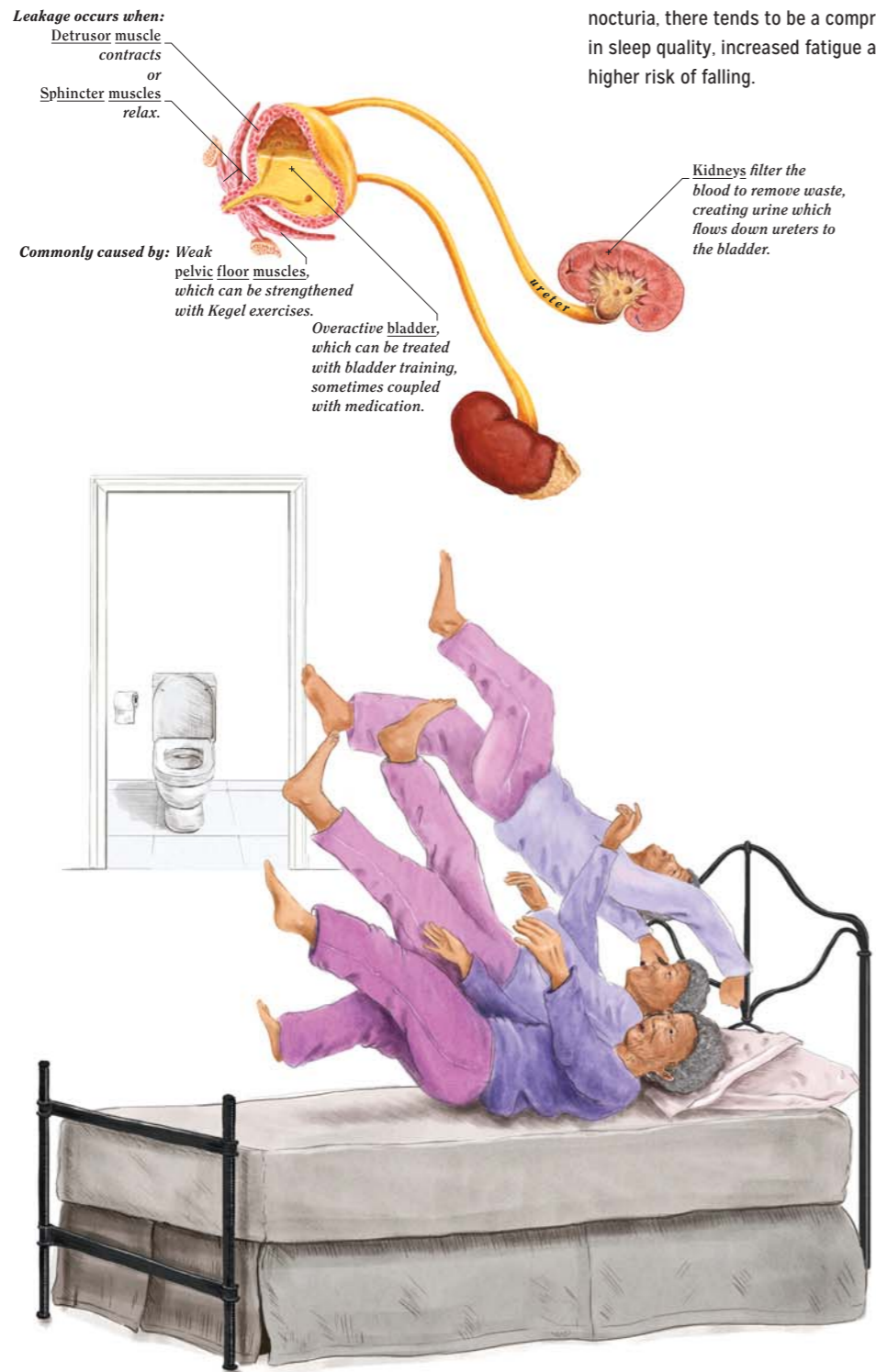
Inflamed and thickened alveoli membranes mean oxygen can't effectively reach bloodstream.

Fluid collecting in alveoli.



Incontinence & Sleep

As we age, the ability to control our bladder decreases. This raises the risk of urinary incontinence, which can range from mild leaking of urine to uncontrollable wetting. When the need to pass urine happens excessively at night, a condition known as nocturia, there tends to be a compromise in sleep quality, increased fatigue and a higher risk of falling.

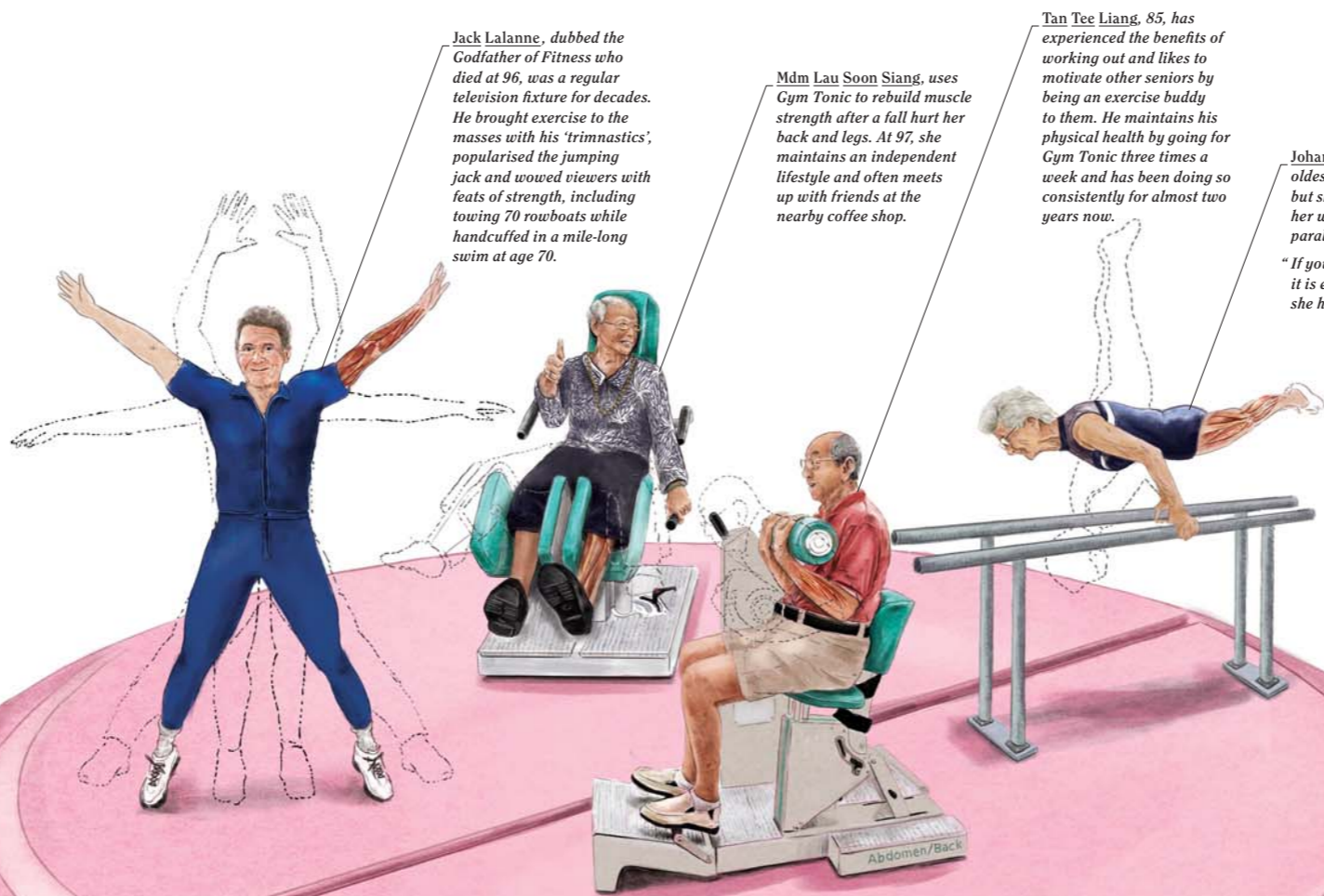


Falls & Fractures

About one third of Singaporeans aged 60 and above have recurring falls. The risk increases with age and frailty. Besides experiencing a greater functional decline and a subsequent loss of independence, the elderly subsequently develop a fear of falling, which often leads to withdrawal from social activities, anxiety and depression. Among the most serious injuries sustained from a fall is a broken hip about 20% of elderly hip fracture patients die within a year of falling and only 25% actually make a full recovery.

Exercise as Polypill

When we exercise, contracting muscles release myokines, proteins which promote tissue regeneration and repair as well as anti-inflammatory functions. Regular physical activity also slows the accumulation of free radicals in the mitochondria, the energy producers for cells. Strength training in particular is effective in staving off muscle loss and frailty. It helps to relieve chronic pain and mitigate the symptoms of conditions ranging from heart disease to arthritis and osteoporosis. As exercise improves the body's use of insulin, diabetes can be prevented or controlled. It also protects the mind by stimulating production of BDNF in the brain, a naturally occurring growth hormone that improves cognition and alleviates anxiety and depression.



Jack Lalanne, dubbed the Godfather of Fitness who died at 96, was a regular television fixture for decades. He brought exercise to the masses with his 'trimnastics', popularised the jumping jack and wowed viewers with feats of strength, including towing 70 rowboats while handcuffed in a mile-long swim at age 70.

Mdm Lau Soon Siang, uses Gym Tonic to rebuild muscle strength after a fall hurt her back and legs. At 97, she maintains an independent lifestyle and often meets up with friends at the nearby coffee shop.

Tan Tee Liang, 85, has experienced the benefits of working out and likes to motivate other seniors by being an exercise buddy to them. He maintains his physical health by going for Gym Tonic three times a week and has been doing so consistently for almost two years now.

Johanna Quaas is the world's oldest gymnast at age 91, but she doesn't let age get in her way as she navigates the parallel bars with dexterity. "If you are fit, it is easier to master life," she has said.



Hitting that goal of 10,000 steps a day could feel oddly rewarding. However, the target is merely an arbitrary number invented in 1960s Japan and not indicative of your fitness level. For older people who find walking difficult, it might even do more harm than good.



Frail seniors are more prone to falls, fractures, disability and even death. As a result, they tend to have heavy care needs and chalk up higher healthcare costs.

Frailty is characterised by weakness, exhaustion, slow walking speed, low activity and weight loss. Anyone who meets three or more of these five criteria is labelled by researchers and the medical community as ‘frail’. Those who have one or two of these symptoms are categorised as ‘pre-frail’ and at high risk of becoming frail. People with none of these symptoms are considered ‘robust’.

Using the prevalence estimates from a large local survey on physical frailty in seniors aged 60 and above, we may have about 44,000 frail seniors and nearly 313,000 pre-frail ones living in our midst, comprising nearly half of all community-dwelling elderly in Singapore.

Contrary to popular belief, activities such as brisk walking, line dancing or following instructional exercise videos are not enough to prevent muscles from deteriorating. We conceived Gym Tonic, an evidence-based, strength training programme devised specifically for seniors. It helps fight ageing-related declines in muscle strength and mobility with the help of air-powered exercise machines that can track and analyse physical functions through customised software.

The programme, developed in partnership with local technology company PulseSync, assesses, prescribes, tracks and evaluates exercise for the elderly. Strength training, the core feature of the programme, is an internationally proven way to tackle the age-related loss of muscle mass, quality and strength, a condition known as sarcopenia.

Gym Tonic is rooted in clinical research, anchored by four key components:

- i. A set of six air-powered (pneumatic) elderly friendly exercise machines from Finland, which can strengthen core muscle groups.
- ii. Measurement instruments and assessment protocols to evaluate indicators such as body composition and muscle strength.
- iii. Training and research support from the University of Jyväskylä in Finland.
- iv. Software and data analytics to capture and track workout performance, such as repetitions and weight load, which can be analysed to inform more effective interventions.

Building a coalition

We have equipped and trained like-minded organisations to run a structured strength training programme safely and effectively. To date, more than 2,500 seniors are registered on Gym Tonic across 26 sites, comprising 14 senior care and day rehab centres, six nursing homes, three community organisations, two senior activity centres and a sheltered home. We are planning to launch more sites to reach out to more seniors within the community. Gym Tonic was used as a case study on philanthropy by NUS Business School. It was also the campaign brief at the Creative Circle Awards’ NexGen Challenge where young creatives pitched their ideas to promote the initiative.

Results

Gym Tonic has shown that physical decline can be reversed with strength training. We commissioned a study to evaluate about 400 seniors in nursing homes and senior care facilities who were on the Gym Tonic

programme, which involved regular 30-minute strength training exercises on the machines twice a week.

After three months, 41 and 55 per cent of frail seniors in nursing homes and senior care centres respectively on this regime progressed to the pre-frail state. It has also been effective for community-dwelling seniors in the study – one in four improved from pre-frail to robust.

On average, seniors on Gym Tonic saw substantial gains of about 15 to 20 per cent in overall muscle strength. This is similar across different types of senior care facilities and consistent with other studies in Finland. So far, there has been interest from Malaysia, Hong Kong, Taiwan and China to adopt Gym Tonic.

Personal transformations: Regained strength to walk

Mdm Tham Lai Lin, 99, who has Alzheimer’s, suffered seven falls in the past two years due to her weak knees, swollen legs and poor balance. Because of that, she was frequently hospitalised and had to be confined to a wheelchair. After three months on Gym Tonic, she is able to stand up and walk for 100 metres straight with the help of a walking frame. Staff at St. Andrew’s Nursing Home, where she resides, have also noticed she is more alert, cooperative and sociable.

Improved continence, better sleep

Mdm Yap Ah Fook, 80, saw improvements in her energy levels and sleep quality after joining the programme at Care Corner Senior Activity Centre in Toa Payoh. While she used to have weak hips, she found that the targeted exercises strengthened her pelvic floor muscles – she does not need to go to the toilet as frequently at night and sleeps better.

Ditched walking frame, found a job

Mr Oh Sing Hock, 66, was suffering from

numbness in both hands and had an unsteady gait due to an ageing-related spinal condition. After undergoing surgery, he had to use a walking frame and he stayed mostly at home. But six months after Gym Tonic, he is able to walk independently. The programme did wonders for his confidence as well – he even found a job as a general worker at a school near his home.

Gym Tonic cheerleader

Mdm Choa Choi Huei, 74, used to be intimidated by gym equipment, but after experiencing initial benefits being on Gym Tonic, she was inspired to continue. Over the course of a year, she lost 17kg, bringing her weight a step closer to the healthy range. She has even become a mentor of sorts, cheerfully imbuing newcomers with her ‘can-do’ spirit and is always there to help familiarise them with the machines.

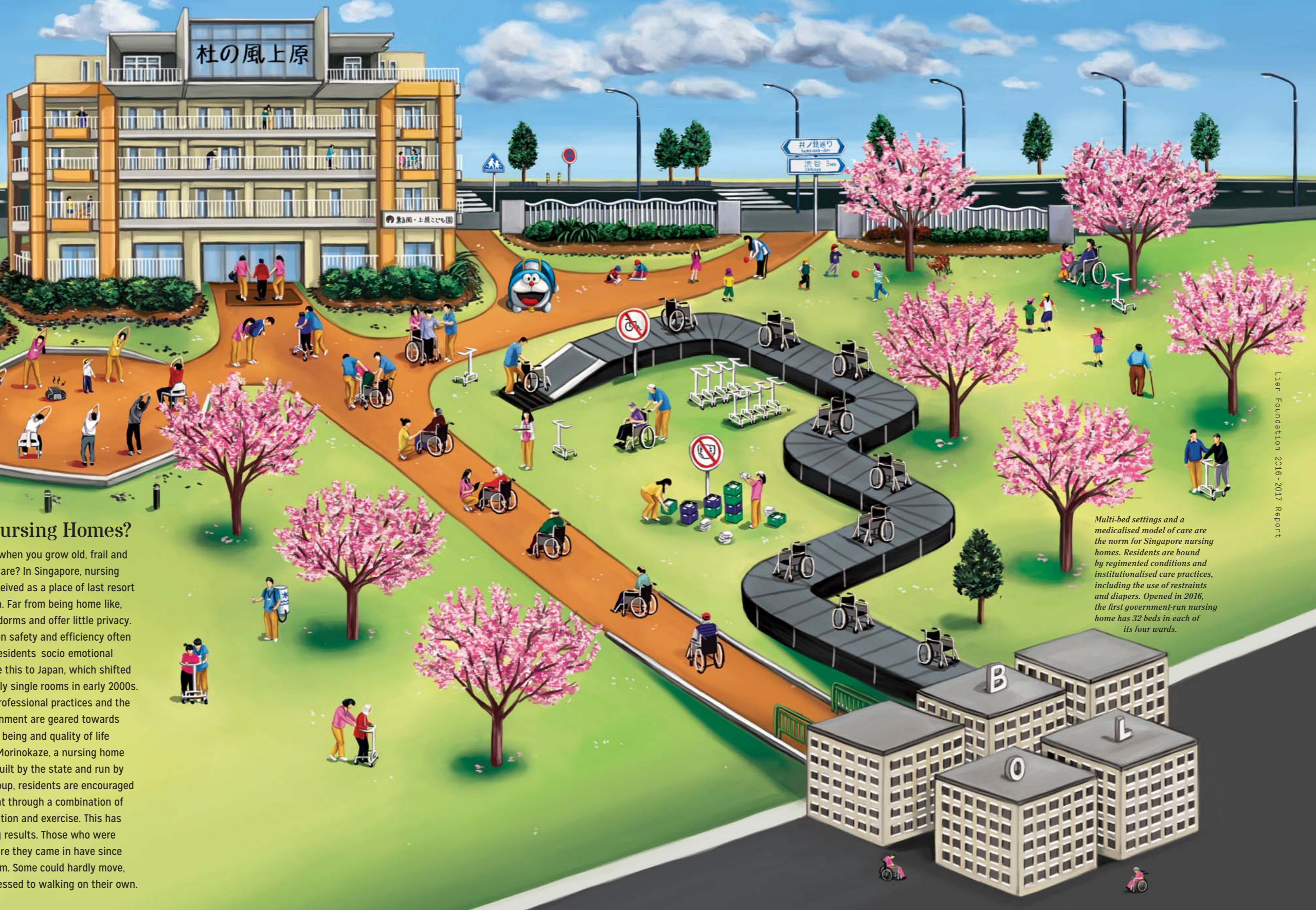
From fat to fab and free from pain

Mdm Chin Nyok Chu, 69, used to have backaches, weak limbs and depended on a walking stick. After attending thrice weekly sessions of Gym Tonic over 12 weeks, her pain has disappeared – and so has her walking stick. She picks her grandchild up from school every day and is able to walk up to 1.5km – twice as far as before – without needing to rest. Once a size XXL, she is delighted to now fit into size L clothes.

When dreams come true

Patricia and Soo Jin, a couple in their 70s, attended Gym Tonic as part of training to strengthen and prepare themselves for a three-day mountain trek in New Zealand, an item on their bucket list. Both blazed their way through the harsh terrain and even helped others along the way. Having experienced first-hand Gym Tonic’s ‘exercise as medicine’ mantra, they even convinced 10 of their friends to join the programme.

Morinokaze occupies an old school compound in Shibuya and houses a kindergarten where children join the elderly for regular activities. In keeping with its no-diaper policy, residents are given fibre supplements instead of laxatives for their constipation and all rooms have ensuite toilets equipped with support frames. Bed sensors help track residents' movement as restraints are prohibited by law.



BOLD Nursing Homes?

What happens when you grow old, frail and are in need of care? In Singapore, nursing homes are perceived as a place of last resort for good reason. Far from being home like, they resemble dorms and offer little privacy. The emphasis on safety and efficiency often compromises residents' socio-emotional needs. Compare this to Japan, which shifted to building solely single rooms in early 2000s. Programmes, professional practices and the physical environment are geared towards enhancing well-being and quality of life for seniors. At Morinokaze, a nursing home designed and built by the state and run by a non-profit group, residents are encouraged to be self-reliant through a combination of nutrition, hydration and exercise. This has reaped fulfilling results. Those who were on diapers before they came in have since weaned off them. Some could hardly move, but have progressed to walking on their own.

Multi-bed settings and a medicalised model of care are the norm for Singapore nursing homes. Residents are bound by regimented conditions and institutionalised care practices, including the use of restraints and diapers. Opened in 2016, the first government-run nursing home has 32 beds in each of its four wards.



Economics of Singapore Nursing Home Care

homing in on the numbers

Single or twin bed rooms have long been the norm for nursing homes in most advanced countries, but not for Singapore. In fact, a seminal research by Japanese Prof Tadashi Toyama has shown that contrary to prevailing opinion, those with their own rooms are more emotionally stable, sociable and engaged in daily activities compared to residents in multi-bedded rooms. They even eat and sleep better, while care staff have reported greater job satisfaction and reduced workloads.

Together with Khoo Chwee Neo Foundation, we commissioned global strategy consultancy Oliver Wyman to evaluate the impact of adopting a different model of care. Working with local nursing home leaders, architects and clinicians, a more home-like alternative model was proposed in the form of HDB-style rooms for residents, including living and dining areas. Each household of 10 residents would be staffed with a trained Senior Care Associate to coordinate with the clinical and ancillary support teams.

It turns out that quality of care and the levels of privacy and autonomy for nursing home residents can be ramped up significantly for just \$12 more a day in a scenario where all are single rooms, and an additional \$5 more if a resident has dementia.

More nursing homes are being built now than ever before. Even if the upcoming 5,000 beds are to be converted to all single rooms with half of the beds set aside for seniors with dementia, the total incremental costs will work out to \$26.5 million more per year, or just about 0.24 per cent of the annual public healthcare budget.



Supporting Aspirations in Aged Care

a consumer survey

Longevity bestows many blessings, but is also fraught with questions and concerns.

What kind of aged care would we like for fast-ageing Singapore? How will we finance that care? Are we worried about ageing? Are we financially prepared?

These were some of the questions we asked in a public survey to better understand Singaporeans' hopes and fears about ageing and enable care providers to get a better grasp of future needs.

The survey, conducted by Nielsen Singapore and in partnership with NTUC Income, polled close to 1,000 respondents between 30 and 75 years old on topics like expectations of aged care services, housing alternatives like assisted-living facilities and long-term care insurance. The results showed that good health, being financially prepared and having a sense of purpose as we age were our collective wishes.

Unsurprisingly, 8 in 10 people were worried about ageing. They feared being unable to care for themselves and running out of savings. Younger respondents were most worried about how they would finance their care once they grew old, while those already in their 60s and 70s did not want to be a burden on their families.

Close to 80 per cent preferred to age at home, while almost half of respondents were willing to stay in assisted-living facilities. Meanwhile, 6 in 10 believed that nursing home residents should stay in single or twin-bedded rooms, rather than in six-bedded wards.

With an increasingly educated population and higher expectations, the gap between our aged care aspirations and what's offered on the ground must close quickly.



Safe But Soulless

in-depth study on nursing homes in singapore

A startling lack of choice in residential care, chronic manpower shortage and a financing system out of sync with the evolving nature of care are some of the biggest problems plaguing nursing homes today. These are among the top findings of the study, which was pieced together through visits to the homes, research and in-depth interviews including the operators who run around 40 of Singapore's 70-odd nursing homes.

Commissioned together with the Khoo Chwee Neo Foundation, the study throws up some surprises. For instance, as of 2016, Singapore had fewer nursing home beds per senior aged 65 and above than it did 15 years earlier. Some foreign nursing home workers are still paid less than many domestic workers. And many residents live in these institutions not because of heavy nursing needs, but because there is no one to care for them.

Recommendations were provided on ways forward. For instance, the financing model could be restructured to reward nursing homes for improving their residents' conditions and enabling them to return home, where possible. Nursing homes could come under a new law that oversees long-stay care homes instead of being in the purview of the Private Hospitals and Medical Clinics Act, which unnecessarily subjects them to over-medicalised conditions.

The number of seniors who live alone, and most likely to need residential care, will more than double to 92,000 by 2030. Given rapid ageing, growing singlehood and rock bottom fertility rates have become indelible parts of Singapore's demographic destiny, the study advocates for a greater diversity in care options and new ways to pay for them.



Anita's Nursing Home Stay

a social documentary

In late 2016, television host Anita Kapoor, 45, took a staycation of a different kind.

Instead of a swanky hotel or beachfront getaway, she volunteered to spend two weeks as a resident at The Salvation Army's Peacehaven Nursing Home. Having been a caregiver to her mother and an advocate for the elderly, she saw it as an opportunity to experience and gain insights into the day-to-day realities of nursing home life in Singapore.

Despite being filmed in one of Singapore's better-run homes, the raw and intimate 70-minute film told from Anita's perspective highlighted areas of improvement for the sector, including a less medicalised environment and practices that respect personal autonomy.

During her stay, Anita sacrificed her creature comforts and much of her autonomy as she led the life of a typical resident – she was treated like someone who could not walk, had difficulty swallowing, was incontinent and had mild dementia. She moved around in a wheelchair, slept in a six-bed ward and wore adult diapers for a week. To find out what residents who are at risk of falls go through, she was tied to her bed for a few nights – with the help of a 'body jacket'. She kept a video diary of her experiences and illuminated the film with her poignant reflections of life in a Singapore nursing home.

To accompany the film, we initiated a Consumer Charter which articulated a more evolved philosophy of care that residents can hope to get in the years to come. Most public hospitals in Singapore have their own charters, but these are virtually unheard of in the nursing home sector.



Genki Kaki

a 10-part series on senior living in Japan

In a little more than a decade, one in four Singaporeans will be a senior citizen, much like Japan today. We took a film crew and two Singaporean seniors, Elizabeth Seah, 62, and Jelly Jacintha Tan, 77, to Japan to experience the rich diversity of services and living options available. Thanks to Healthy Food Co, Ageing Asia and Sasakawa Peace Foundation who helped open doors, they visited elderly-friendly malls, restaurants, shopping streets, gyms and places that provide residential and day-care in and around Tokyo, a space-starved metropolis like Singapore.

The 10-part series of films and articles reflects on lessons therein for Singapore. Channel News Asia's digital features arm, CNA Insider, helped to broaden the reach of the stories and adapted our content into a series of short videos for their online audience.

There is much to learn from Japan's successes and failures in caring for its seniors. Unlike Singapore, Japan has a vibrant private sector offering innovative choices for seniors who need care, but is in fiscal trouble for spending too much. Singapore is on the other end of the spectrum where public spending on long term care was 0.15 per cent of GDP in 2015, lower than the average 1.4 per cent for OECD nations.

With the number of seniors set to double to nearly a million in under 15 years, physical infrastructure must be planned in advance and policies calibrated carefully. What's just as important – and harder to emulate – is the heart-ware that Japan has for its seniors. Ageing Singapore needs to find its own *Genki* – soon.



Eldercare in Japan

a media educational trip

We organised a trip to Japan for journalists from The Straits Times and Lianhe Zaobao to understand how the Japanese care for their elderly. Through visiting four different types of eldercare facilities, they learnt how the sector has managed to enhance quality of care while broadening the variety of services.

One of the highlights was the Dream of Mizuumi Centre in Tokyo, whose 'Earn and Spend' concept we will be adopting for the day activity centre in our Jade Circle project. Unlike most daycare centres where seniors follow a structured timetable, those at Mizuumi get to choose from more than 160 games and activities and decide when they want to do them. Completing their tasks and rehabilitation exercises, such as a session in the hydrotherapy pool, will earn them credits which can be used to pay for treats like massages and cooking lessons.

The learning trip inspired newspaper features describing key policy decisions, innovations and models of care that Singapore could take a leaf from. For instance, the introduction of long-term care insurance in 2000 encouraged a competitive market of service providers, mostly private players, to meet the growing demand of elderly requiring long-term care. As a result, Japanese seniors were able to benefit from a range of services from institutions of their choice.

At a time when Singapore is planning a rapid expansion of nursing home capacity, the articles helped to raise public awareness and inspire conversations on the kind of senior services we want for our parents and ourselves in the future.



Jade Circle

a new model for dementia care

Jade Circle, the nursing home project for people with dementia that was conceived to usher in a new era in eldercare, has been revived with an expanded scope to transform care and enable Singaporeans to age meaningfully.

A partnership with Khoo Chwee Neo Foundation and The Salvation Army Peacehaven Nursing Home, the project was previously shelved because of the lack of government subsidies for means-tested residents in Jade Circle's single and twin rooms. This gave us the time to reformulate and improve upon our original concept, shaped by lessons from our public survey and research projects on long-term care.

Expected to be ready by the end of 2019, Jade Circle will retain the original concept of having only single and twin-sharing rooms. It will also have a significantly bigger day-activity centre, in keeping with the national push for the elderly to age in the community.

It pioneers a culture of habilitative care which stresses autonomy and choice – from meal options to daily activities. In its new incarnation, Jade Circle will be the first residential care unit in Singapore to adopt an anti-diaper, restraint-free policy to encourage independence and well-being. It will give the elderly a chance to preserve their dignity and save care workers the menial chore of changing dozens of diapers every day.

Residents will be divided into two households in the 22-bedder extension to Peacehaven Nursing Home. A Senior Care Associate, assisted by a nursing aide, will look after residents in each household. This care team will receive continual training and also have access to nurses and other health professionals from Peacehaven Nursing Home.

The new Jade Circle two-storey day-activity centre will double up as a lifestyle club, featuring a hydrotherapy pool, café, hair salon and our Gym Tonic programme. It will be able to accommodate up to 120 seniors daily.

An 'Earn and Spend' programme, family portal and self-selection activity kiosk are some features created to empower seniors to remain active and engaged. They are rewarded with credits for completing their exercises or games, which they can use to buy whatever they like from the grocery store or café.

A dementia care training academy will serve as an active learning lab for professionals and caregivers. It will offer clinical attachments in actual care settings and the use of an online Learning Management System. The centre will also be a test bed for innovative, evidence-based practices and technologies, as well as complementary and alternative therapies for those with dementia.



IngoT PCC
enabling mass personalisation

— The elderly community comprises unique individuals who are more than just a collection of medical conditions. Yet current IT systems in the long-term care sector largely capture medical and administrative data, rather than valuable information on a person's life story.

IngoT PCC (Person-Centred Care), developed together with technology solutions provider PulseSync, unites multiple providers, professionals and family caregivers on a common platform, irrespective of whether they provide care in a nursing home, in the community or at home.

Taking a leaf from software used in the hospitality sector and social networking services, this new IT initiative boasts features including a Facebook-like timeline of history, needs and interests, effectively painting a well-rounded picture of an individual to better inform care.

For instance, staff will use the platform to update each senior's medical records and daily activities, such as his appetite, mood and behaviour, all of which can be charted to spot physical or psychosocial early warning signs. A physiotherapist will be able to pull out relevant data on rehabilitation regimen, while family members can log in to see what their loved ones have been up to and contribute relevant information. The system will also be synced with other smart devices such as vital-sign monitors, bed sensors and location trackers.

By end of 2019, the platform will be adopted by 11 voluntary welfare organisations and rolled out across 25 eldercare services and centres. They collectively serve more than 6,000 seniors, or one in four currently receiving care through MOH-funded programmes in nursing homes, day care centres and at home.



Bioethics Casebook
a guide to doing the right thing

— Ailing seniors and their families often grapple with ongoing or changing care needs, and with out-of-pocket costs for medical and non-medical services. Unclear sharing of filial obligations within families, lack of flexible work hours for caregivers and a reliance on foreign domestic workers, who may not speak the same language, are further sources of stress.

While the first volume of the casebook produced in 2014 dealt with end-of-life matters, this second volume, 'Caring for Older People in an Ageing Society', aims to foster better care practices and decision-making among healthcare professionals and caregivers by helping them to recognise and respond to situations of ethical uncertainty. For instance, what should staff do, or refrain from doing, when a resident with dementia hits another person?

Jointly developed by the National University of Singapore Yong Loo Lin School of Medicine's Centre for Biomedical Ethics, The Hastings Center in the US and the Ethox Centre in the UK, the book features 10 case studies inspired by real-life situations after consulting more than 180 professionals, including nurses, therapists and social workers. They describe some of the most complex but common ethical challenges faced by different groups in society when it comes to caring for the elderly.

Available online as an educational resource, the case studies are accompanied by expert commentaries, information on healthcare laws as well as a teaching and learning guide. It is being used locally to train ethics educators, who will in turn train other healthcare professionals. It is also used by universities in England, Ireland and Hong Kong.



Second Beginnings
envisioning the future of senior living

— What if we were free to design from scratch to meet the needs and aspirations of our seniors? What kind of spaces, living arrangements, facilities or services could we imagine?

An age-friendly city goes beyond providing ramps and railings, wide walkways, ample public seating and wheelchair-friendly public transport. It is also one where seniors can coexist in harmony with people of all ages, feeling welcome and engaged in whatever they choose to do.

We embarked on a book project with COLOURS, a design consultancy that has been working on collaborative public space design, to throw up ideas of new types of spaces that can meaningfully engage Singapore's growing ranks of seniors as they live out their golden years. At the outset, we redefined the concept of senior living to encompass not just places of care, but also those that enable seniors to feel a sense of kinship with the community, as they exercise, learn, work or play.

The result is a compilation of 10 proposed design typologies ranging from eldercare facilities to living and community spaces that take into account the distinct qualities that set future seniors apart from those of today. With smaller families, higher educational levels and better financial security, future seniors will have higher expectations and lead lifestyles that are more integrated with technology and wellness.

Treating Singapore's space crunch as a design challenge rather than an excuse, the team scoured the island to uncover unused spaces where some of the ideas can come to life to enliven the landscape and lives of seniors. They have also highlighted examples of similar concepts elsewhere in the world.

The vacant land below raised MRT tracks, for instance, can be transformed into a 'Viaduct Village' where seniors can hawk their wares, enjoy a cup of coffee with friends or work their green fingers in a community garden. Disused industrial spaces can be morphed into a 'Hobby Factory' for seniors to pursue passions old and new.

Other ideas like 'Giving Campus' brings together seniors and tertiary students in a reciprocal learning environment, while the 'Kelong Co-Op' offers baby boomers with shared interests an idyllic retirement community by the waterside.

The 'Community Pocket', a senior wellness hub, will be brought to life in a void deck in Ang Mo Kio in one of our upcoming projects with TOUCH Community Services. We hope more of these ideas will eventually come to fruition and hold pride of place in our ever-changing skyline someday.



Darn Dementia

Every three seconds, someone in the world is diagnosed with dementia. Set to overtake heart disease as a leading cause of death in developed countries, this incurable modern plague that attacks the brain has more than 100 different types, with Alzheimer's making up more than half of cases. Everyday tasks become challenging, accompanied by disorientation, personality changes and a tendency to relive the past.

Disruptive and bizarre behaviours, including meddling with faeces in extreme cases, may be a way of communicating an unmet need or discomfort such as pain or constipation. Identifying and managing the root cause could ameliorate the use of antipsychotic medication, which should be a last resort. In advanced dementia, non-pharmacological therapies that appeal to the senses involving music, massage, aromatherapy and even the use of dolls can help reduce aggression and promote positive engagement. Increasingly, validation therapy is used to preserve the dignity of those with dementia by going along with their perception of events, rather than confronting them to accept reality.



Forget Us Not
raising dementia awareness

— Dementia, which slowly but surely robs people of the ability to remember, to reason and even to love, is fast replacing cancer as the most feared disease. It is expensive to treat and exacts a heavy caregiving toll. The number of persons with dementia (PWDs) has grown in tandem with the ageing population. A local study estimated that 1 in 10 Singaporeans aged 60 and older might have dementia. Prevalence increases with age, peaking at one in two among those aged 85 or older.

Our Forget Us Not initiative educates the public by debunking common myths, imparting a better understanding of symptoms and reducing stigma associated with dementia. To realise our vision of building dementia friendly communities, the initiative also focusses much of its efforts on conducting training so that as many people as possible – from the *kopitiam* stallholder to the bus driver to the bank teller – can be equipped with the know-how to identify and support PWDs in their midst and resolve situations that may arise.

What started as a campaign in Yishun with Khoo Teck Puat Hospital has evolved into a ground-up movement and has spread to other parts of Singapore. A new strategic partner, the Alzheimer’s Disease Association (ADA), has also joined our movement to drive greater awareness and support PWDs and their caregivers. With ADA, we organised a symposium on the growing trend of young onset dementia and played host to Australian advocate Kate Swaffer, who shared her experience of being diagnosed with the disease at age 49.

Another newcomer to the campaign is the Bishan East-Thomson constituency. With twice the proportion of 80-year-olds compared to the national average, it has become home to Singapore’s first dementia friendly coffeeshop. The 24-hour Kim San Leng *kopitiam*, a much loved, high-traffic landmark in Bishan, has been transformed into a nerve centre for sparking awareness and understanding on this incurable, degenerative condition that largely affects the old. It sports eye-catching decals that act as conversation-starters and its stallholders have been trained to become ‘dementia friends.’

In less than two years, we have trained close to 90 organisations and 20,000 ‘dementia friends’ across Singapore comprising people from major corporations, schools, voluntary groups, government agencies and religious organisations.

For instance, in the transport sector, we have trained more than 300 officers from the Public Transport Security Command (Transcom), the police unit in charge of security within the bus and MRT services, enforcement officers from Land Transport Authority as well as service staff from transport operators SBS Transit, SMRT and Tower Transit. In the finance sector, we have trained more than 3,200 staff from all local banks, namely DBS/POSB, OCBC and UOB, as well as foreign banks Maybank and HSBC. Singapore’s largest finance company Hong Leong Finance has sent all 200 of their frontline staff across 28 branches for training. Key partners from other sectors include McDonald’s, Sheng Siong Supermarket and Frasers Centrepoint Malls. Staff from the National Library Board, CPF Board and ambassadors from the Pioneer Generation



Apex Harmony
augmenting psychosocial programming

Office have benefitted from our training sessions too.

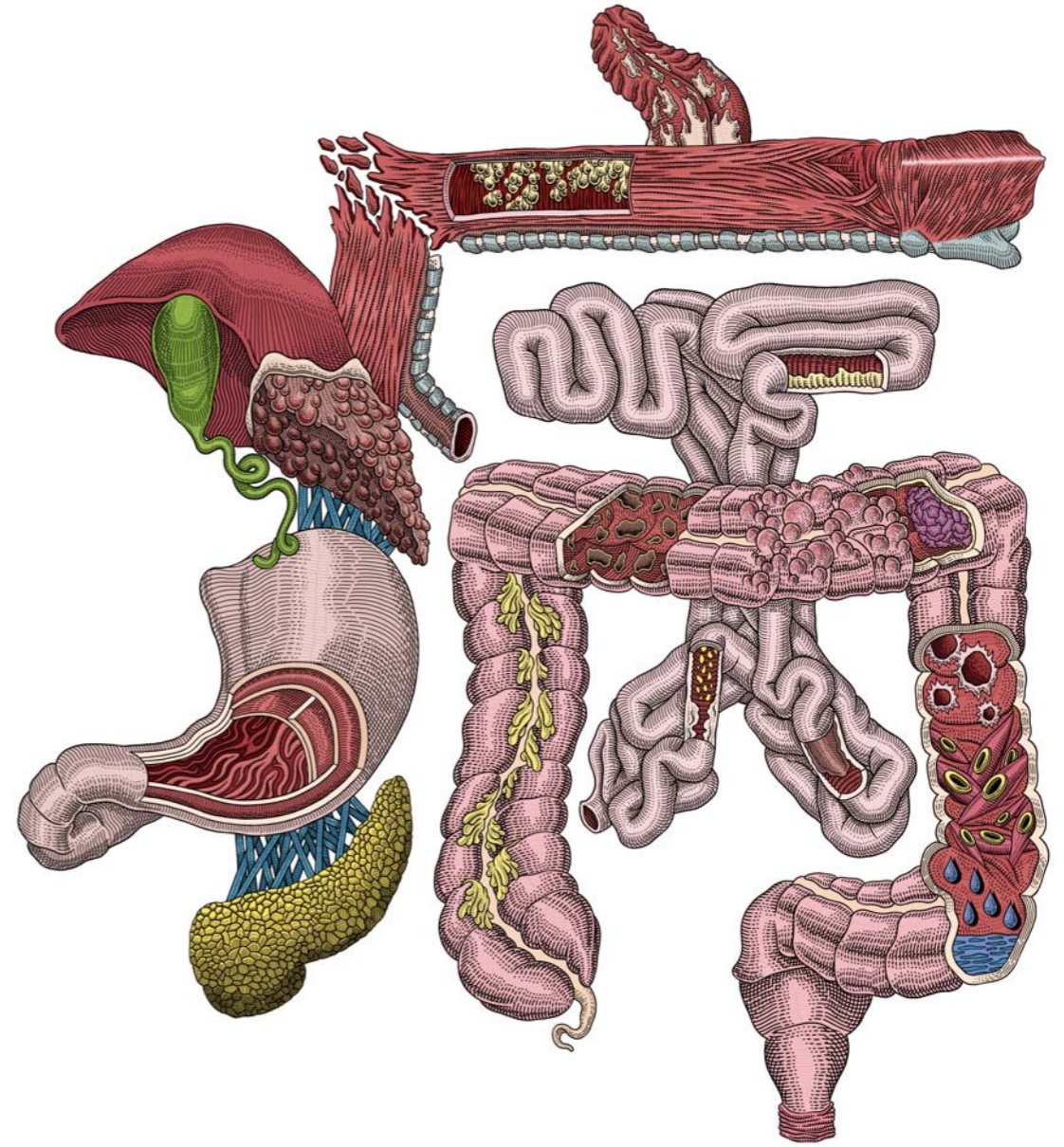
For further impact, we developed a handbook together with train-the-trainers’ sessions so more organisations can incorporate our content into their regular staff training. To encourage the public to sign up as ‘dementia friends’, we made use of short films, social media, handy guides, and organised community events such as *getai* shows. Held at Yishun and Bishan, these night performances weave issues on dementia into the show. We even made a music video where PWDs from Khoo Teck Puat Hospital and two nursing homes participate in a heart-warming rendition of an evergreen Chinese song 往事只能回味.

— We worked with Apex Harmony Lodge, Singapore’s first home for people with dementia, to demonstrate how programmes within an existing residential care facility can be redesigned to let residents live a normalised life.

Guided by the idea of person-centred care, activities tailored to the ability, needs and interests of each resident have been introduced to improve their well-being. It also helps them regain a sense of self-worth and purpose even as they live out their last years in a long-term care institution. This includes morning ventures where residents, accompanied by staff, walk or commute by bus to nearby eateries to have breakfast.

Residents diagnosed with mild to moderate dementia can choose to be engaged in work-related activities, from packing cutlery to folding laundry, in a programme partnering local businesses which brings them out of the Lodge into community settings. This gives them the chance to exercise their cognitive abilities and encourage independence. Musically inclined residents can pursue their passions too, both in the Lodge and through performances outside.

Those who are unable to go out have plenty to do as well. A long-term partnership with Holy Trinity Kindergarten gives residents the chance to engage with children through games, painting and building Lego. They can also work within the home – be it to indulge their green fingers in the garden or pluck and sort vegetables for meals. Even those with severe dementia are not left to languish in bed. There are programmes that use light, massage and music to stimulate their senses, so that they can better engage with and enjoy their surroundings.



Diseases are not new to humanity. While some like smallpox and the bubonic plague that once devastated large populations are no longer a threat; diarrhoea, one of the world's ancient health problems, persists today as the main child killer in many lands. Our evolving lifestyle patterns are also a prelude to the creation of new diseases, biological & societal.



Ebola virus

chinese goddess of smallpox, a popular subject of worship in the 19th century



痘疹娘娘



17th century plague doctor, whose costume was intended to protect them from airborne diseases

GEORGE'S ANATOMY



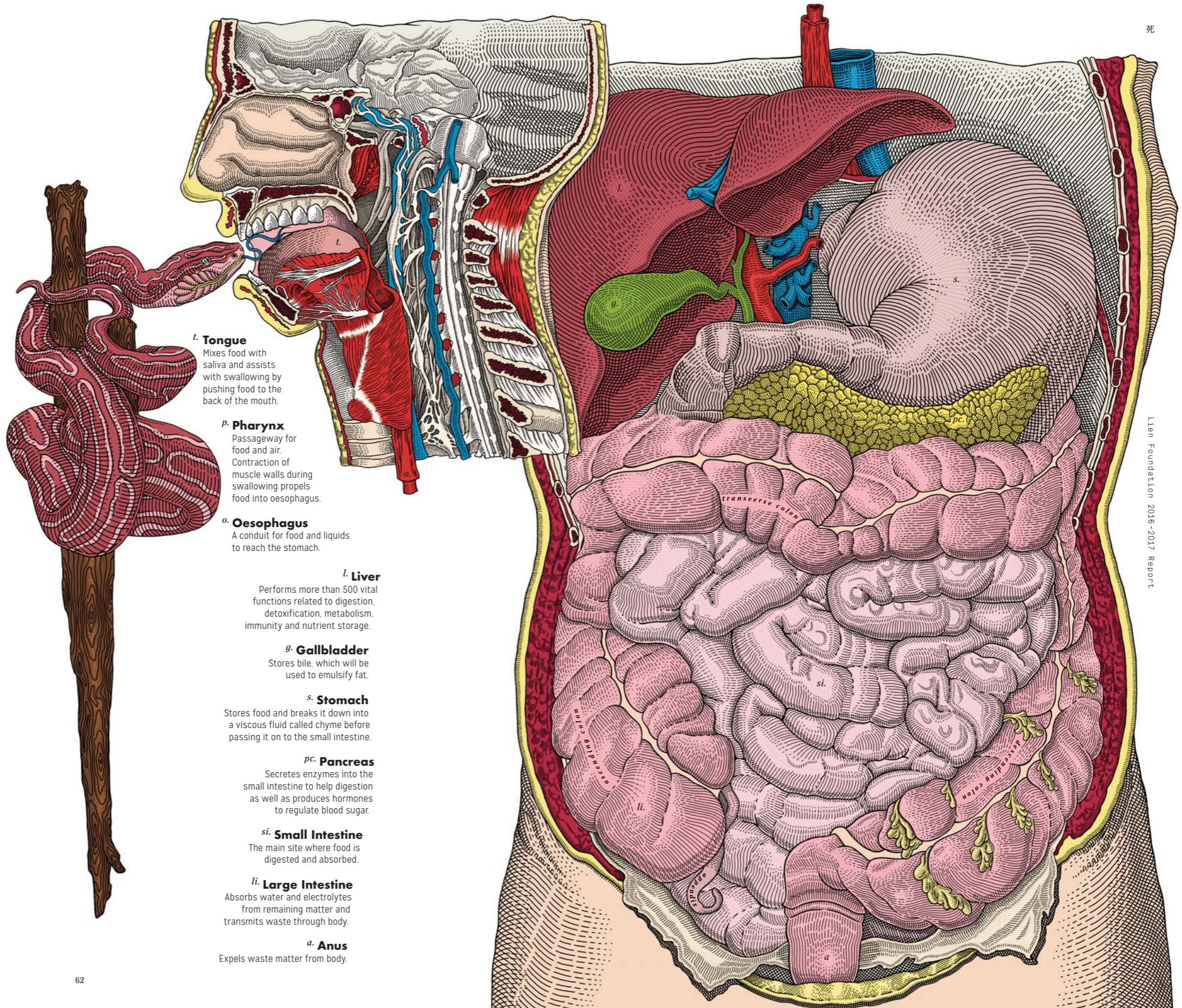
colon cancer

Lien Foundation 2016-2017

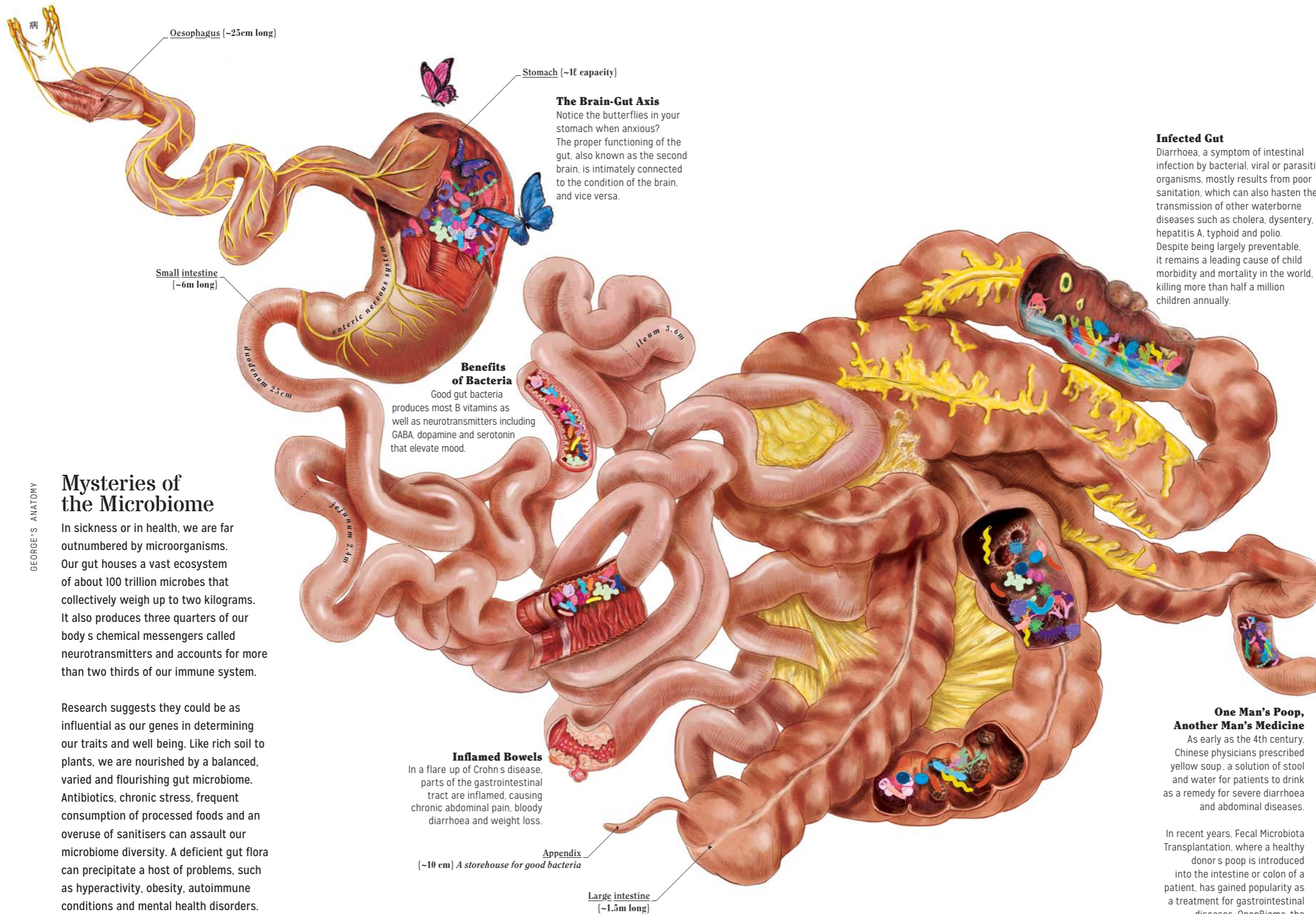
The Gut Digest

A nine metre long snaking pipe, the gut is responsible for converting what we eat into energy, aided by a laborious process of rhythmic contractions and chemical reactions that starts from the mouth and ends at the anus. According to Hippocrates, it is also where all disease begins. Indeed, it is home to more cancers and causes more mortalities than any other organ system in the body.

The ancient Greeks believe that snakes have restorative powers, as seen in the rod wielded by Asclepius, the god of healing and medicine. Even today, in parts of Asia, snake bile is consumed as a tonic to stimulate appetite and treat ailments like whooping cough, rheumatic pain and skin infections. Its venom is also being studied by scientists in the management of cancer.



- t. Tongue**
Mixes food with saliva and assists with swallowing by pushing food to the back of the mouth.
- p. Pharynx**
Passageway for food and air. Contraction of muscle walls during swallowing propels food into oesophagus.
- o. Oesophagus**
A conduit for food and liquids to reach the stomach.
- l. Liver**
Performs more than 500 vital functions related to digestion, detoxification, metabolism, immunity and nutrient storage.
- g. Gallbladder**
Stores bile, which will be used to emulsify fat.
- s. Stomach**
Stores food and breaks it down into a viscous fluid called chyme before passing it on to the small intestine.
- pc. Pancreas**
Secretes enzymes into the small intestine to help digestion as well as produces hormones to regulate blood sugar.
- si. Small Intestine**
The main site where food is digested and absorbed.
- li. Large Intestine**
Absorbs water and electrolytes from remaining matter and transmits waste through body.
- a. Anus**
Expels waste matter from body.



Mysteries of the Microbiome

In sickness or in health, we are far outnumbered by microorganisms. Our gut houses a vast ecosystem of about 100 trillion microbes that collectively weigh up to two kilograms. It also produces three quarters of our body's chemical messengers called neurotransmitters and accounts for more than two thirds of our immune system.

Research suggests they could be as influential as our genes in determining our traits and well being. Like rich soil to plants, we are nourished by a balanced, varied and flourishing gut microbiome. Antibiotics, chronic stress, frequent consumption of processed foods and an overuse of sanitisers can assault our microbiome diversity. A deficient gut flora can precipitate a host of problems, such as hyperactivity, obesity, autoimmune conditions and mental health disorders. By analysing and manipulating our microbiome composition with specific bacteria strains, it may soon be possible to diagnose and improve the treatment of diseases, from Crohn's to cancer.

The Brain-Gut Axis
 Notice the butterflies in your stomach when anxious? The proper functioning of the gut, also known as the second brain, is intimately connected to the condition of the brain, and vice versa.

Benefits of Bacteria
 Good gut bacteria produces most B vitamins as well as neurotransmitters including GABA, dopamine and serotonin that elevate mood.

Inflamed Bowels
 In a flare up of Crohn's disease, parts of the gastrointestinal tract are inflamed, causing chronic abdominal pain, bloody diarrhoea and weight loss.

Common pathogens:
Campylobacter
 One of most common causes of food poisoning, usually found in raw or undercooked meat, unpasteurised milk and untreated water.

Clostridium difficile
 A superbug often found in hospitals and spread by bacterial spores in faeces. Being resistant to most antibiotics, it's able to proliferate in the colon.

Cryptosporidium
 Chlorine-resistant, microscopic parasites commonly found in public pools and lakes, causing diarrhoea.

E.Coli
 While naturally found in intestines, some strains of the bacteria (O157:H7) in undercooked foods, contaminated water and faeces cause severe food poisoning and meningitis.

Hepatitis A & E
 Usually found in unsanitary surroundings or contaminated water, these two virus strains attack the liver and cause jaundice, vomiting, and abdominal discomfort.

Vibrio cholerae
 The bacteria that causes cholera, an acute diarrhoeal disease that can kill within hours if left untreated.

Infected Gut
 Diarrhoea, a symptom of intestinal infection by bacterial, viral or parasitic organisms, mostly results from poor sanitation, which can also hasten the transmission of other waterborne diseases such as cholera, dysentery, hepatitis A, typhoid and polio. Despite being largely preventable, it remains a leading cause of child morbidity and mortality in the world, killing more than half a million children annually.

One Man's Poop, Another Man's Medicine

As early as the 4th century, Chinese physicians prescribed yellow soup, a solution of stool and water for patients to drink as a remedy for severe diarrhoea and abdominal diseases.

In recent years, Fecal Microbiota Transplantation, where a healthy donor's poop is introduced into the intestine or colon of a patient, has gained popularity as a treatment for gastrointestinal diseases. OpenBiome, the world's first public poop bank in the US, provides fecal samples to hospitals around the country for the procedure. Poop is also now offered in capsules at US\$635 for 30 pills.

- Anus**
- 1g of faeces can contain:**
- 100 parasite eggs
 - 1,000 parasite cysts
 - 1 million bacteria
 - 10 million viruses





Lien Aid

delivering clean water and sanitation to rural communities

Our water sanitation arm was formed in 2006 to enable sustainable access to clean water and sanitation for Asia's rural poor. So far, close to one million people across Cambodia, China, Vietnam and Myanmar have directly benefitted from clean water projects. Local governments and communities have contributed more than \$9.7 million in funding and \$5.1 million has been raised from third party donors such as Asian Development Bank, UNICEF, Singapore's foreign affairs ministry, corporations and other foundations.

An appetite for expansion

Lien AID implements clean water projects through two flagship programmes – Community Water Enterprise (CWE) and Village Water Management (VWM). They harness partnerships and the support of local communities and authorities.

In 2011, small scale water services were established in Cambodia through the CWE programme, which is implemented in locations where piped water systems are not feasible. It applies the principles of a social enterprise model by training selected locals and government personnel. It has since expanded its reach, with close to 80 CWEs operated by village entrepreneurs across 12 provinces in Cambodia, providing access to drinking water for nearly 400 villages. Cambodia's Ministry of Rural Development has also stepped in to co-fund five CWEs.

The VWM programme was initiated in China in 2012 to train Student Village Officers to champion and implement water projects. This programme is delivered in locations where available water sources are relatively clean but far from households.

More than 1,000 officers have been trained, and rural households in close to 80 villages across six Chinese provinces now have access to clean water through piped water schemes. On average, about two-thirds of the cost of piped water infrastructure is funded by local contributions. An event was held in Beijing to recognise outstanding local partners and share outcomes from our strategic partnership with the China Association of Poverty Alleviation and Development.

In Myanmar, a pilot project in Tetma village, a dry zone in the Mandalay region, was successfully handed over to local village authorities. Not long after, the project received funds from the World Bank to further extend connectivity between households and water points.

A viral campaign

Is water at \$1,260 a bottle too hard to stomach? For millions of rural poor in Asia, clean water can be up to 1,260 times less affordable than in Singapore considering their low wages and high cost of water due to reasons like poor infrastructure.

To drive home the message that clean water is a luxury, we embarked on an outreach campaign that branded regular tap water as Asia's most expensive water label 'Eau' at a pop-up bar at Singapore's central business district. We invited the public in for a taste and seized the opportunity to tell them about the water woes in Asia as well as our ongoing efforts to bring clean water to the region. The campaign garnered positive public feedback, with 400 visitors and 1.4 million video views.



Lien Environmental Fellowship

developing systems-level capabilities

Launched in 2010, the LEF programme empowers leading academics and researchers in Asia to tackle water and sanitation challenges in their home countries. Successful programme applicants receive mentorship, technical and financial support to translate their ideas into viable solutions that can benefit and impart capabilities to target communities.

There have been 10 such community projects initiated by eight Fellows across six countries – namely Bhutan, India, Indonesia, Laos, Myanmar, and Sri Lanka. Altogether, this portfolio has benefitted more than a million people through improved access to water and sanitation, skills transfer and education. More recently, a dedicated in-house engineering team was formed to ensure proper execution of projects, boost quality, control costs and allow for timely completion.

Spreading cleanup success in Sri Lanka

The cleanup of Kandy Lake, linked to a major source of drinking water, was an impactful collaboration involving the entire community. The team, led by an LEF Fellow from Sri Lanka's University of Peradeniya, commissioned a wastewater treatment plant for the prominent Temple of Buddha Tooth located along the banks of the lake, effectively stemming pollution into the waters while setting an example for others.

The team also devised a simple 'purifying system' by placing floating platforms filled with a native plant to filter and treat the lake water. Training and conservation talks were conducted in schools to nurture environmental stewardship among the young. More than 720,000 residents have benefitted since.

Tapping on this experience, the team has earmarked three more lakes to clean up, including one that is more than two times larger than Kandy's in the nearby Kurunegala city.

Replicating waste-to-energy technology in India

A team led by the country's National Environmental Engineering Research Institute developed technology to harness food and vegetable waste for bio-energy. The food waste treatment facility helps to supplement energy in off-grid areas where power is scarce while reducing sanitation hazards and landfill waste. It will be replicated at six sites for communities in the Nagpur region, which will impact more than 10,000 people when completed in three years.

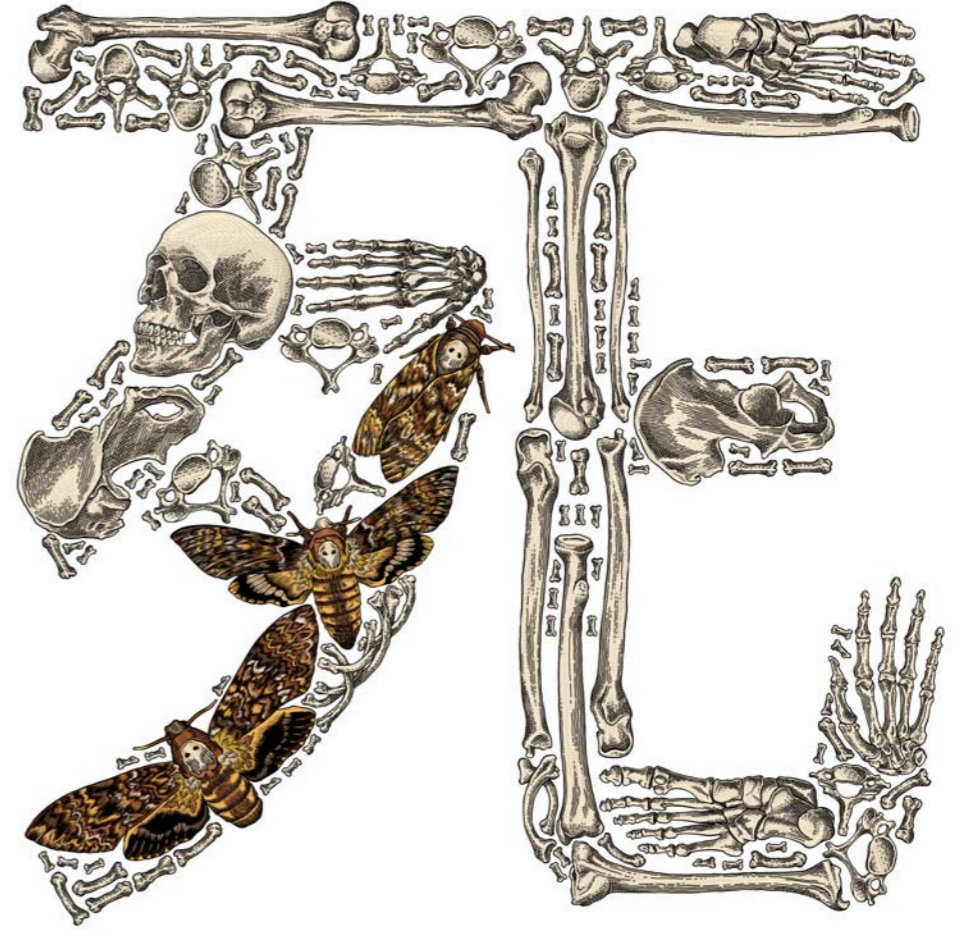
Boosting water access for karst communities in Indonesia

In the drought-prone district of Gunungkidul, water protection and distribution is challenging because of the karst geology, which is prone to unpredictable or easily contaminated groundwater. Moreover, because of the mountainous terrain, about 30 per cent of the population is unable to access piped water. Building on earlier successes, the project team from the Institute of Technology Yogyakarta identified two sites to construct bank filtration wells and protect doline lakes, improving water security for more rural villages.

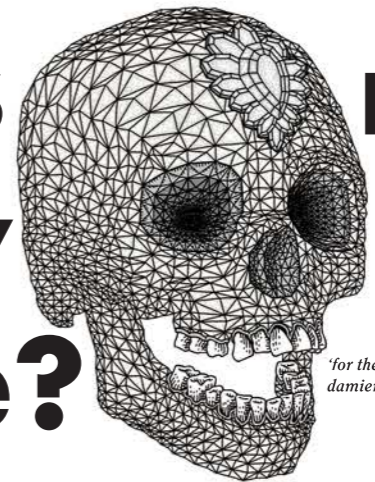
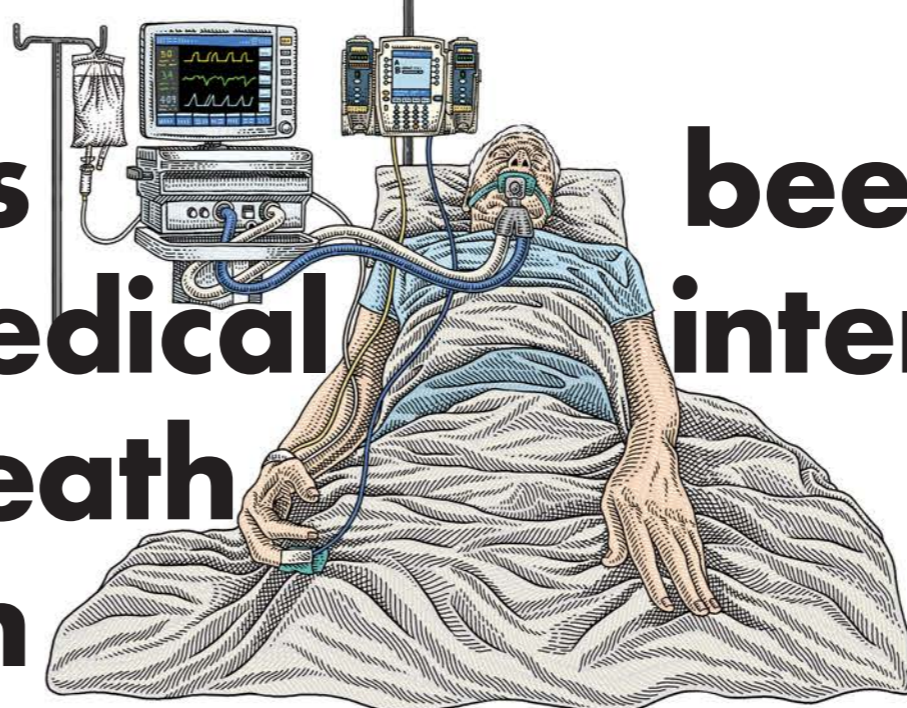
Germination of Societal Diseases

What ails us in this increasingly fragmented world buffeted by winds of change? An addiction to screens, a penchant for instant gratification and an insatiable appetite for material luxury, status and celebrity fuel a vicious circle of chasing the next novelty. Fear mongering and misinformation spread like a virus through cyberspace and infect our thoughts and actions. The beast of dogma scuttles any attempt at uncovering the beauty of truth. Instead, it feeds the other beast of bureaucracy a defender of indolence and the status quo. Conformity is highly contagious. It breeds mediocrity and a false sense of security. Often, it is driven by a fear of failure, a force more destructive than failure itself. Break the chains of conformity with courage as the antidote, or these maladies will come to afflict our psyche, weaken our resistance and permeate our daily existence.





Modern dying has been dealt a heavy hand by medical interventions. For most, social death precedes biological death in a veil of suffering. Recapturing the soul of medicine, palliative care is extending its reach so more can die in dignity. How much do we sacrifice to prolong life? After all, we're close to acquiring super human abilities with biotech breakthroughs, which could see the death of death.



'for the love of god' sculpture by damien hirst



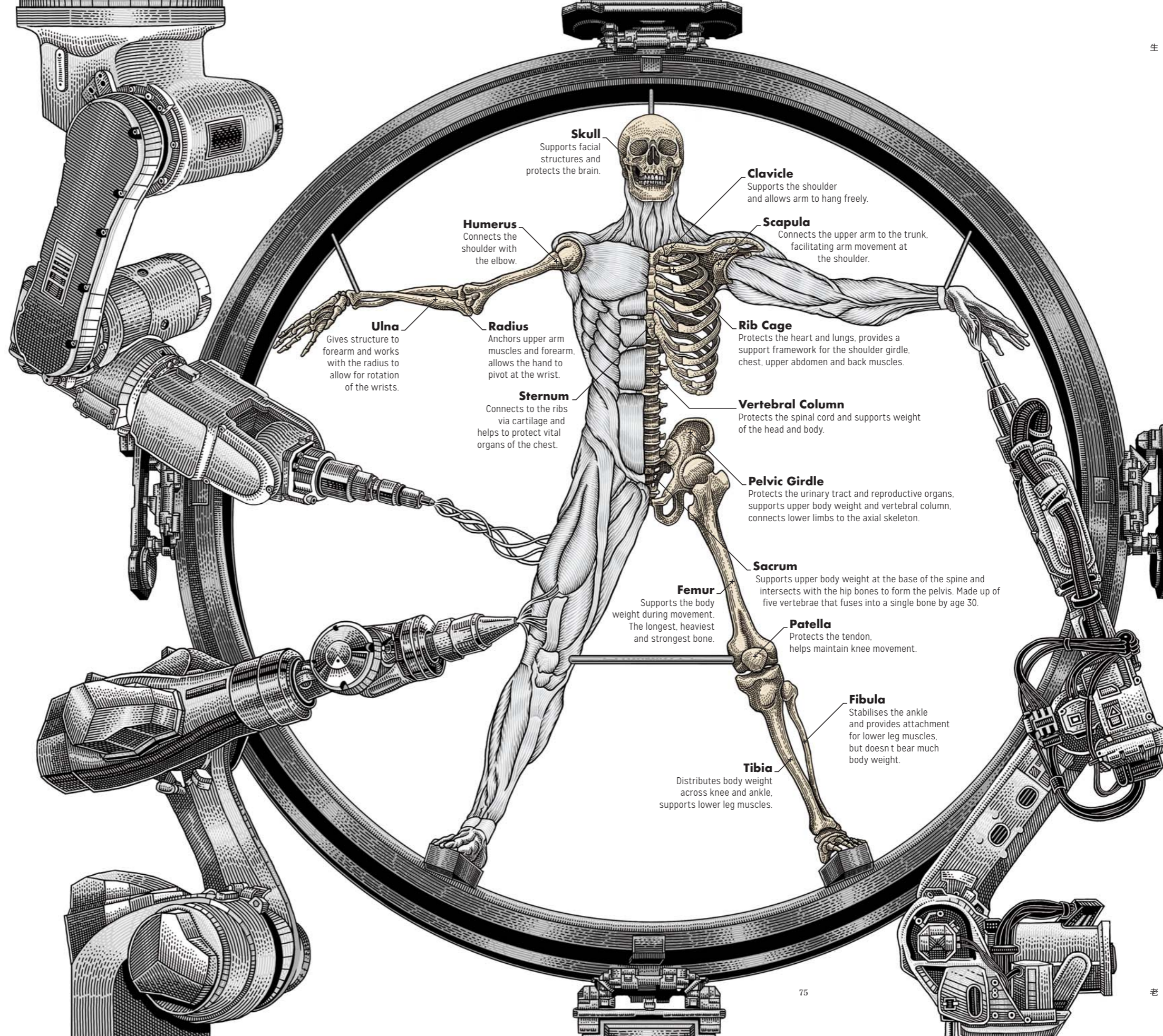
a reinterpretation of the ancient ouroboros gives new meaning to the cycle of renewal

Skeletal Secrets

Don't we all look similar in the end? The skeleton is all we're left with after nature has taken its course. To the anthropologist, it's the evidence of life, while to the most of us, it's synonymous with death, capable of instilling dread and fear whether personified as the Grim Reaper or as an army of White Walkers in Game of Thrones.

If you've seen how Westworld's human-like robots are made, it all starts with the skeleton, the scaffold which muscle tissues attach onto. Packed with 206 bones, this internal framework gives us our shape and stability, protects our organs and produces red blood cells in the bone marrow. By studying how different bones work together as levers for movement and using our anatomy as a blueprint, scientists may soon create robots with the perfect human proportions that act just like us.

GEORGE'S ANATOMY





Increased Pain

Pain is a multidimensional experience that affects the senses, cognition, behaviour, mood and a main contributor of distress and suffering. For many patients at the end of life, pain is often moderate to severe in intensity, in more than one location and is variable in pattern.



Morphine
Most commonly used first-line therapy to control pain.



Fentanyl
Synthetic opioid about 80 times more potent than morphine.



Oxycodone
A second-line option if morphine is poorly tolerated.

Delirium

Prevalent in the last days or weeks of life, delirium can be distressing for patients and those around them. It is characterised by the abrupt onset of confusion, incoherent speech, reduced awareness of the environment, hallucinations and disturbances in the sleep cycle.



Haloperidol
Antipsychotic drug to manage agitation by rebalancing dopamine levels.



Midazolam
Has muscle relaxant and anticonvulsant properties to sedate patients with severe agitation.

Suffering at End of Life

For all the earthly pleasures that we may enjoy in our lifetime, the day will come when we have to come to terms with the end of it. What we perhaps fear more than the Grim Reaper himself is the sharp scythe that he carries, a harbinger of pain and suffering before the final journey to the unknown. Most would agree that an ideal death should be painless. But in reality, dying is a much more complicated and protracted process. While we cannot conquer all injuries and illnesses, we can certainly decrease unnecessary suffering. Palliative care does that by controlling symptoms, alleviating pain and reducing stress. It is centred around compassion and humanity at a time when we are faced with new dilemmas in science and possess an arsenal of tools to postpone our final breath.

Dyspnea

Feelings of breathlessness and suffocation are common causes of discomfort and fear among patients with chronic or life limiting illnesses. It is subjective and can be worsened by anxiety and panic. When secretions accumulate in the airway, the noise made is known as the death rattle.



Morphine
Relaxes respiratory muscles, making breathing easier, and controls anxiety associated with feeling of suffocation.



Hyoscine butylbromide
Reduces respiratory tract secretions.



Fan
A stream of cool air over the patient's face can alleviate shortness of breath.





Lien Collaborative for Palliative Care

strengthening leadership and capacity in developing countries

Started in 2013, the Collaborative is a regional initiative co-developed with the Asia Pacific Hospice Palliative Care Network (APHN) to spearhead the development of palliative care in Asian countries with little or no such services.

Since then, the Collaborative worked in concert with main government hospitals and health ministries to start new palliative care services in four countries – Bangladesh, Myanmar, Sri Lanka and India. To date, 45 volunteer expert faculty from various countries including Australia, Canada, UK and Singapore have trained and mentored over 140 doctors, nurses and allied health professionals, who now teach palliative care within their hospitals. The multi-year ‘Training of Trainers in Palliative Care’ programme has been completed in Myanmar and Sri Lanka, with Bangladesh expected to finish in 2018.

In Sri Lanka, the Collaborative was instrumental in the formation of a National Steering Committee to guide the sector’s development. A postgraduate diploma was also introduced. In Bangladesh, Palliative Medicine is now recognised as a specialty while Myanmar has plans to introduce palliative care into the curricula of all medical and nursing schools.

Essential pain medicines have been made more accessible and affordable. For instance, Sri Lanka has increased the maximum number of days that morphine may be prescribed from 7 to 30 days, while Bangladesh and Myanmar have both started to manufacture oral morphine locally. India has brought oral morphine into targeted cancer treatment centres in 10 sites across 5 states and now plans to expand it to another 10 more in the country’s poorer states.



Lien Centre for Palliative Care (LCPC)

driving research and education

Set up together with Duke-NUS Medical School, the National Cancer Centre and SingHealth, the Centre focusses on building up a strong pool of health professionals trained in palliative care as well as research that looks into the clinical, social and cultural aspects of the discipline.

Singapore’s National Strategy for Palliative Care has identified the need for improved education and training of healthcare providers in palliative care. Phase Two of the Centre’s activities, which started in 2015, aims to address this gap by conducting generalist level training for allied health professionals.

Over the past two years, it engaged more than 800 participants through courses and symposiums. This included a basic palliative care course held for social workers in collaboration with the Singapore Association of Social Workers as well as one for pharmacists in partnership with the Pharmaceutical Society of Singapore.

In collaboration with palliative care professionals from various institutions across Singapore, the Centre created the SG Pall eBook, an electronic mobile-friendly handbook with the objective of making basic palliative care knowledge easily available to healthcare professionals on the go.

Since 2015, the Centre has garnered about \$3.6 million in external funding and has eight papers published in top medical journals. This includes a comparison of preferences for end-of-life care among advanced cancer patients and their caregivers. Researchers found that caregivers were willing to pay three times more than what patients would pay for themselves for a treatment that would extend the patient’s life by one year.



Life Asked Death and Hippocratic

films on building palliative care capabilities in asia

Life Asked Death and Hippocratic are two documentary films produced by Australian production house Moonshine Movies that shine the spotlight on palliative care practitioners. They highlight the scale of pain and suffering that needs to be urgently addressed in Asia while celebrating the little triumphs in bringing palliative care to patients in resource-limited countries.

Life Asked Death is a 26-minute film that follows the work of Lien Collaborative in Bangladesh, Myanmar and Sri Lanka. It shows that barriers to pain relief can be removed when palliative care is integrated into existing healthcare systems and essential pain medications are made available. Since its online premiere in conjunction with the World Hospice and Palliative Care Day in 2016, the film and related videos have garnered more than 600,000 views. Screenings were held in more than a dozen countries, including Australia, Bangladesh, Myanmar, Malaysia, Philippines, Sri Lanka and Singapore.

Hippocratic, a feature-length documentary film, tells the life story of acclaimed Indian physician Dr MR Rajagopal and his dream of a pain-free India. Known as India’s father of palliative care, Dr Raj reflects on his efforts and determination to relieve unnecessary human suffering in a country of 1.25 billion people through universal access to essential pain medicines. Screenings were held in countries including the US, Canada and Australia, where Dr Raj was guest speaker at these events. Hippocratic has also won two awards at international film competitions.



Both Sides, Now

a community engagement about leaving well

We want to see a shift in culture where end-of-life care is understood and embraced collectively by society and care preferences are discussed, before the end is near. And we need to actively learn more about it.

Produced by Drama Box and ArtsWok Collaborative, Both Sides, Now, which debuted in 2013 at Khoo Teck Puat Hospital, has embarked on a new phase of engaging communities to talk more about death and dying. It will focus its efforts within Chong Pang and Telok Blangah over the next few years, bringing arts workshops, performances and talks into these neighbourhoods to help individuals and families make informed decisions about end-of-life plans.

To extend the effectiveness and reach, we need to apply a whole-of-society approach to end-of-life care. This requires long-term commitment and ownership from the government and community at large. We are happy to see both sides doing their part.

The Ministry of Health and Tote Board Community Healthcare Fund have stepped in as major funders for this three-year initiative. Khoo Teck Puat Hospital, through its Wellness *Kampung* and Montfort Care’s Good Death Programme, has come on board as community partners, while Ang Chin Moh Foundation has been steadfast in its support to co-present the project together with us.



When it comes to improving care for the dying, there is much to be learnt from the UK, the birthplace of the modern hospice movement led by Dame Cicely Saunders. Half a century on, it is a good time to reflect on how to truly transform the end-of-life experience.

Our study trip resulted in After Cicely 50 to reaffirm the pioneering spirit of Dame Cicely and creatively inspire those taking steps in new frontiers. Through feature stories and five short films, we explored new approaches to palliative care challenges, ambitions of the sector and community efforts to promote well-being at the end of life.

Making dying everyone's business

With rapid ageing fuelling a surge in chronic illnesses, palliative care needs to be made more accessible by infusing its principles within the entire healthcare system and community settings. The UK's National Council for Palliative Care set up a Dying Matters Coalition, which includes 32,000 community organisations that organise outreach activities all year round. These culminate in an annual, high-profile Dying Matters Awareness Week, providing an unparalleled opportunity to bring end-of-life issues under the national spotlight.

We participated in Pushing Up Daisies, one of the hundreds of events held during that week across the country, where we learnt that easing pain and smoothing the bumpy journey many face in the last leg of life is too important an issue to be relegated to the tiny palliative care community alone. The homegrown festival in the town of Todmorden, West Yorkshire, had 70 activities taking place a week and is run entirely by volunteers, including people with terminal illnesses. It creates a space for conversations through interesting activities like graveyard tours, which immerse participants in the stories of long-departed lives, and flower arrangement workshops where participants talk about end-of-life issues by drawing comparisons to the life cycle of flowers.

Mapping future ambitions

Spending time at institutions like St Christopher's Hospice and St Joseph's Hospice allowed us to exchange ideas with practitioners and experts like Dr Heather Richardson, Joint CEO of St Christopher's Hospice as well as Dr BJ Miller, a US palliative care specialist. He rose to international prominence with a TED Talk in which he shared how his life experience – having almost died in an accident and losing both his lower legs and a forearm at age 19 – informed his perspective on dying and end-of-life care. Fresh perspectives from areas like design and architecture can inform palliative care and contribute to a better life even as the end is near, he said.

In Lancaster, we attended #MyLastOrders, a death café for healthcare workers. More than 300 people including doctors, nurses, palliative care specialists and volunteers joined the talks led by Ian Dewar, Chaplain at the Royal Lancaster Infirmary who wants medical professionals to rethink what death and dying mean to them.

We can also be more creative at harnessing technology to extend the effectiveness and reach of palliative care. Encompass, an initiative by St Luke's Hospice in Sheffield, enables doctors to monitor multiple patients from one remote setting and guide community nurses in a patient's home through tablet computers and software.

The Body After Death

As soon as our heart stops beating, we lose consciousness. Blood and oxygen supply to the brain is cut off and the body starts to deteriorate at different rates, depending on its condition, the environment and circumstances of death. For centuries, we have either buried or cremated the dead, processes which take a toll on the environment. In future, we could choose to dissolve our bodies in a solution of potassium hydroxide. This cleaner method known as alkaline hydrolysis speeds up the natural decomposition process to about three hours instead of the years it takes underground.



Pallor Mortis (15-25 minutes after death) Body turns pale as circulation stops and gravity causes the blood to settle.



Rigor Mortis (few hours) Body stiffens from lactic acid build up in the muscles.



Putrefaction (4-11 days) Flesh rots as bacteria breaks down proteins and tissues disintegrate. Body becomes bloated from gas build up and discharges fluids, usually through the mouth and nose. Skin ruptures, tongue swells and protrudes from mouth. Body turns purple and eventually black.



Algor Mortis (1 hour) The death chill happens when body cools until it reaches room temperature.



Livor Mortis (8-12 hours) Blueish discoloration becomes evident after blood congeals and blood vessels become permeable.



Active Decay (few weeks) Decomposition starts immediately after death and goes all the way to skeletonisation.



Skeletonisation (years) Soft tissues dry and decay, reducing the body to teeth and bones. A body, unembalmed and not in a coffin will take 8 to 12 years. It will be even longer if body is in a coffin.

Of Mice, Men and Medical Breakthroughs

Dystopian or utopian?

Inventions that once belonged to the realm of science fiction are now finding their way into the real world. From biomedical engineering to nanotechnology and regenerative medicine, the revolution continues, with China leading the way into a brave new world of human enhancement. Do we take the red pill, and accept its mind blowing and unfamiliar future, or the blue pill that maintains the status quo?

GEORGE'S ANATOMY



Genome Editing

Hailed as the biotech discovery of the century and the weapon to cure cancer, CRISPR is the fastest, cheapest and most precise method of manipulating genomes by splicing out or replacing defective genes in the DNA sequence. Chinese scientists were the first to use the technique in humans when they injected modified cells into a patient with aggressive lung cancer. The same method could also give birth to designer babies, super bugs or a mutant class.

Bionic Lens

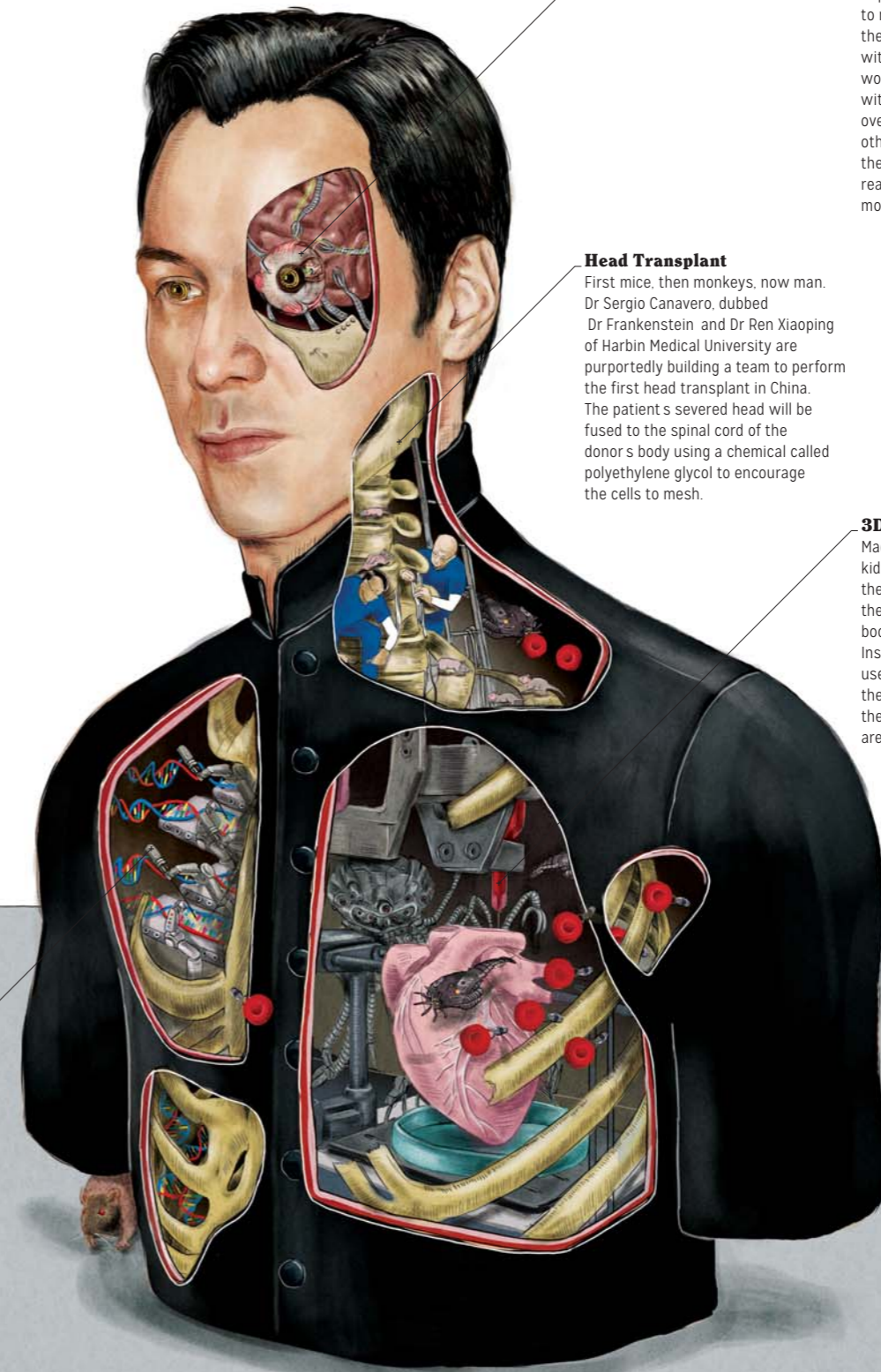
A quick and painless surgery to replace the natural lens in the human eye could provide us with new ways of seeing the world. Besides bestowing us with superhuman vision, it could over time be upgraded to include other functions such as surfing the web, virtual and augmented reality as well as recording life moments to share with others.

Head Transplant

First mice, then monkeys, now man. Dr Sergio Canavero, dubbed Dr Frankenstein and Dr Ren Xiaoping of Harbin Medical University are purportedly building a team to perform the first head transplant in China. The patient's severed head will be fused to the spinal cord of the donor's body using a chemical called polyethylene glycol to encourage the cells to mesh.

3D Printed Organ

Made to order livers and kidneys could be a reality in the next five years, given that the technology to print human body parts already exists. Instead of ink, the 3D printer uses human cells, depositing them layer by layer to create the desired living structure; and are kept in shape by polymers.



Lien Foundation 2016 - 2017 Report



Lien Ying Chow Legacy Fellowship

grooming leaders in china and singapore

— The Lien Ying Chow Legacy Fellowship, which was set up to promote exchange among scholars, government and business leaders from Singapore and China, turned 10 in 2017. Established in partnership with Nanyang Technological University, the Fellowship has since forged a network of 63 Lien Fellows from China and 33 from Singapore.

To cap off a momentous decade, it also received the prestigious Business China Enterprise Award from Singapore's Prime Minister for its contributions in strengthening bilateral relations and knowledge exchange.

Each year, chosen Fellows focus on a research project in their field of interest. Under the guidance of a mentor and subject experts, they are empowered to formulate and present recommendations on addressing policy and governance issues in China and Singapore. Many of the Fellows have produced articles and publications that provide viable solutions to a range of contemporary issues.

Through a series of networking sessions and forums organised by the Fellowship, they also get to exchange expertise and boost mutual understanding of the two countries. For instance, Liu Chuanzhi, founder of Chinese tech giant Lenovo and a Lien Distinguished Fellow gave a talk at the 2016 China Insights Series Forum jointly organised by the Fellowship and Business China, attracting more than 1,000 people.



Lien Initiative on Policy and Governance

advancing insights on a globalising china

— Our policy-oriented research focusses on the areas of politics, economics, social development and management relating to Singapore and China, with the aim of promoting good governance and public administration leadership. In the last few years, we strengthened engagements with international experts and collaborated with other institutions to organise conferences.

The biennial Lien Conference on Good Governance was held in 2017. With a theme 'Towards an Inclusive and Sustainable Globalisation', it brought together more than 250 international academics, practitioners and Lien Fellows to examine the latest issues amidst hardening anti-globalisation rhetoric.

We have initiated research on cross-border giving as well as a landscape study of the philanthropy sector in China. A toolkit is being developed to provide an understanding of the legal and cultural environment as well as identify potential NGO partners in China to facilitate effective cross-border giving. Workshops and panels have also been held to engage academics and practitioners in this field.

To tap on opportunities arising from the Belt and Road Initiative, China's ambitious plan to remake global trade, we have set up a research unit, the Lien Research Programme for Belt and Road Initiative. Given growing interest on the impact of this development, research will focus on how it will translate to economic opportunities in Southeast Asia. These insights could inform discussions when Singapore assumes the Chair of ASEAN in 2018.



Lien Centre for Social Innovation

catalysing responses to unmet social needs

— Whether it is lifting people out of poverty, tackling social isolation among the elderly or empowering the disability community, social innovators are powerful change makers who can help society build resilience by solving inevitable challenges that come with rapid development.

The Lien Centre for Social Innovation, a partnership with Singapore Management University since 2006, is a think tank that examines the social landscape in Singapore and Southeast Asia and addresses unmet needs through applied research and relevant programmes in collaboration with the public, private and people sectors.

The Centre has released over a dozen research publications on the unmet social needs of vulnerable groups in Singapore. They delve deep into topics such as the welfare issues confronting migrant workers, challenges of single-parent families and needs of the elderly population in Singapore.

Social Space, the Centre's flagship magazine, went through a revamp and upped its frequency to become a bi-annual publication, featuring developments in social innovation and interviews with personalities such as Bill Drayton, the founder of Ashoka. It has also launched a digital platform to further engage its growing community.

To inspire, empower and multiply active problem solvers, the Centre started new initiatives. These include the Social Impact Accelerator, SMU Social Impact Festival, and short courses on social innovation and entrepreneurship for tertiary students. It also continues to work with partners in multi-year programmes, such as the Create4Good Challenge, a competition organised together with Singapore University of Technology and Design, as well as the MasterCard-SMU Research Forum on social and financial inclusion.

Death of Death?

More than 100 billion people have died before us. What makes us any different?

Technology has progressed to the point where it is possible to transcend biology, hack our humanity and alter our destiny. Some scientists now see death as a technical glitch that can be solved and are working to rewrite the operating systems of life.

Renowned futurist Ray Kurzweil has predicted that by 2045, machines will become exponentially smarter than humans, triggering a Singularity with the new superintelligence continuously self upgrading. This may signal the end of the so called human era as we merge with machines to radically extend life, expand minds and gallop towards immortality.

Evolve or extinguish?
How will the wizardry of technology unravel the mystery of mortality?
Try asking Siri or AliGenie.

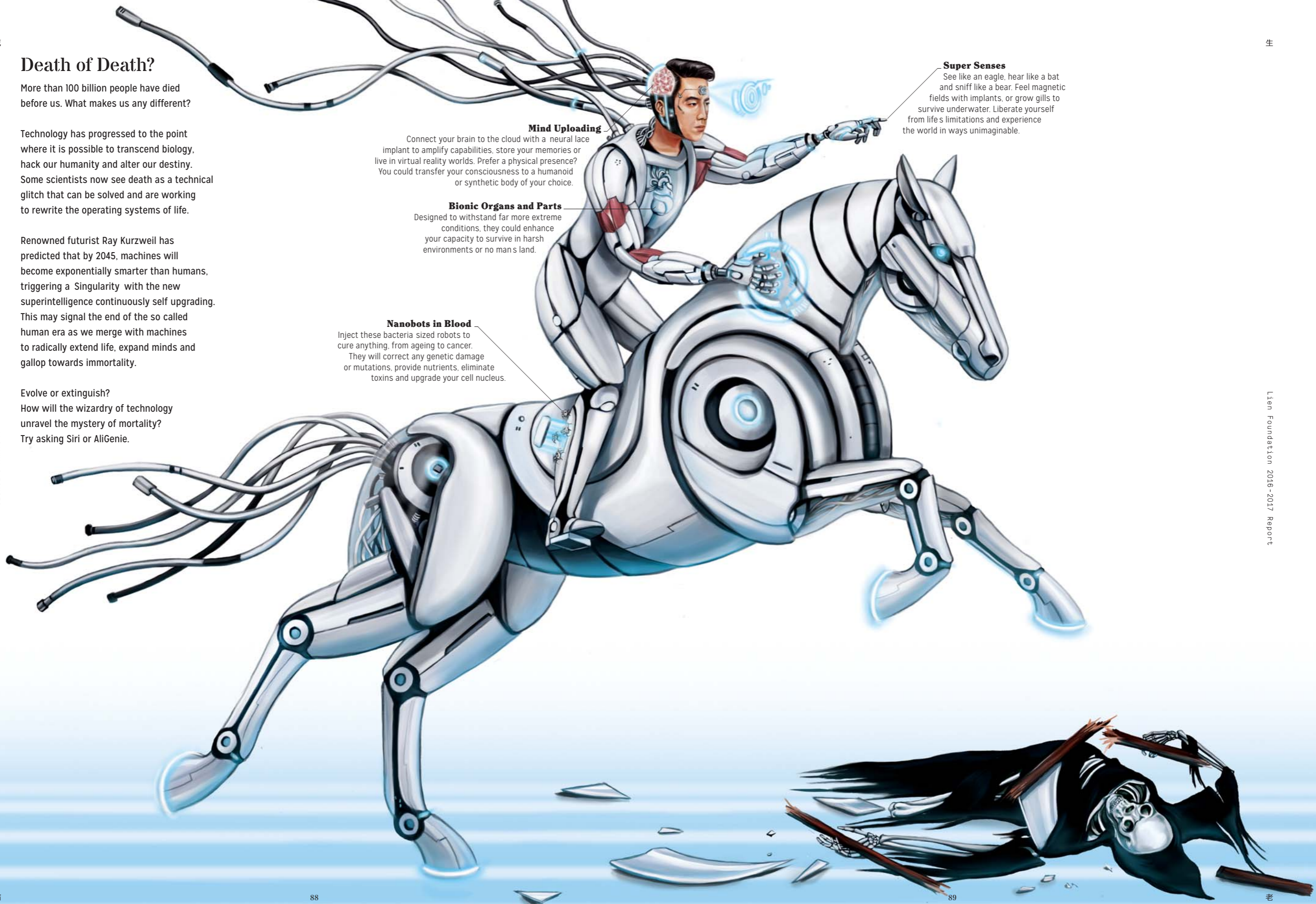
GEORGE'S ANATOMY

Mind Uploading
Connect your brain to the cloud with a neural lace implant to amplify capabilities, store your memories or live in virtual reality worlds. Prefer a physical presence? You could transfer your consciousness to a humanoid or synthetic body of your choice.

Bionic Organs and Parts
Designed to withstand far more extreme conditions, they could enhance your capacity to survive in harsh environments or no man's land.

Nanobots in Blood
Inject these bacteria sized robots to cure anything, from ageing to cancer. They will correct any genetic damage or mutations, provide nutrients, eliminate toxins and upgrade your cell nucleus.

Super Senses
See like an eagle, hear like a bat and sniff like a bear. Feel magnetic fields with implants, or grow gills to survive underwater. Liberate yourself from life's limitations and experience the world in ways unimaginable.



Overview of Grantmaking

	2016 (S\$'000)	2017 (S\$'000)
Grants Distributed	15,106	13,677
Grants Approved	14,320	14,068

2016 Grants Distributed

agency	project	disbursed (S\$'000)
Early Childhood Development		
Care Corner & Consortium	Circle of Care II	1,100
SEED, Wheelock, SUSS & Hay Group	Principal Matters	810
Canossaville Children & Community Services	Circle of Care @ Canossian Eduplex	6,000
		7,910
Eldercare		
Duke-NUS, NCCS & Singhealth	Lien Centre for Palliative Care	1,500
Apex Harmony Lodge Consortium	Apex Psychosocial Care Transformation	786
	IngoT Person-Centred Care	1,910
		4,196
Water & Sanitation		
Lien AID	Ongoing support for 5 years	3,000
		3,000
	7 projects in total amounting to:	15,106

Grants Approved

agency	project	committed (S\$'000)
Canossaville Children & Community Services Consortium	Circle of Care @ Canossian Eduplex	11,000
	IngoT Person-Centred Care	3,320
		14,320
	2 projects in total amounting to:	14,320

2017 Grants Distributed

agency	project	disbursed (S\$'000)
Early Childhood Development		
Care Corner & Consortium	Circle of Care II	1,100
SEED, Wheelock, SUSS & Hay Group	Principal Matters	810
Canossaville Children & Community Services	Circle of Care @ Canossian Eduplex	3,000
		4,910
Eldercare		
Duke-NUS, NCCS & Singhealth Consortium	Lien Centre for Palliative Care	1,500
Salvation Army Consortium	IngoT Person-Centred Care	790
Khoo Teck Puat Hospital & Alzheimer's Disease Association	Jade Circle	2,000
	Gym Tonic II	677
	Forget Us Not II	800
		5,767
Water & Sanitation		
Lien AID	Ongoing support for 5 years	3,000
		3,000
	9 projects in total amounting to:	13,677

Grants Approved

agency	project	committed (S\$'000)
Care Corner & Consortium Consortium	Circle of Care III	10,000
Khoo Teck Puat Hospital & Alzheimer's Disease Association	Gym Tonic II	3,268
	Forget Us Not II	800
		14,068
	3 projects in total amounting to:	14,068

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Hsieh Fu Hua

鞠躬尽瘁播福泽, 连谢华兄义相挺

Agnes, Lynn, Geraldine, Kim Choo, Shang Chee, Poh Kheng and the Circle of Care family

Teamwork makes the dream work. Thank you for seeing potential in what others overlook.

Karthik, Honey, Lena and all the professionals at Kindle Garden

Thank you for your guts and gumption in creating a culture where all children are welcome and valued, regardless of their learning needs.

Sok Bee, Hui Nee, Agatha, Winnie, Hong Huay and the ECHO team

You deserve more than a high five for raising skills in the early intervention sector and empowering parents.

Yin Fong, Beth, Siat Yeow and the Principal Matters team

Thank you for embracing the adventure together. Your effervescence has energised the early childhood sector.

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You are a playful force when it comes to stretching the children's imagination.

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Learning never exhausts the mind. Grateful for an extended and enriching journey with our friends from near and far.

Gracie and the Blackbox Research team

There is strength in numbers. Thank you for making them into meaningful and memorable messages on inclusion.

Superhero Me volunteers and children

Thank you for keeping our work grounded and relevant. Together we power the way to a more inclusive childhood.

Ken, PulseSync and our partners in the Gym Tonic and IngoT coalition

Thank you for injecting heartware into our software and doing the heavy lifting so seniors can continue to kick ass and pull punches.

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You have been a great ally and influence. Thank you for sticking to your guns and for mustering the will to make it happen.

Anita, Elizabeth, Jelly, Michelle and the teams at Plug & Play and Zoo Group

Thank you for illuminating our causes with your passion and talent, on and off screen.

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Your wealth of insights has in turn nourished ours and gives us the confidence to effect meaningful change.

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Your creative brilliance is matched only by your empathy of the human condition.

Jacqueline, Nancy, Michael, Mikey and other contributors to the Bioethics Casebook

Making the right decisions is never easy. Your guidance has been invaluable when it comes to navigating the everyday realities of care giving.

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Cynthia and the volunteer faculty at the Lien Collaborative for Palliative Care

Thank you for your generous time and undying commitment to improve care for the dying.

Drama Box, ArtsWok, Ang Chin Moh Foundation and the Both Sides, Now team

You have breathed life into end-of-life issues with your artful die-logues and performances.

Mike, Sue and the Moonshine team

Your film-making talent has humanised dying and is a gift that keeps on giving.

Gen, Joanne and Wan Cheng

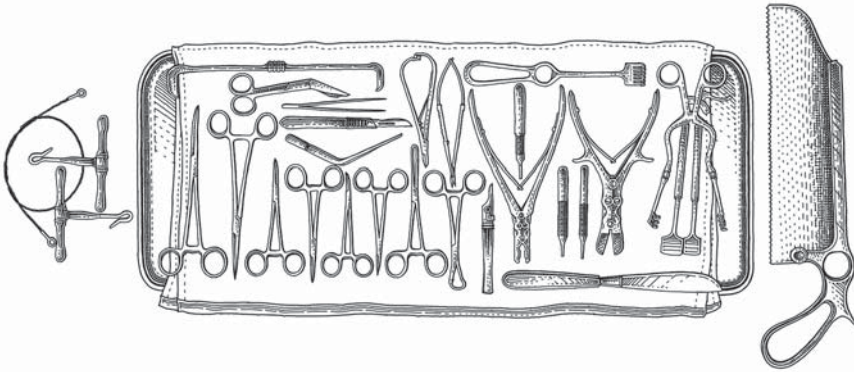
Thank you for building our social currency and amplifying our work with your horns.

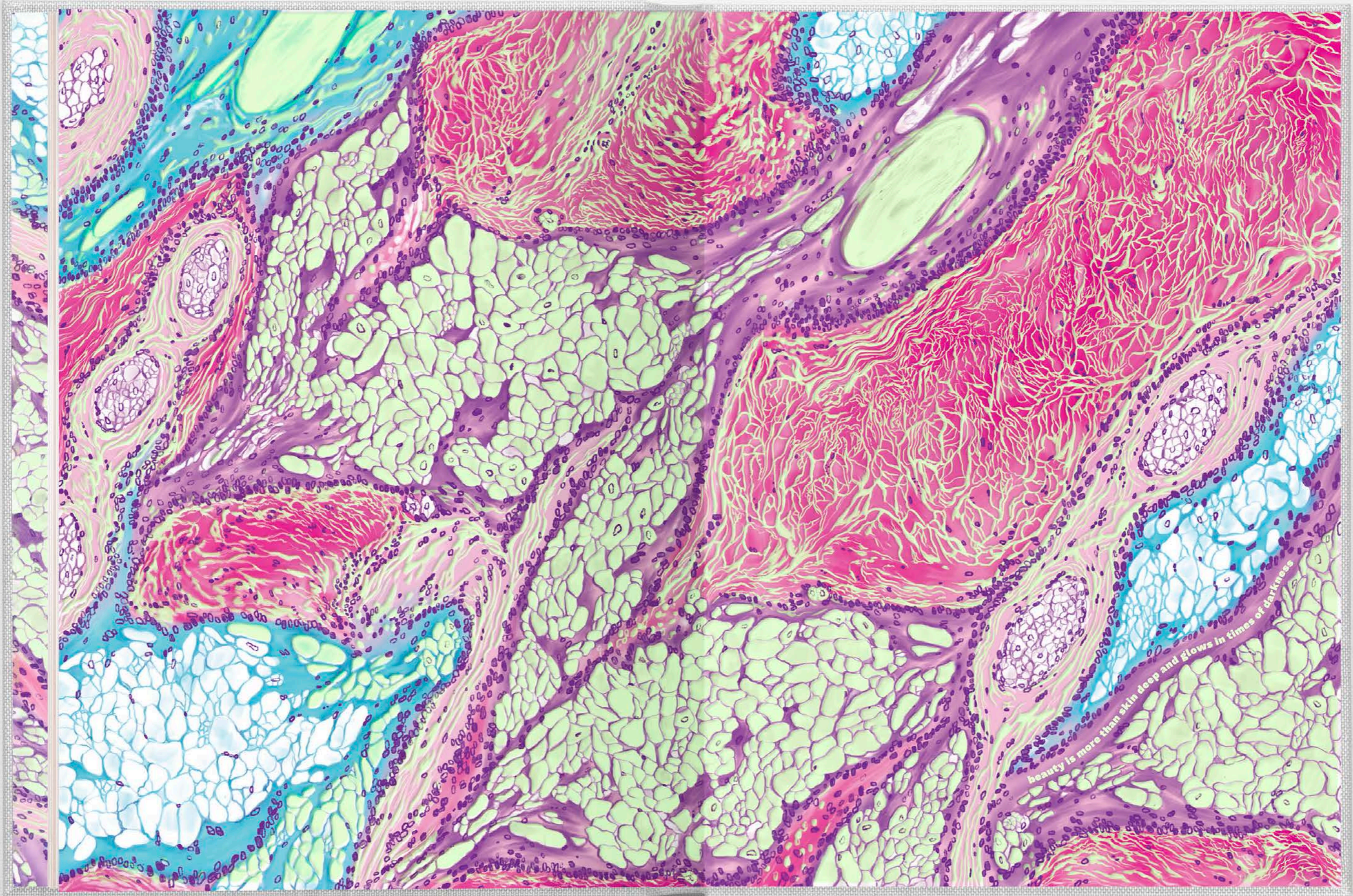
Zann, Kelvin, Fely, Priscilla, Rachele, Tiffany and Christopher

This book is now a beautiful reality thanks to your exacting standards and perseverance through health and sickness, life and death.

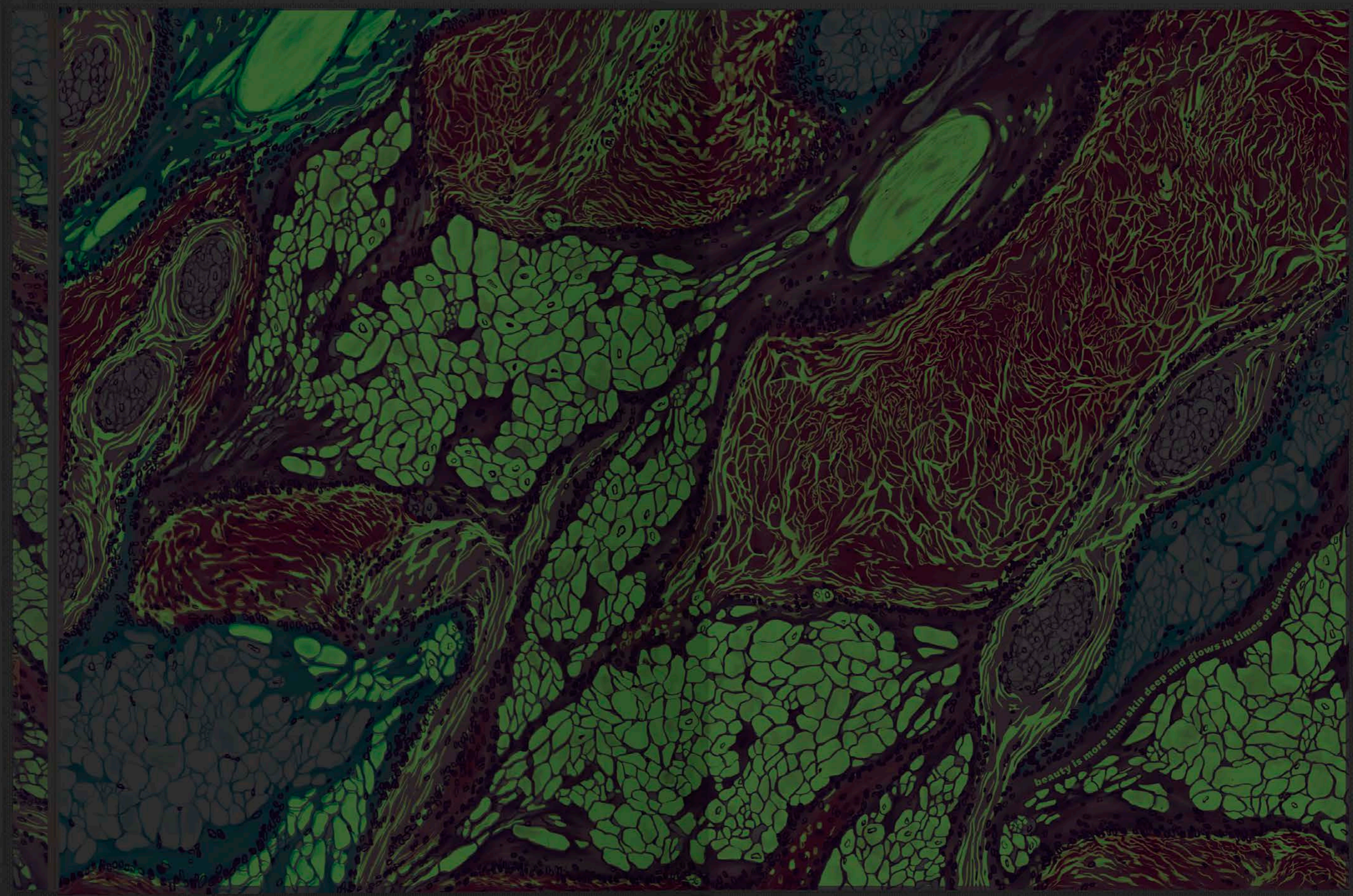
Our colleagues and volunteers, board and faculty members

Your actions speak louder than our words. With meaning and purpose, you've only made the work better.





Beauty is more than skin deep and glows in times of darkness



beauty is more than skin deep and glows in times of darkness

