Southfields Academy Weekly Newsletter
Week Commencing Monday 19th July 2021

Ethos statement: We believe that through individual commitment, self-discipline, integrity and respect for others, we inspire everyone to learn.

Year 9 News – Ms Gavin

This year has been a very challenging year for everybody, however, Mrs Douglas and I are pleased to say we have seen so many great achievements from the Year 9 students and they have shown real dedication and resilience throughout. The Year 9s have been involved in many sporting events run by the PE department, amazing performances in the Tara Arts theatre and performances for the Year 9 Theatre Festival; the drama department was amazing directing all of this. We are so proud of what we have seen from Year 9 this year given the current circumstances, as their fantastic personalities and abilities have shone through!

We have reached the end of Year 9 and cannot wait to see them all return for the GCSEs in September. We have every faith in them succeeding after seeing the work that they have produced this year.

Please encourage your child to prepare for September. We ask to you to ensure your child is fully equipped going into the new academic year and full school uniform will be expected as always.

We are holding our graduation on Tuesday 20th July and look forward to seeing all of the students celebrating their achievements. We will have some entertainment, awards, a bite to eat and there will be plenty of photographs to mark and remember the occasion.

We both wish you a safe and enjoyable summer holidays.

Biology Olympiad – Mr Bhatti

On a hot sunny afternoon in early June, 16 Biology A-level students competed in the Intermediate Biology Olympiad. The Southfields students competed with 8873 students from 449 schools from around the world to answer a number of challenging questions that rely on their creativity and imagination to problem-solve. It is an achievement to simply have participated in the Intermediate Olympiad so congratulations to all students.

Mr Bhatti, Miss Toffolo and Mr Norris are incredibly proud to have 6 students placed in the competition and achieve awards.

Nicole Ma Karissa Grecia 56.58% Award: Commended
Christopher Freakley 59.55% Award: Commended
Sosna Daniel 61.20% Award: Highly Commended
Waleed Ahmad 62.71% Award: Highly Commended
John Kerr 64.89% Award: Highly Commended
Suleman Sharaf 73.99% Award: Silver

Thought for the Week

"When words are both true and kind, they can change the world." —*Buddha*

Biology Magazine – Ms Toffolo

The global pandemic has taught everyone how important it is to be scientifically-informed. A single google-search for 'infections, immunity and vaccines' can reveal the misinformation that exists for all of us.

A-Level Biology students know the importance of being able to serve the public and the community. They set out to create Southfields' first-ever Biology magazine designed to communicate a range of immunological topics to the public. Students created scientifically-informed referenced-research articles in a chosen field that strongly interested them and they felt passionate about communicating to you.

This is the complete list of articles. We include four articles for you to enjoy.

- Immune response towards viral infections written by W.Ahmad
- Organ Transplants - what's new? Written by A.Aziz
- Is Chronic Kidney Disease (CKC) Dangerous written by D.Contreras
- Males vs. Females: Life Expectancy written by S.Daniel
- An insight into vaccinations and the anti-vax ideologies written by L.Mello
- Vaccines; keeping up to date with new strains written by S.Esmail
- Healthy Babies and Inherited Immunity written by C.Freakley
- The Universal Blood Donor written by E.Gallegos
- How do plants achieve immunity memory written by D.Meira
- Thoughts Control Our Health? Written by N.Grecia
- Why do some people have better immunity? Written by J.Kerr
- Monoclonal antibodies, what can't they do? Written by D.Lanaj
- Evolution of vaccines written by T.Marshalleck-Rainford
- Pregnancies and the Rhesus Disease written by M.Mickiewicz
- Organ donors from the farm? Written by K.Miller
- Humans to Animals, Animals to Humans: Diseases that cross boundaries written by N.Minahal
- Is the future safe for generations to come? Written by K.Quinnell
- Cancer in large organisms written by S.Sharaf

Dates for Your Diary

Wednesday 21st July 2021 – Achievement Assemblies
Monday 26th July 2021 – Summer Holidays Commence
Friday 3rd September 2021 – Year 7 Return to the Academy
Week commencing 6th September 2021 – Year groups return to the Academy

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Keep up with the Academy

Make sure you visit our website regularly. To be notified of updates to our website including new stories and new pages, please make sure you download the school news app. to your phone or tablet. Search "School News App" in the Google Play Store or Apple Store and then use our postcode, SW18 5JU, to find us.

You will then be able to click on the 'News' button to view all of the latest news items that have been added to the school(s) you have selected and also all of the upcoming calendar events by clicking on the 'Events' button.

Healthy Babies and Inherited Immunity.

Written by (C. Freakley.)

Immunity can be developed in many different ways, the most common being natural exposure. Natural exposure is when we are exposed to pathogens that make us sick, we fend for ourselves by creating natural antibodies that attack the virus or bacteria. These antibodies also help defend us from the bad guys in the future.
“An infant’s immune system doesn’t mature until around 2 to 3 months,” (Dr. Sabella , 2017)
So how do we protect our babies ?

Passive Immunity

Passive immunity, in the short-term, is the immunity that we gain from someone or something else. This can be from an immune serum or just as simple as getting it from our mothers.
Antibodies are transmitted from mother to child through the placenta, this occurs during the third trimester (last 3 months) of pregnancy.
Antibodies are also transmitted from mother to baby via Breast milk.
Although this passive immunity doesn't last forever… This gives our babies the boost they need until their immune system starts to develop on its own.
Baby formula is also a healthy alternative for those mothers who cannot breastfeed.

However, breastfeeding does not defend the baby from more serious infections and diseases. This means that there needs to be an alternative way for babies to gain more antibodies.

Active Immunity

Vaccinations. Vaccinating is another effective way to immunise babies. In the same way that pathogens from a virus or bacteria would, a vaccination triggers an immune response. This means that if the baby comes across the pathogens from the real disease in the future, their immune system will be able to recognise them and defend the body from the spread.

A baby under a year old in the UK will be provided with a total of 8 Vaccines that will help defend them against diseases such as Meningitis, Hepatitis and Polio.

So, if a baby can receive antibodies that the mother has produced through breast milk… Is it possible that vaccinated antibodies can be transmitted from mother to baby ?

Inherited vaccination immunity

The question is, is it possible ?

Before now, there has not been much research into this but
according to recent studies, the inheritance of vaccination antibodies is possible.
Early research shows that vaccinated pregnant women pass on the COVID-19 Antibodies through the uterus and via breastfeeding.

“A South Florida healthcare worker was vaccinated three weeks before giving birth to a girl with Covid-19 antibodies” (G. Kilander, 2021)
This is one of the first pieces of evidence that antibodies produced by vaccinations can be transmitted from mother to baby !

This also totally disproves the rising anti-vaccers community as “ the risk of COVID outweighs any small theoretical risks of the vaccine “ (Dr. Rhame, 2021).

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- Dr. Rhame, interviewed in “ Study: Vaccinated Moms-To-Be Pass COVID Antibodies To Babies “, By K. Raddatz, Mar 28th 2021.
- Study: Vaccinated Moms-To-Be Pass COVID Antibodies To Babies – WCCO | CBS Minnesota (cbslocal.com)
- Dr. Sabella, “Is Your Newborn Baby’s Immune System Strong Enough?”, Nov 24th 2017.
- Is Your Newborn Baby’s Immune System Strong Enough? – Health Essentials from Cleveland Clinic

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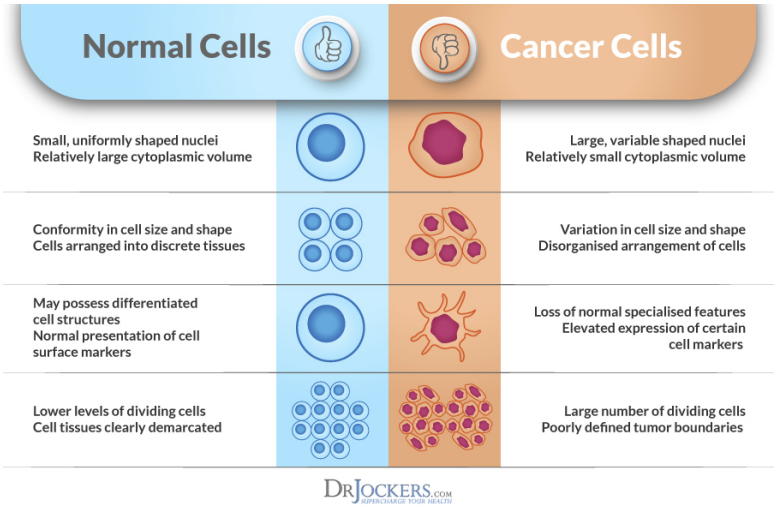
- Hapvida, Syringe Picture, Jun 6th 2016
- Solucione as suas 16 maiores dúvidas sobre vacinação infantil! (hapvidaplanos.com.br)
- W. Hernandez, Breastfeeding Picture, Feb 10th 2014
- Divorce and Visitation - Custody Law Phoenix - Hernandez (hernandezfirm.com)
- Question Mark Picture, 2014
- Free Icon | Question mark (freepik.com)

Cancer in large organisms

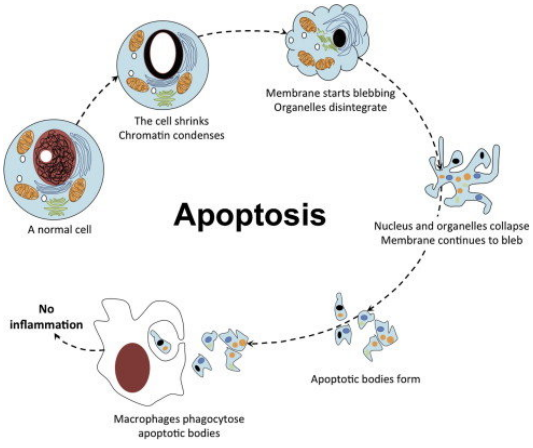
Written by S. Sharaf

Cancer is an uncontrolled rapid growth of abnormal cells that can sometimes move around compared to the controlled division of immobile normal cells. Cancer/tumours develop when the body's normal control mechanisms stop working. Some cancer mutations suppress the signals required for these mechanisms to work, thereby forming new abnormal cells. "These extra cells may form a mass of tissue, called a tumour" (Cancer treatment centers of America, 2019, p. 1).



Comparison of cancer cells and normal cells (Dr Jockers, 2016, p.4, fig, 3).

To help fight off the growth of potentially cancerous or virus-infected cells, they have to die, this may seem particularly contradictory but it isn't actually random and is done in a carefully controlled way during a process called apoptosis, in fact, "this process is also responsible for the gap between your fingers or else we'd have paddles as hands" (John W. Kimball, 2014, p. 2). When cells are told to die, they shrink and grow bubble-like protrusions on their membranes. The DNA within the cells is then chopped up into smaller fragments, and certain organelles fragmentate. Finally, the cell splits into tiny pieces that are packaged into a membrane. The chunks then release soluble 'find-me' signals such as phosphatidylserine that attract (phagocytic) immune cells, which engulf them.

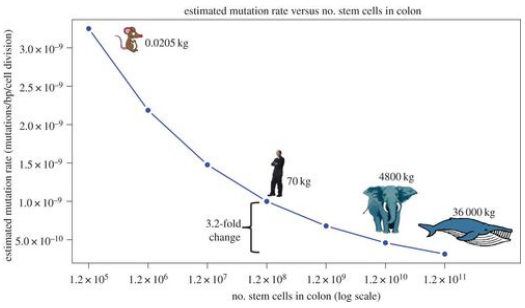


Cytology of apoptosis (Johnny Stiban, 2015, p.5, fig, 4).

Unfortunately, these mechanisms don't always work the way they should, this is why we use numerous treatments such as "cryosurgery, lasers, hyperthermia, photodynamic therapy" (National cancer institute, April 29, 2015, pp. 1-2) to treat cancer/tumours. One of the commonly used treatments is surgery. It can either be used to remove an entire tumour in one area of the body, debulk

a tumour by removing a little bit of it so that other cancer treatments can work more efficiently or ease some of the symptoms caused by cancer.
Another type of treatments uses "Y" shaped molecules called "monoclonal antibodies" (Mayo Clinic, 2019, pp. 1-2) they can attach to a specific target such as molecules on the surface of cancer cells and block molecules certain cancer cells need to grow, they can also flag them for destruction by our immune system or deliver harmful substances to cancer cells.

In the process of trying to defeat cancer, we discovered a biological paradox that scientists still haven't been able to solve, large animals like the whale seem to be immune to cancer. Peto's paradox is the name given to the lack of correlation between body size, longevity and cancer risk across species. Animals who have "1000-fold more cells than humans" (F. Caulin and C. Maley, April 1, 2012, p. 1) like whales "do not exhibit an increased cancer risk" (F. Caulin and C. Maley, April 1, 2012, p. 1), this is contradictory because you would think that a larger organism would have more cells, therefore, higher risk of them mutating, however, this isn't the case. Nagy et al. (2007) proposed one of many hypotheses stating that "natural selection acting on competing phenotypes among the cancer cell population will tend to favour aggressive 'cheaters' that then grow as a tumour on their parent tumour". These hypertumours then survive off of the parent tumour's blood supply thus damaging it, this cycle repeats over and over because tumours don't have time to reach a critical size in large organisms. Understanding why large organisms are more resilient to cancer might help us, humans, find a way to defeat it.



Estimated mutation rate versus no. stern cells in colon (F. Caulin et al. 2015, p. 3, fig, 2)

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Why do some people have better immunity?

Written by J.Kerr

What is innate immunity?

Innate immunity (or natural immunity) can be described as our first line of defence against any pathogen (which is a foreign material that can cause disease). This is the form of immunity that we are all born with, and it takes effect immediately upon infection. Its primary function is to prevent the spread of these pathogens throughout our body, although ideally, these pathogens will have been neutralised before entering our bodies (due to physical barriers such as the skin). However, there can also be chemical barriers if the pathogen gains entry into the body such as the acid in our stomachs. These barriers can also be thought of as external and internal defences respectively. Innate immunity is described as a non-specific defence mechanism, meaning any form of pathogen that attempts to enter our bodies will be killed. This is achieved using similar mechanisms for all pathogens. This system has no immunologic memory, “therefore it is unable to recognise (or memorise) the same pathogen should the body be exposed to it in the future”.(Marshall et al, 2018)

What is adaptive immunity?

Adaptive immunity, otherwise known as acquired immunity, is the form of immunity that develops after an immune system response to a foreign substance. The exposure to this foreign substance may be via vaccination or via infection with a particular pathogen. Adaptive immunity is vital in cases in which the innate immune response is ineffective. Unlike the innate immune response, the adaptive immune response is specific to certain antigens. An antigen is a molecule found on the surface of a cell, which can be detected as foreign by the immune system, prompting an immune response. So whilst innate immunity is a non-specific defence mechanism, adaptive immunity is antigen-dependent and antigen-specific (Marshall et al, 2018). This is not the only difference between these two types of immunity; adaptive immunity is a gradual process and it takes effect over time instead of immediately, but it enables the host to mount a more rapid and efficient immune response upon subsequent exposure to this antigen (Marshall et al, 2018). This is due to the production of ‘memory cells’ upon exposure to the foreign antigen. This form of immunity allows for short/long-term protection, but only in rare cases is it lifelong. The innate immune response on the other hand lasts your whole life.

Why do different individuals have better immunities? What can we learn from them?

Natural variation in immune response has been observed by doctors for centuries, nevertheless only recent research has noted that the character and strength of our immune response are controlled by our habits, genetics, and previous exposures to disease. To no surprise, the immune system weakens with age, hence why those over 70 are most at risk from covid-19 than others (Lawton,2020). Your nutritional status also plays an important role in the strength of your immune response to the coronavirus. a healthy diet produces an immune system capable of withstanding an attack from the virus. Nutrients in balanced quantities are absorbed by our cells, preventing nutritional deficiency. Individuals that consume well-balanced diets appear to be safer with better immune systems and fewer numbers of chronic diseases and infections (Aman, 2020).

What role does genetics play in immunity?

Despite the ability to strengthen our immune system through a healthy lifestyle, research from Kings College London suggests that “nearly three-quarters of immune traits are affected by genes” (2017). Genes are a part of our DNA that codes for and produces a specific protein, they are the basic units of heredity (genetic heritage passed down from our biological parents) and are the building blocks for human growth and development. Researchers are continuing to discover how genes affect certain immune disorders. For example, a particular genetic defect could potentially block the cells that defend

our body, however, another defect may prevent the removal of toxic chemicals from our body. The set of genes that codes for the proteins on the cell surface, therefore helping our immune system to identify foreign material, are called the MHC genes, or the HLA genes. Similar to fingerprints, everyone's HLA gene mixture is unique. Your HLA genes give you a collection of defence mechanisms, which may be better for some microorganisms and worse for others (Svoboda, 2020). This would explain the reason why you might be prone to the cold virus but yet are unlikely to ever get a stomach bug. These MHC genes also affect our susceptibility to and severity of the disease SARS-coV-2, the virus responsible for the coronavirus disease (Nguyen, 2020). However the HLA genes are not the only genes that affect immune resistance; the human genome project has identified tens of thousands of gene variants found in people who develop specific diseases and are less common in those without these gene variants (Svoboda, 2020). Scientists are flagging these variants and collecting an 'atlas' of the proteins they produce and the resulting conditions.

What is being done/what can we do to prepare for new strains of diseases?

Vaccination can lead to adaptive immunity, and over the years we have seen that vaccination has made an enormous contribution to global health. For example, two major infections, smallpox and rinderpest, have been completely eradicated (Greenwood, 2014). Our innate immunity is not able to fight every disease nor can our immune systems keep up with constantly mutating viruses. The lag time between the mutating virus and the production of a vaccine has detrimental effects. However, the perfect way to combat the virus's ability to replicate, mutate and transmit, is to have the vaccine achieve the same thing. The ability for the therapy to replicate, mutate and transmit would remove the "fundamental mismatch" (the barriers to controlling infectious disease) between the virus and the therapy. Super-spreaders of this particular disease will now also become super-spreaders for the therapy. Leor Weinbergers' hijacker theory is the idea that you could engineer a virus to amputate its own genetic material, making the virus ineffective against our own cells, this form of the cell can then 'hijack the hijackers' by entering already-infected cells and use the cells 'machinery' to form more versions of itself. This will turn a factory that makes HIV into a factory that makes the therapy for HIV. This therapy carries no disease, lowers HIV levels, and keeps the cells healthier (Weinberger, 2020). This discovery could potentially eradicate HIV and other infectious diseases.

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An insight into vaccinations and the anti-vax ideologies

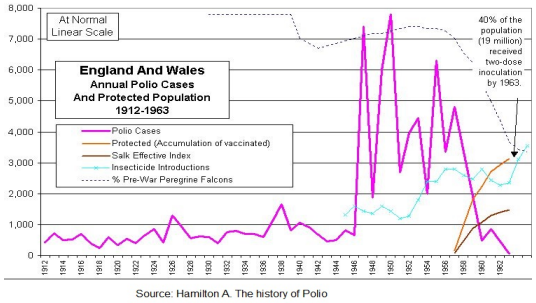
Written By: **L. Mello**

The concept of vaccination has been around for hundreds of years since Edward Jenner in 1796 realised the first vaccination against smallpox. From the 18th century to the 21st, vaccines have faced a lot of changes and have been successful in eradicating many diseases, many see vaccinations as a major medical breakthrough and necessary to the functionality of our society in situations such as the one being faced now with the COVID-19 cases worldwide. However, others completely disagree with such a view, arguing that vaccines make people sick and have many concerning risks. Vaccines have suffered rejections since its creation, but recently, due to the increased use of social media and misleading information being released every minute many have started to question the reliability of it.

The process of Vaccination was invented by Edward Jenner. His first successful trial came along in 1796 and throughout its 225 years of existence, many improvements were made. From 1796 to 2021, many diseases have been eradicated due to the constant vaccinations that led to a rapid and safe herd immunity. Infections such as Polio have been eradicated and are on their way to be eradicated worldwide as well as Rinderpest, Dracunculiasis, Yaws, Rubella, measles. The list is big, however, it could come to decrease if the percentage of vaccinated people decreases, which is why it's important to understand it

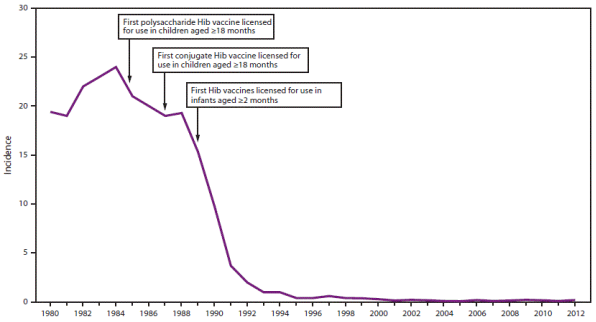
In order to understand why vaccines are so important and how they work, it's useful to first explain how the immune system works. Our body has its own defense mechanism which is constantly fighting off foreing cells, foreing cells have proteins or sugars on their surface which have different shapes to those present in the human body. After pathogens are detected by the human immune system, white blood cells work together to fight off the infection by producing antibodies which will target those foreing proteins. After the right antibody is found, the white blood cells become production lines, they will then start to produce those specific antibodies in masses to fight off the diseases. Some white blood cells will become memory cells if the same foreing cell ever infects the body again. This process can take days, and in some cases, an individual will not have enough time as the infection can be deadly.

The role of vaccinations is to make all of this process almost instantaneous with certain diseases as it's going to train our immune system to immediately recognise those foreing cells by exposing it to inactive or weakened foreing cells so it's convinced that we are infected, leading to an immune response, going through all of that process but without the harm, meaning that when the real pathogen attacks our body, the response will be quick. Once a certain percentage of the population creates an immunity to an infection, herd immunity is achieved. By the definition of Gavi: herd immunity is the indirect protection from a contagious infectious disease that happens when a population is immune either through vaccination or immunity developed through previous infection (Gavi, 2020).An example, If 95% of the population is vaccinated against X infection, the chances of someone catching it due to the lack of immunity is 20 every 1 million. The efficiency of such treatment can be seen as no cases of Polio have been reported in the UK since the mid 80's according to the NHS (NHS, no date)



Source: Hamilton A. The history of Polio

The World Health Organisation has categorised ‘Vaccine Hesitancy’ as a top ten threat to health in 2019 (WHO, 2019).The main reasons for vaccine hesitancy varies from religious beliefs -mainstream religion does not condemn vaccines, to the contrary they support it- to group of individuals believing that there is not enough evidence for vaccines to government conspiracy theories. The main argument used is that vaccines cause people, especially children to be sick, leading to the development of complications such as autism. This idea was led by a study made by a group of British doctors in 1995. They tried to show that individuals who had received the MMR (measles-mumps-rubella) vaccine, had far more chances of acquiring bowel disease than individuals who had not been vaccinated (Thompson,et all 1995). This created a social panic as many journals and the press started to cover the story to the public, frightening thousands of parents who became reluctant to vaccinate their children,yet no further studies had shown that there was a link between the vaccination and autism (NIH, no date). Evidence was found by Brian Deer that one of the scientists in the investigation, Wakefild, was forging data about the children, making his argument even less reliable, leading to his article being removed from the Lancet (Deer, 2011). Even after such events, many still use the studies made by these british doctors as an argument against vaccinations. Others might argue that diseases were already disappearing as our hygiene standards rose and sanitation in cities got better. This is not completely false, the improved socioeconomic conditions have had a direct impact on the diseases as cleaner, less crowded streets and better households will suppress many pathogens, avoiding many infections. However, our conditions regarding sanitation is no better than the 1990’s, yet, the decrease in cases of diseases such as Haemophilus influenzae type b (Hib) cannot be linked with any other factor other than vaccinations(WHO, no date)



Source: Elizabeth, C. et al. Prevention and Control of Haemophilus influenzae Type b Disease

Many Vaccines have been around for decades and are constantly tested by different organisations, going through many test trials before its release for human volunteers in its phase III and then for further assessments, so then it's safe to be released to the public (WHO, 2020). Millions of people are vaccinated every year and its estimated that 2|3 millions lives are saved every year due to vaccinations. These are extremely important mainly during this current situation being faced in our society.

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