MANCHESTER 1824

The University of Manchester

ManchesterImmunologyGroup


# Immune attacks

Human Immunology Top Trumps

# How to play...

Aim: to win all of the cards

- There can be 2, 3 or 4 players.
- Once the cards are shuffled, deal the whole pack out face down, equally between the players.
- Players are only allowed to look at their top card, the rest must remain face down.
- In a clockwise direction, the first player reads out a category and its number, from their first card.
- All of the players then in turn read out the number that they have for this category.
- The player with the highest number wins and takes each of the top cards from all players.
- The winner then places these cards at the bottom of their own pile and chooses a category and number from their next top card.
- In the case that two players have the same category number then all cards from that round are placed in the middle and the same players then chooses a different category from their next top card. The winner of this round wins all of the cards, along with those from the middle.

Most terms may be new to you so we have provided a phonetic sounding of the words below each card title.

Here is a short explanation of the 6 categories and the scoring:

**Speed of Activation:** describes the speed at which this member of the defence system comes into action. 10 is the highest or fastest cell.

**Length of Response:** This is how long the defender will fight the pathogen. The best scoring to have is VERY LONG then LONG, ALWAYS PRESENT, SHORT & the least useful is VERY SHORT.

**Power to Attract Other cells:** This is how good it is at getting other cells to the infection site. 10 is the highest score.

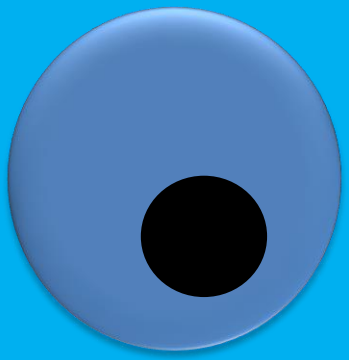
**Pathogen Fighting Power:** this is how good the defence team member is at fighting or killing a pathogen. 10 is best at fighting.

**Strength of 2nd Response:** If we get the same infection, it is good to be ready this time so we can deal with the infection quickly and get less ill. Some cells are particularly good at dealing with 2nd infection. 10 is best.

**Overall Immune Power:** This is based on the scores the cells/barriers have received for each of the other categories and gives their overall immune power. 100 is highest and best.

# Immune Attack

## T cell
*(tee-sel)*

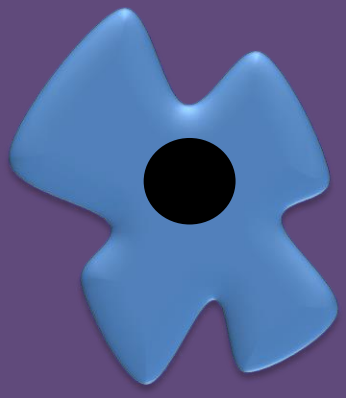


| | | |
|---|---|---|
| F | Speed of Activation | 5 |
| A | Length of Response | Long |
| C | Power to attract other cells | 8 |
| T | Pathogen Fighting Power | 8 |
| S | Strength of 2nd response | 9 |
| | Overall Immune power | 90 |

**DID YOU KNOW?**
**T cells are produced in the THYMUS (an important immune organ). A number of different types have been found with different functions (HELPER and KILLER).**

# Immune Attack

## **Macrophage** (*mak-roh-faj*)



| | | |
|---|---|---|
| F | Speed of Activation | 9 |
| A | Length of Response | Short |
| C | Power to attract other cells | 7 |
| T | Pathogen Fighting Power | 7 |
| S | Strength of 2nd response | 3 |
| | Overall Immune power | 70 |

**DID YOU KNOW?**
**Macrophages are a type of White Blood Cell. They act by swallowing up and digesting pathogens-this is called PHAGOCYTOSIS.**

# Immune Attack

## Hair
*(h-ay-r)*

| | | |
|---|---|---|
| F | Speed of Activation | 10 |
| A | Length of Response | Always present |
| C | Power to attract other cells | 2 |
| T | Pathogen Fighting Power | 3 |
| S | Strength of 2nd response | 2 |
| | Overall Immune power | 50 |

**DID YOU KNOW?**
**Hair protects more exposed and sensitive areas of the body and stops the entry of microbes into the nose and mouth. It also protects against damage to the skin barrier.**

# Immune Attack

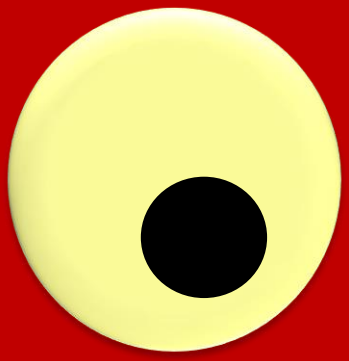
## Mast cell
*(mast sel)*

| | | |
|---|---|---|
| F | Speed of Activation | 9 |
| A | Length of Response | Short |
| C | Power to attract other cells | 7 |
| T | Pathogen Fighting Power | 7 |
| S | Strength of 2nd response | 3 |
| | Overall Immune power | 70 |

**DID YOU KNOW?**
**Mast cells are full of granules that empty their contents out to protect against infections like worms. Mast cells also cause many symptoms of allergy as they have HISTAMINE in their granules.**

# Immune Attack

## B cell
*(bee sel)*

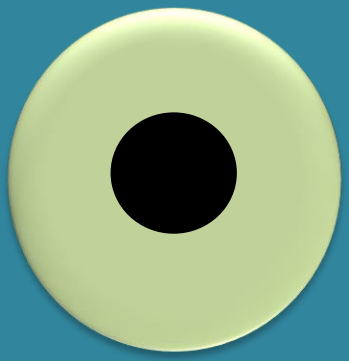


| | | |
|---|---|---|
| F | Speed of Activation | 5 |
| A | Length of Response | Long |
| C | Power to attract other cells | 8 |
| T | Pathogen Fighting Power | 6 |
| S | Strength of 2nd response | 9 |
| | Overall Immune power | 92 |

**DID YOU KNOW?**
**B cells are produced in the BONE MARROW. Their main job is to produce ANTIBODY. They also function as MEMORY cells providing a very quick 2nd immune response**

# Immune Attack

# Helper T cell
*(help-er tee sel)*



| | | |
|---|---|---|
| F | Speed of Activation | 4 |
| A | Length of Response | Long |
| C | Power to attract other cells | 10 |
| T | Pathogen Fighting Power | 6 |
| S | Strength of 2nd response | 9 |
| | Overall Immune power | 92 |

**DID YOU KNOW?**
**Helper T cells are a form of T CELL involved in ACTIVATING and DIRECTING other cells of the immune system like B cells to make sure they do their job properly.**

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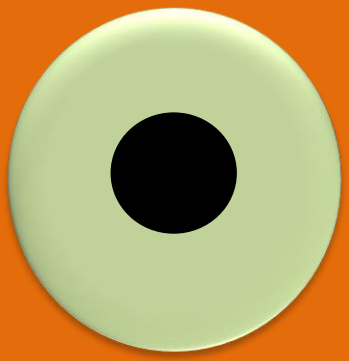
# Immune Attack

## Cytotoxic T cells
*(Si-toh-tox-ic tee sel)*



| | | |
|---|---|---|
| F | Speed of Activation | 3 |
| A | Length of Response | Long |
| C | Power to attract other cells | 5 |
| T | Pathogen Fighting Power | 10 |
| S | Strength of 2nd response | 9 |
| | Overall Immune power | 90 |

**DID YOU KNOW?**
**These are a type of T CELL that can cause the death of a TUMOUR cell or cells infected with a VIRUS by releasing toxic granules to make holes in the target cell surface.**

# Immune Attack

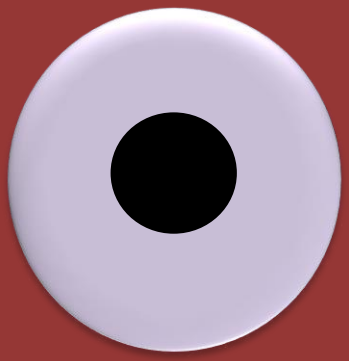
## Tears
*(Tee-rs)*

| | | |
|---|---|---|
| F | Speed of Activation | 9 |
| A | Length of Response | Short |
| C | Power to attract other cells | 4 |
| T | Pathogen Fighting Power | 6 |
| S | Strength of 2nd response | 2 |
| | Overall Immune power | 35 |

**DID YOU KNOW?**
**Tears help to flush out microbes that settle on the eye. An enzyme in tears called LYSOZYME helps to prevent eye infection.**

# Immune Attack

# Memory B Cell
*(mem-or-ee bee sel)*

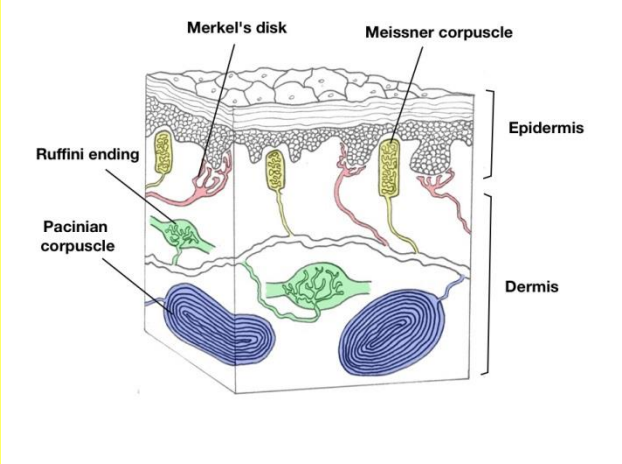


| | | |
|---|---|---|
| F | Speed of Activation | 3 |
| A | Length of Response | Very Long |
| C | Power to attract other cells | 9 |
| T | Pathogen Fighting Power | 10 |
| S | Strength of 2nd response | 10 |
| | Overall Immune power | 95 |

**DID YOU KNOW?**
**These are a form of MATURE B cell that are particularly good at providing a fast and effective SECOND repose to protect against infections when they infect you a 2nd time.**

# Immune Attack

## Skin




| | | |
|---|---|---|
| F | Speed of Activation | 10 |
| A | Length of Response | Always present |
| C | Power to attract other cells | 4 |
| T | Pathogen Fighting Power | 4 |
| S | Strength of 2nd response | 2 |
| | Overall Immune power | 55 |

**DID YOU KNOW?**
**Our skin is an important barrier in the human body. It stops microbes entering the body. Its protection is broken by injuries such as cuts or scratches on the skin surface.**

# Immune Attack

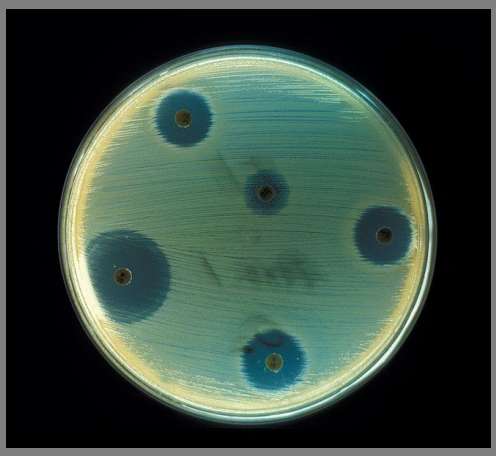
# Vaccination
*(vax-in-aye-shun)*


| | | |
|---|---|---|
| F | Speed of Activation | 4 |
| A | Length of Response | Very Long |
| C | Power to attract other cells | 10 |
| T | Pathogen Fighting Power | 10 |
| S | Strength of 2nd response | 10 |
| | Overall Immune power | 98 |

**DID YOU KNOW?**
**Vaccines contain a dead or weak form of the disease-causing pathogen. This then stimulates the correct immune cells to be produced to protect against that infection.**

# Immune Attack

# Antibiotics
*(ant-ee-by-o-tics)*

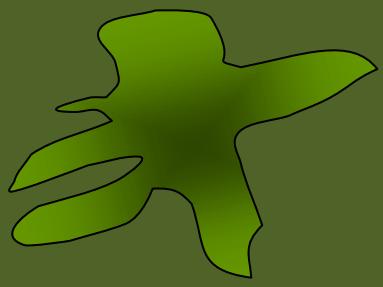


| | | |
|---|---|---|
| F | Speed of Activation | 3 |
| A | Length of Response | Short |
| C | Power to attract other cells | 8 |
| T | Pathogen Fighting Power | 0 |
| S | Strength of 2nd response | 0 |
| | Overall Immune power | 50 |

**DID YOU KNOW?**
**These are substances administered by a doctor when you are ill. They defend against BACTERIA only and NOT viruses or parasites. Antibiotics stop bacteria reproducing or directly kill the bacteria.**

# Immune Attack

## Mucus
*(Mew-cus)*

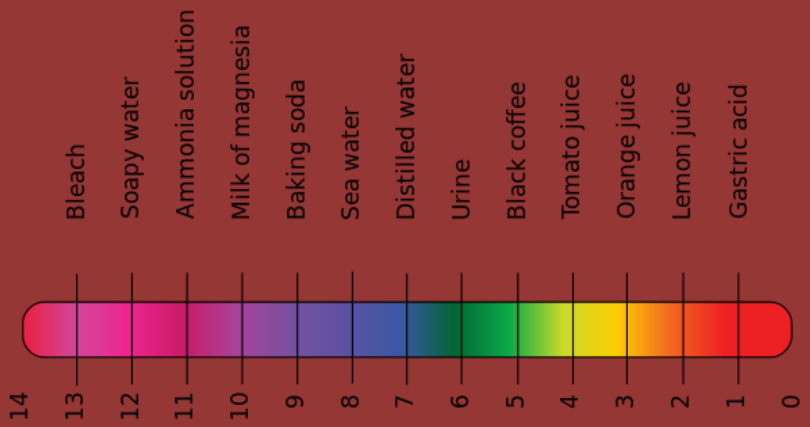


| | | |
|---|---|---|
| F | Speed of Activation | 10 |
| A | Length of Response | Always present |
| C | Power to attract other cells | 2 |
| T | Pathogen Fighting Power | 5 |
| S | Strength of 2nd response | 2 |
| | Overall Immune power | 55 |

**DID YOU KNOW?**
**Sticky mucus in our respiratory tract and gut help to trap unwanted pathogens that enter the body. Mucus also contains anti-pathogen substances like DEFENSIN that can kill bacteria.**

# Immune Attack

## pH
*(pee-aich)*




| | | |
|---|---|---|
| F | Speed of Activation | 10 |
| A | Length of Response | Always present |
| C | Power to attract other cells | 5 |
| T | Pathogen Fighting Power | 5 |
| S | Strength of 2nd response | 3 |
| | Overall Immune power | 60 |

**DID YOU KNOW?**
**Acid pH (<7.0) such as in the STOMACH and SKIN inhibit the growth of harmful bacteria.**

# Immune Attack

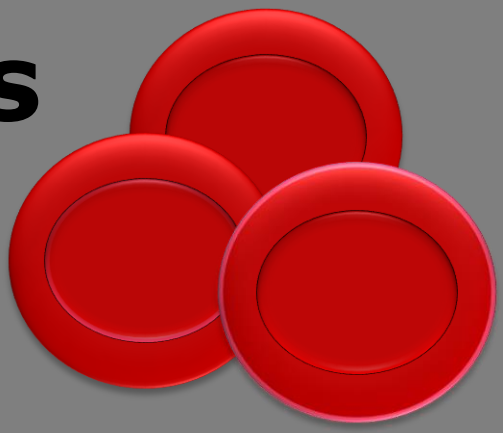
# Neutrophil
*(new-troh-fil)*

| | | |
|---|---|---|
| F | Speed of Activation | 8 |
| A | Length of Response | Short |
| C | Power to attract other cells | 7 |
| T | Pathogen Fighting Power | 6 |
| S | Strength of 2nd response | 3 |
| | Overall Immune power | 70 |

**DID YOU KNOW?**
**Neutrophils are the most common WHITE BLOOD CELL. Found in the blood, they are normally the 1st cells to arrive at the site of inflammation. Many found in PUS.**

# Immune Attack

## Red Blood Cells
*(red blud sels)*

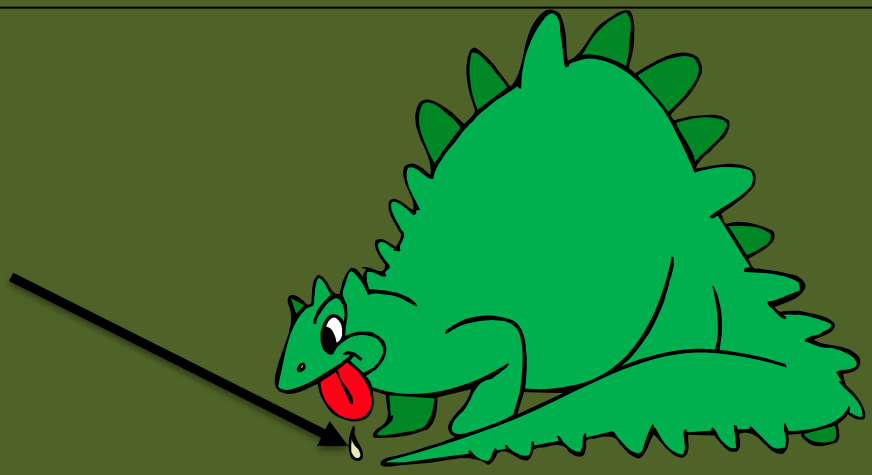


| | | |
|---|---|---|
| F | Speed of Activation | 2 |
| A | Length of Response | Very Short |
| C | Power to attract other cells | 2 |
| T | Pathogen Fighting Power | 0 |
| S | Strength of 2nd response | 0 |
| | Overall Immune power | 50 |

**DID YOU KNOW?**
**Red Blood Cells are the most common type of blood cell. Their job is to deliver OXYGEN to organs. Rich in IRON. No defensive function**

# Immune Attack

## Saliva
*(Sal-i-vah)*

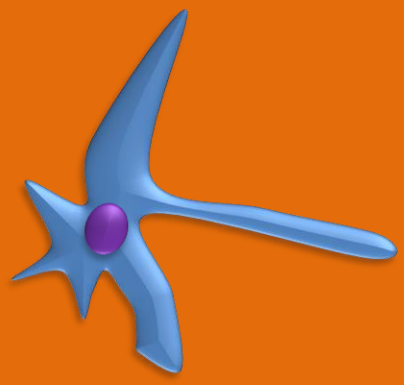


| | | |
|---|---|---|
| F | Speed of Activation | 10 |
| A | Length of Response | Always present |
| C | Power to attract other cells | 4 |
| T | Pathogen Fighting Power | 2 |
| S | Strength of 2nd response | 2 |
| | Overall Immune power | 45 |

**DID YOU KNOW?**
**Saliva provides a BASIS immune barrier by cleaning the mouth and removing BACTERIA to help prevent infections.**

# Immune Attack

# Dendritic cell
## *(den-drit-ick sel)*



| | | |
|---|---|---|
| F | Speed of Activation | 10 |
| A | Length of Response | Short |
| C | Power to attract other cells | 10 |
| T | Pathogen Fighting Power | 4 |
| S | Strength of 2nd response | 4 |
| | Overall Immune power | 80 |

**DID YOU KNOW?**
**Dendritic cells can move all over the body and look for pathogens or damage. Dendritic cells are vital to switch on T cells to start the immune response and be able to have MEMORY to infections we meet again.**

# Immune Attack

## Regulatory T cell

*(reg-you-layt-orr-ee tee sel)*

| | | |
|---|---|---|
| F | Speed of Activation | 5 |
| A | Length of Response | Long |
| C | Power to attract other cells | 6 |
| T | Pathogen Fighting Power | 0 |
| S | Strength of 2nd response | 9 |
| | Overall Immune power | 90 |

**DID YOU KNOW?**
**Regulatory T cells are a type of T CELL. They STOP the inflammation caused by the immune response which might otherwise make us very poorly.**

# Immune Attack

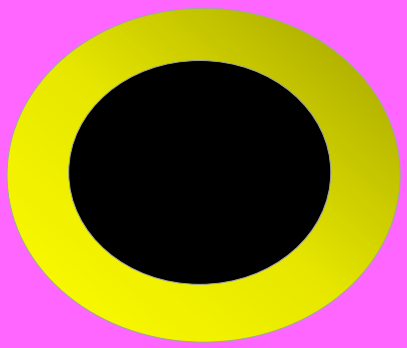
## Eosinophil
*(e-oh-sin-oh-fil)*

| | | |
|---|---|---|
| F | Speed of Activation | 9 |
| A | Length of Response | Short |
| C | Power to attract other cells | 7 |
| T | Pathogen Fighting Power | 6 |
| S | Strength of 2nd response | 3 |
| | Overall Immune power | 70 |

**DID YOU KNOW?**
**Eosinophils are a type of White Blood Cell. They contain lots of GRANULES and can release their granule contents that contain things to kill pathogens. They can also catch pathogen in special TRAPS.**

# Natural Killer cells

*(Nat-you-ral kill-er sels)*



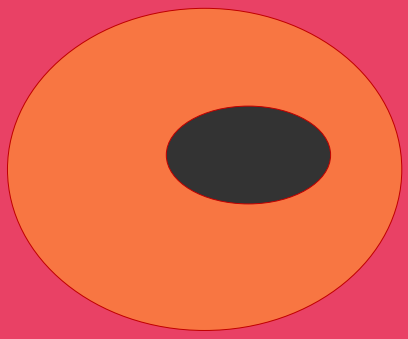
| | | |
|---|---|---|
| F | Speed of Activation | 8 |
| A | Length of Response | Short |
| C | Power to attract other cells | 5 |
| T | Pathogen Fighting Power | 8 |
| S | Strength of 2nd response | 2 |
| | Overall Immune power | 60 |

**DID YOU KNOW?**
**These are <u>not the same</u> as cytotoxic T cells and are quickly activated to kill TUMOUR cell or cells infected with a VIRUS.**

# Immune Attack

# Innate Lymphoid Cell

*(In-ate lim-foyd sel)*

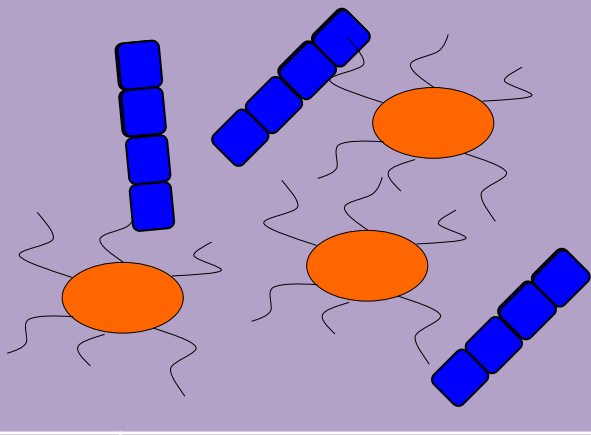


| | | |
|---|---|---|
| F | Speed of Activation | 5 |
| A | Length of Response | Short |
| C | Power to attract other cells | 8 |
| T | Pathogen Fighting Power | 6 |
| S | Strength of 2nd response | 2 |
| | Overall Immune power | 60 |

**DID YOU KNOW?**
**Innate Lymphoid cells were only discovered in the 21st century and are found in our organs and protect against infection.**

# Immune Attack

## Microbiota
*(my-crow-by-oh-ta)*



| | | |
|---|---|---|
| F | Speed of Activation | 8 |
| A | Length of Response | Always there |
| C | Power to attract other cells | 6 |
| T | Pathogen Fighting Power | 6 |
| S | Strength of 2nd response | 1 |
| | Overall Immune power | 68 |

**DID YOU KNOW?**
**The Microbiota is the friendly BACTERIA that lives in our body. It protects against infection by out-competing with other bacteria or killing other pathogens. There are more bacterial cells than human cells in our body.**

# Immune Attack

## Epithelial cell
*(ep-ee-theel-ee-al sel)*

| | | |
|---|---|---|
| F | Speed of Activation | 8 |
| A | Length of Response | Always there |
| C | Power to attract other cells | 7 |
| T | Pathogen Fighting Power | 4 |
| S | Strength of 2nd response | 1 |
| | Overall Immune power | 58 |

**DID YOU KNOW?**
**All our organs are lined with epithelial cells which act as barrier to stop pathogens from entering the body. Epithelial cells can also make substances that can kill pathogens and some make MUCUS.**