**Secondary Schools:
Discovering the Immune System – VDJ Game**

Approximate timing: 30 minutes

Required resources: PowerPoint presentation, fact sheet, activity sheet

This lesson will introduce students to how our adaptive immune system functions. Firstly by introducing the way B cells use VDJ genes to produce all of the antibodies that we’ll ever use, before describing why this is important and how this can change with age and disease. An activity that can be printed or ran online will then demonstrate the process of making antibodies to help with learning.

**The lesson supports:**

Links to Babraham Institute research themes:

<https://www.babraham.ac.uk/our-research/healthy-ageing>

<https://www.babraham.ac.uk/our-research/lymphocyte>

Links to Babraham Institute scientific services

<https://www.babraham.ac.uk/science-services/flow-cytometry>

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| **Learning outcomes** |
| All students will: | Describe how antibodies are made by B cells |
| Most students will: | Explain why B cells don’t function as well with age  |
| Some students will: | Describe two mechanisms that B cells use to choose VDJ genes |
| Key word/s | VDJ, antibody, gene, B cells, antigen, DNA |

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| **Teaching notes** | **Student learning activities**  |
| **Development** (10 mins) Run presentation (VDJ – slides):Go over slide content – refer ‘Weapons od Mic for background information | Slides 2 - 14Student actions |
| **VDJ Game** (15 minutes)This can be run online, or as a printable jigsawOnline version can be found here: <http://immunearmy.babraham.ac.uk/antibodies/index.html>  | VDJ - activityThe students need to see how many different antibodies they can make: * You must use 1 ‘V’ gene, 1 ‘D’ gene and 1 ‘J’ gene
* You can use the same genes more than once, but not in the same combination

How many different antibodies can you make?  |
| Plenary (5 mins)Plenary questions are linked to initial learning outcomes | Students answer questions:* Which cells produce antibodies?
* How are antibodies made?
* Why don’t B cells function as well with age?

How do B cells choose VDJ genes that are far apart from each other? |
| **Extension activities**Suggested follow-up activities<http://immunearmy.babraham.ac.uk/> | Visit Immune Army websiteWMD secondary school resource – refer to separate lesson planWMD origami sheetResearch stories* Work in groups to think about the implications of each piece of research, and order them e.g. by importance, relevance or ease of comprehension
* Think about :
	+ Who would this affect the most and why?
	+ What did you base your decision on?

Discuss with class |