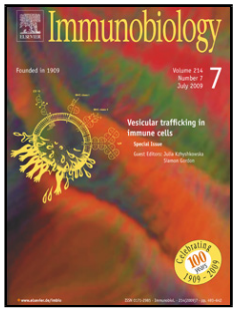

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A hypothetical new role for single-stranded DNA binding proteins in the immune system

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Abstract: The breadth of the host range of single-stranded DNA (ssDNA) viruses is roughly comparable to the host range of double-stranded DNA viruses (dsDNA). Yet, general ssDNA sensing receptors that activate the immune system have not been unequivocally identified while numerous dsDNA sensing receptors are known. Here, we hypothesize that some of the Single-Stranded DNA Binding (SSB) proteins may act as receptors that detect single-stranded DNA from pathogens and activate the innate immune system. As the first test of our hypothesis, we checked whether human genes that are known to bind to ssDNA are potentially interferon-regulated. Out of the 102 human genes that are known to have ssDNA binding ability 23 genes show a more than two-fold increase in gene expression upon interferon treatment. Single-stranded DNA viruses are pathogens of not only animals but also of plants and protozoans. We used this information to further prioritize our candidate list to ssDNA binding genes that are common between the model plant Arabidopsis thaliana and humans. Based on these strategies, we shortlist several promising candidate genes including the HMGB1 gene which could act as a ssDNA sensor that activates the immune system. Agreeably though we cannot establish a definitive role for these genes as ssDNA sensors of the immune system as yet, our preliminary analysis suggests the potential existence of ssDNA binding protein-like receptors (SLR's) that are worth investigating further.