

Solstice Health Assignment

Technical Exercise: The purpose of this technical exercise is to give you a sense of the kind of problems you would be working on at Solstice while giving us a sense of your technical capabilities and your capacity to solve open-ended problems.

You will be building a miniature version of Solstice's Fact Check solution. This will involve finding the appropriate citations for marketing claims from their relevant clinical sources.

We've shared with you one page from a marketing file as well as eight associated clinical files, all related to the drug FLUBLOK. Your task is to build a solution that is able to:

Task: *Match each claim from the marketing file with all of the relevant sentence(s), table(s), figures in the clinical files that best support the claim being made. Keep in mind that a claim can have multiple matches that best support it.*

- Do not worry about OCRing the marketing document. Assume you already have the claims in the below format.

```
{
  "claims": [
    {
      "claim": "Flublok ensures identical antigenic match with WHO-
and FDA-selected flu strains."
    },
    {
      "claim": "Flublok contains 3x the hemagglutinin (HA) antigen
content of standard-dose flu vaccines, which has been linked to
greater immunogenicity vs standard-dose flu vaccines."
    },
    {
      "claim": "Cell- and egg-based flu vaccines have the potential to
develop mutations during production, which may reduce their
effectiveness."
    },
    {
      "claim": "Recombinant technology leads to a broader immune
response that may provide cross-protection, even in a mismatch
season."
    },
    {
```

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```
"claim": "Vaccination with a higher-dose recombinant flu vaccine  
may induce a more robust antibody response than egg-based standard-  
dose vaccines."  
},  
{  
  "claim": "Flublok (quadrivalent) was evaluated in the pivotal  
trial against Fluarix (quadrivalent standard-dose vaccine)."  
},  
{  
  "claim": "Flublok is produced using a novel production platform  
in which recombinant HA is expressed in insect cells using a  
baculovirus expression vector system (BEVS)."  
},  
{  
  "claim": "Recombinant HA antigens produced using BEVS have been  
shown to induce significantly higher levels of broadly cross-reactive  
antibodies against highly conserved regions of HA compared with egg-  
derived vaccines."  
},  
{  
  "claim": "Flublok contains 45 micrograms (mcg) of HA per strain  
vs 15 mcg of HA per strain in a standard-dose influenza vaccine."  
}  
]  
}
```

Please include a written document outlining your thought process in coming up with your solution.

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Final Deliverable: *The final deliverable should be a script that takes in the marketing file claims json provided above and the five clinical files as inputs and outputs a JSON in the format below. We have provided a screenshot of the reference block for you to double check your work and verify if annotations are coming from the right files.*

```
{
  "claims": [
    {
      "claim": "Monotherapy with TEVIMBRA increases OS versus chemotherapy, with an improved safety profile",
      "match_source": {
        "document_name": "",
        "matching_text": ""
      },
      "match_source": {
        "document_name": "",
        "matching_text": ""
      }, ...
    },
    {
      "claim": "Increased overall survival by 2.3 months",
      "match_source": {
        "document_name": "",
        "matching_text": ""
      }, ...
    },
    {
      "claim": "Increased overall survival independent of PD-L1 status",
      "match_source": {
        "document_name": "",
        "matching_text": ""
      }, ...
    }
  ]
}
```


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*The following task is optional and purely supplementary; you will not be penalized if you choose not to undertake it. Your primary focus should remain on the main assignment objectives described earlier. If you have sufficient time and energy remaining, we would appreciate seeing your approach and workflow for this additional task.

Supplementary Task:

Parse the provided Marketing File Page PDF and extract the claims as outlined in the accompanying JSON document. We've also attached an example image illustrating how the identified claims appear on the Solstice platform. Ideally, your parsing of the PDF should replicate this approach—grouping headings and associated contextual information with each claim. You're welcome to utilize any tools or methods you find suitable to accomplish similar results.

FLUBLOK COMBINES THE ADVANTAGES OF RECOMBINANT TECHNOLOGY WITH A HIGHER DOSE^{2,4}




AN EXACT STRAIN MATCH^{1,5}

The only recombinant flu vaccine that has known and exact antigen content, Flublok ensures identical antigenic match with WHO- and FDA-selected flu strains.


3x 3x THE ANTIGEN^{1,3}

Flublok also contains 3x the hemagglutinin (HA) antigen content of standard-dose flu vaccines, which has been linked to greater immunogenicity vs standard-dose flu vaccines.¹




AVOIDS MUTATIONS⁴

Cell- and egg-based flu vaccines have the potential to develop mutations during production, which may reduce their effectiveness.



MAY INDUCE A MORE ROBUST ANTIBODY RESPONSE⁶

According to a study published by the CDC in January 2024, vaccination with a higher-dose recombinant flu vaccine may induce a more robust antibody response than egg-based standard-dose vaccines.



MAY PROVIDE CROSS-PROTECTION⁷

Recombinant technology leads to a broader immune response that may provide cross-protection, even in a mismatch season.*

Flublok (quadrivalent) was evaluated in the pivotal trial against Fluorix (quadrivalent standard-dose vaccine). The efficacy of Flublok (quadrivalent) is relevant to Flublok (trivalent) because both vaccines are manufactured using the same process and have overlapping compositions.¹

Flublok is produced using a novel production platform in which recombinant HA is expressed in insect cells using a baculovirus expression vector system (BEVS). Recombinant HA antigens produced using BEVS have been shown to induce significantly higher levels of broadly cross-reactive antibodies against highly conserved regions of HA compared with egg-derived vaccines, which may potentially protect against drift-variant influenza viruses.³

Flublok contains 45 micrograms (mcg) of HA per strain vs 15 mcg of HA per strain in a standard-dose influenza vaccine.^{1,3}

CDC=Centers for Disease Control and Prevention; FDA=US Food and Drug Administration; WHO=World Health Organization


IMPORTANT SAFETY INFORMATION

Appropriate medical treatment must be immediately available to manage potential anaphylactic reactions following administration of Flublok.

Please see additional Important Safety Information throughout. Before administration, please see full Prescribing Information [here](#).

Flublok[®]

Influenza Vaccine

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