

Hummingbird Bioscience Take Home Task

Full-Stack Clinical Informatics Developer Intern

Introduction:

Congratulations on being selected to proceed with the final interview for the position above. As part of the interview process, we ask prospective applicants to design a simple dashboard to visualize the clinical trial data.

Clinical infrastructure development

1. Develop a local full stack application using the framework stack of choice (preferably React) that takes the clinical data shared and visualizes the data in a professional and easy to read manner
2. The application should consist of two pages i) Index/Landing page with basic summary (number of patients, number of Dose etc), ii) The visualization page with the plot (Spider Plot).
3. The plot should have the data filtering capabilities discussed below in the next section.

Clinical infrastructure development

Goal: To set-up a simple dashboard with a landing page and a visualization capability for our dataset file: spiderplot.csv

Dataset: The clinical data file is called spiderplot.csv:

It contains the information of the status of patients enrolled in the clinical trials. The table consists of the change in the tumor sizes of each individual patients for the course of their treatment:

1. **subject:** subject ID/patient ID
2. **tumour_type:** patient's tumor type (Cancer type)
3. **first_dose:** date when the patient received the first drug dose
4. **date:** date when the patient's tumor size reading was recorded
5. **days:** The number of days patients have been on trial
6. **change:** The % change in the tumor size from the baseline
7. **arm:** patient's cohort or group in which they were categorized in (A or B)
8. **dose:** The dose of the drug in mg.
9. **response:** Patient's response events: SD,PR,PD,CR. (Don't need to worry about this for now)

Tasks descriptions:

Your Task

You will design a simple dashboard that reads this CSV and provides two main views:

1. Landing / Index Page

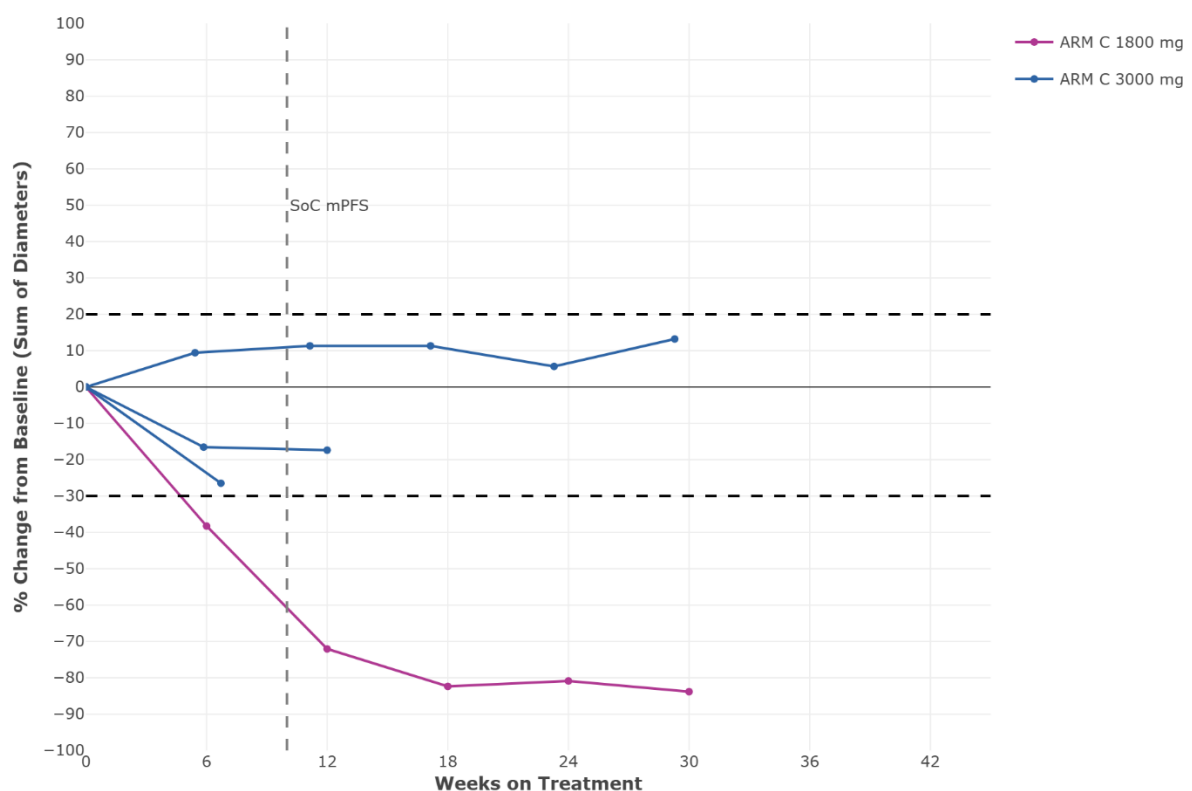
- Show basic summary statistics:
 - number of unique patients
 - available treatment arms
 - available dose levels

Present these in small, clear summary cards or boxes.

2. Spider Plot Visualization Page

- Plot % change in tumor size (change) vs. weeks on treatment (days/7).
- Each line should start from 0 , the same baseline
- Each data point on the line represents a % change in the tumor size since the first start date. (A line would have as many data points as the # entries /rows for that particular patient/subject id in the csv)
- Each patient should appear as a separate line across time.
- Color the lines by treatment arm/cohort + dose

Example plot:



1. Backend

Stack (choose one)

You may implement the backend in any framework you're comfortable with. Two common options:

- **Python + Flask + Pandas** (recommended if you prefer data-wrangling ergonomics).
- **Node.js + Express** (recommended if you want a JS-only stack).

Expose a minimal REST API (JSON). Enable CORS so the frontend can call it from `http://localhost:*`.

Required endpoints

GET /spider

Query params:

`arms=A,B · doses=1800,3000 · tumor_types=sqNSCLC,HNSCC`

Returns an array of subjects with series data example:

```
[
  {
    "subject_id": "08-201",
    "arm": "A",
    "dose": 1800,
    "tumor_type": "sqNSCLC",
    "change": -1.62,
    "days": "47"
  },
  {
    "subject_id": "08-201",
    "arm": "A",
    "dose": 1800,
    "tumor_type": "sqNSCLC",
    "change": 6.12,
    "days": "101"
  }
  .....
]
```

These are the only columns you would be using for the spider plot:

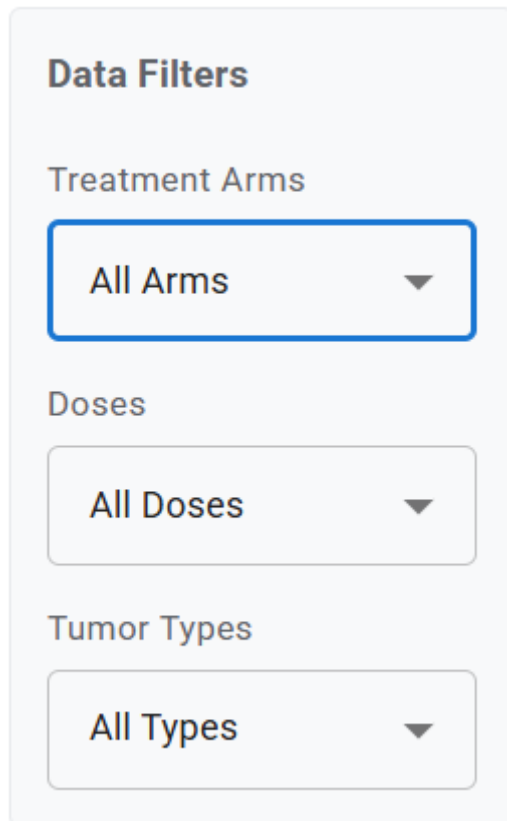
subject_id, arm, days, change, arm, dose, tumor_type

2. Frontend.

- Irrespective of the choice of your tech stack we want the plots to be displayed in a clean manner so use a good visualizing library (eg. Plotly, D3.js)
- We want the plot to be coloured for each patient by their ARM & Dose (eg. ARM A 1800 would be light pink, ARM A 3000 would be dark pink)

- We want the filtering functionality to be present the minimum requirement is:
 - i. Filter by Arms (selecting one would only display patients from that ARM)
 - ii. Filter by Dose
 - iii. Filter by cancer type

But please feel free to add any other filters you see fit.



Data Filters

Treatment Arms

All Arms ▼

Doses

All Doses ▼

Tumor Types

All Types ▼

Final interview presentation:

The candidate should showcase the infrastructure, the dashboard features and discuss the design choices. The candidates **may use any AI assistance tool** as they see fit, but they should be able to explain the choices made.

Expected time required for tasks:

The candidate may take until Friday 5th September 2025 to complete the assignment. Please send the Webapp so we can build it locally and test it. Please upload it on GitHub and send it to **Abhishek Singh** (a.singh@hummingbirdbio.com).

Questions or technical problems?

Please contact Abhishek Singh a.singh@hummingbirdbio.com to discuss. Don't worry if it's not perfect the deadline is short because we want to test your adaptability.