Immuni-Mama Project - Science Fair 2026 Logbook

October 1, 2025

We met to brainstorm possible ideas. They included:

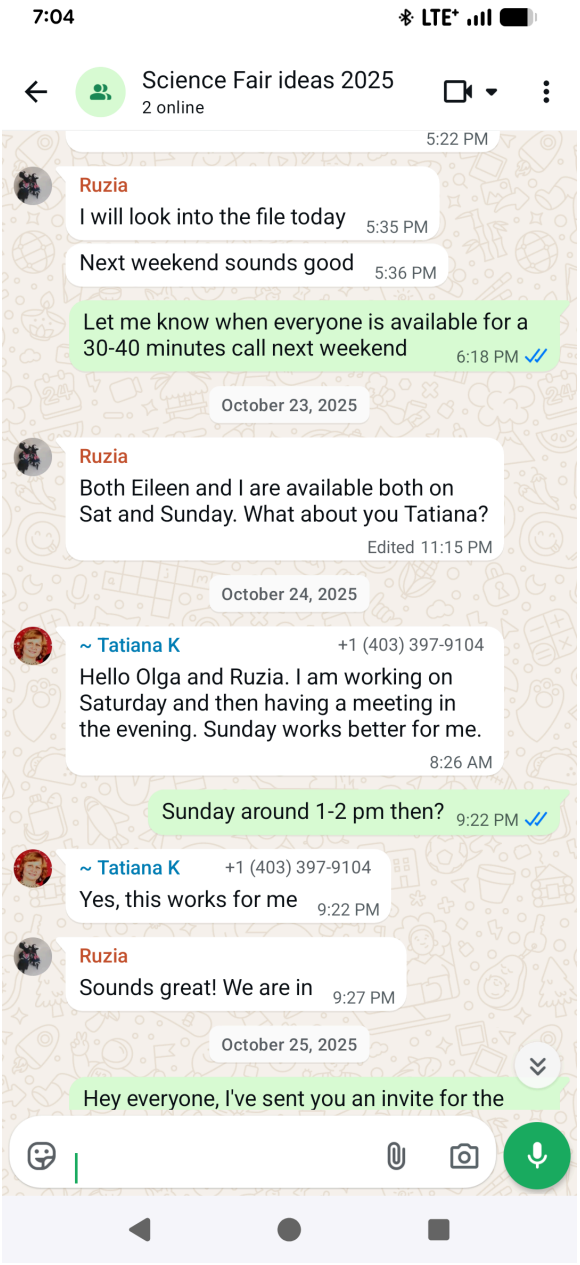
1. How AI impacts human lives
2. Electricity for people with paralysis (cerebral palsy)
3. Vitamin D level quick in-house detection.
4. Eyes regeneration - is there a way to make it possible for humans.
5. Skin Wise extension.
6. Mobile app to improve eating habits for people with disabilities (which disability?)
7. Cavities detection.
8. Microbial flora.
9. Noise impact on mental health.
10. Lifestyle changes for people with diabetes.
11. Cortisol level quick in-house detection (app?)
12. Emotions prediction by AI and linking to PSNS and SNS activity.
13. Future of medicine with AI(AI REplacing doctors)
14. AI diagnosis is better than physicians

Next steps:
Please pick 1-2 ideas you like and create a new document in the same folder. Now we need to validate if the idea is viable for the Science Fair. Please write a quick analysis for the selected idea by following these points:

- Convert your idea to a hypothesis. What exactly do you want to prove in your science fair project? For example, for Skin Wise we had a hypothesis that, by using publicly available data on the melanoma risk factors, we can build a mobile app that will help people to decrease their chances of getting melanoma. Use AI if you need to get some assistance with your hypothesis statement. Write 1-2 paragraphs for now.
- Write 1-2 paragraphs on why this topic/hypothesis is important.
- Which steps do we need to take to prove this hypothesis? Which resources will we need for that (laboratory, equipment, hospital access, access to data sets, something else)?
- Is there a way to access these resources (if so, how)?
- How will we prove that the hypothesis works? How will we measure it?
- Is there something else you want to mention regarding this idea?

October 15, 2025

We had our first virtual meeting with Dr. Tatiana Kalashnikova and discussed the idea of the mobile app for immunocompromised pregnant women. She emphasized that though immunocompromised studies is an emerging area, this topic is not well researched and thus it's very important. Also we all agreed that the mobile app itself can not be categorised as a scientific project, but if we can build a prediction model to evaluate risk factors for immunocompromised pregnant women, it will be a significant achievement.



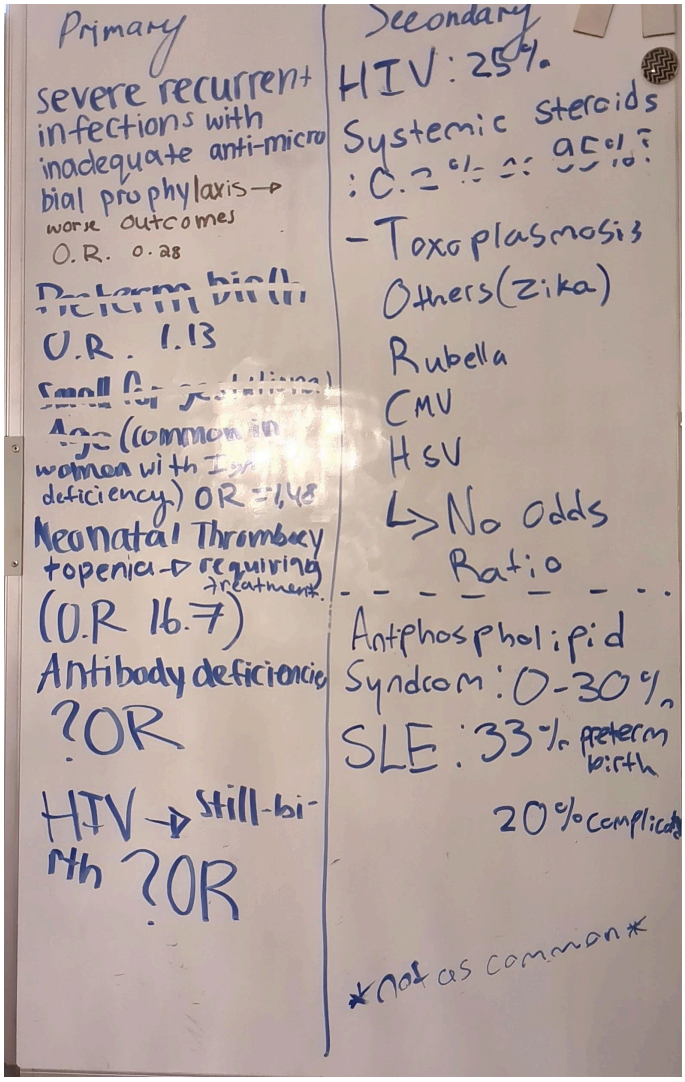
October 26, 2025

Met for the first time with the full group - Eileen, Inga, Ruzia (medical professional), Dr. Tatiana and Olga (project coordinator). We discussed primary and secondary immunodeficiency, its

impact on pregnancy, risk factors and possible outcomes. We came up with the plan for the following steps:

- Inga and Eileen are researching primary and secondary immunodeficiency to get a better understanding of this problem, and what's special about pregnancy with these conditions.
- Dr. Tatiana is sharing useful links and resources.
- Olga and Ruzia are defining the project framework, setting Google Drive location and document exchange procedures.
- Dr. Tatiana and Ruzia will try to determine if there is a chance to get access to real patients' anonymized data (probably not, considering privacy constraints).

By the next meeting, our goal is to identify the primary risk factors for our target groups (Eileen - primary immunodeficiency, Inga - secondary), range them depending on the importance/odds ratio (if we can, we can start identifying possible preventative measures, but it's not the primary goal for this stage).

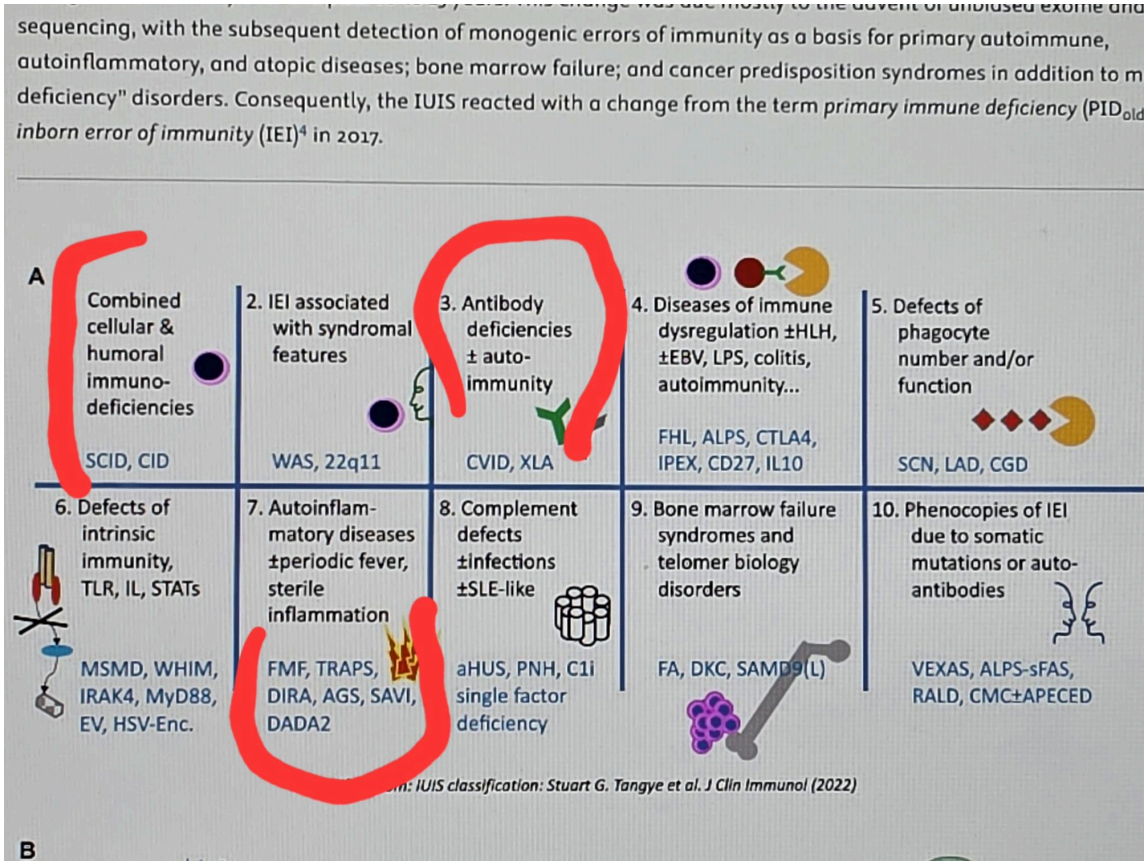


November, 2, 2025

We had a call to discuss with our scientific mentor the available literature and the framework on how we can investigate it.
Some important points to sum up our meeting:

- We'll meet in person around November, 28, to review the risk factors that Inga and Eileen identify for both primary and secondary immunodeficiency. The expected outcomes of this meeting will be to extract the risk factors/odds ratio sufficient for building a predictive model with a data scientist. Or, if it's impossible for some reason, to extract the risk factors to be used in the app.
- Inga and Eileen (also probably with Olga and Ruzia) will meet in person or online around the autumn break to discuss the risk factors they found for their categories to find if there is overlap/common patterns (we need to know if we'll diverge these groups in the app or we will be able to build one algorithm for both categories). By this time, we need to have detailed answers to the following questions:
    1. Key risk factors for your category (primary and secondary immunocompromised pregnant) and odds ratio.
    2. Find odds ratio for these factors change depending on the pregnancy stage.
    3. Are there any subgroups within each group and if yes, how the risk factors/odds ratio fluctuates within each subgroup (and what impacts this fluctuation).

We asked Dr Tatiana to share more literature on odds ratio and immunodeficiency subgroups as these subgroups might be important for our risk assessment model.



November, 17, 2025

Haisa - data scientist and PhD in math - agreed on joining our project as a mentor.

November, 23, 2025

Met with Dr Tatiana, Haisa, Olga and Ruzia to review our findings. More than 20 papers were reviewed in total for primary and secondary immunodeficiencies. We came up with the summary of detected risk factors and odds ratios.

For the next meeting:

- We need to come up with a list of subcategories for their groups. Ideally, we want to find the number of patients in each subgroup.
- Most risky infections for each group (based on the clinically significant odds ratio).
- Signs/symptoms of these infections
- Find the most common signs that repeat in a number of subgroups.
- We need to find how often these symptoms appear in case of each infection (for example, for staphylococcus, there were 30 patients from the group 1, and 15 out of this group have a fever).

So, as a next step, we want to find the frequency distribution for the symptoms for the most risky infections in each subcategory.
So, you need to find the information on how many people in your target group (pregnant women with immunodeficiencies) develop each symptom from your list while having an infection. It's perfectly possible that the information is not publicly available. In this case, we need to ask Ruzia and Tatiana to help us.
Haisa will review the data to confirm if it is sufficient to build a supervised model (we already confirmed that we won't be able to obtain any actual data from real patients, so ML model is not possible right now).

December, 15, 2025

Our team met in the library to discuss symptoms (alert signs) we were able to find by conducting literature review. We found sufficient data for alert signs for five most common infections in both target groups (primary and secondary immunodeficient), but odds ratios were primarily missing. Dr Tatiana confirmed that it's common for rare diseases and we'll be relying more on clinical assessment than on statistical data while calculating weights for risk factors and alert signs.
Also, we reviewed our findings with Haisa (for the risk score calculation algorithm development) and finally started discussing the mobile app design and structure.
The questions we flagged for the next meeting:

- How many screens do we need?
- Which functionality? Obviously, the risk score calculation algorithm itself, the questionnaires, potentially, notifications for missing reports - also something else?
- Which data will be transient and which has to persist?

January, 4, 2025

Meeting at the library to review the available data for risk factors/alert signs mapping. Identified the following gaps:

- **CVID - pneumonia - no cohort studies**
- **No data found on the infection duration**
- **No data found how the background treatment impacts the outcome**

Since many important data points have not been found, we raised a question if the mobile app should be primarily used as a data collection source. In this case, it will be an extremely valuable tool that could potentially close the existing gaps in data and research.

The huge question is - how exactly can we collect data from patients? Considering that

- Self-reporting is known as non-reliable source;
- Privacy related limitations;
- Integrated with sensors/wearables?

We need to think more to estimate possible risks and benefits.

January, 15, 2025 (online meeting recording)

Olga and Haisa, along with Tatiana K, discussed the structure and documentation of their "Pregnancy Infection Risk Scoring Model" (PRISM), agreeing that the model's current state is sufficient to move forward while emphasizing the need for clear explanations of primary and secondary immunodeficiency and their connection to infection risks. Haisa detailed the PRISM model, which calculates an alarm score based on symptoms and personal risk factors, and Dr Tatiana suggested incorporating supportive treatment, duration of infection, and pregnancy trimester into the hybrid probabilistic and deterministic model. The team assigned documentation sections to Eileen and Inga, decided to deploy the model on AWS, and agreed to find data for

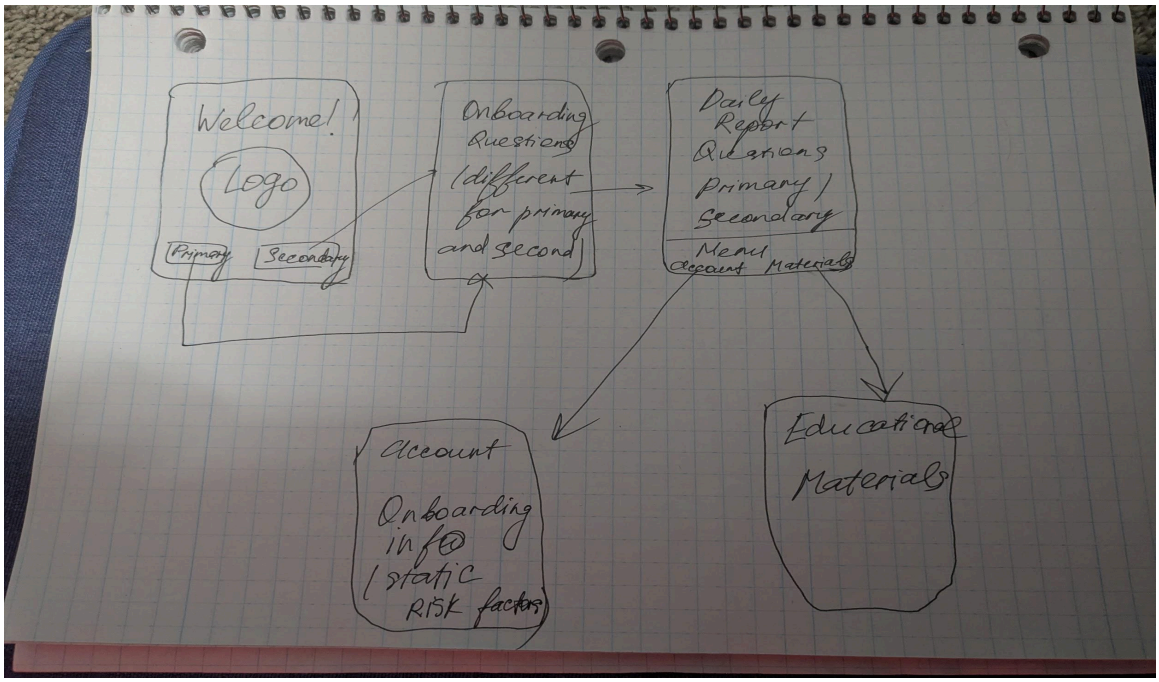
treatment and infection duration to strengthen the project, while including a note about the lack of real patient data in the "Applications for Future" section.

Suggested next steps

- Eileen Niftaliyeva will finish filling in the missing data and focus on filling the project gaps by next week.
- Eileen Niftaliyeva will work on the abstract and introduction sections.
- Inga Deryabina will take the hypothesis and materials sections and insert the Haisa Alpha's Presentation model into the project document.
- Haisa and Tatiana will discuss how to visualize the data model in a beautiful way for the presentation.
- Olga will try to find a suitable location for the next in-person meeting on Sunday after 4 PM, such as McDonald's, and discuss the final time and location in chat.

January, 24, 2025

Finalized the risk assessment model and reviewed which data was missing (the only parameter we need the data for is the infection duration and its impact on the total risk score).
Validated the model on the simulated data with great results - low rate of false positives.
Discussed the presentation and the next steps in terms of mobile app - agreed on the number of screens and our key features.



February, 3, 2025

Met for the first coding sessions.
Inga and Eileen set up Android studio and Git on their laptops.
Olga helped us to configure and build their first Kotlin Multiplatform project (to share it across Android and iOS).
And we built the first screens for onboarding and daily screening.

February, 12, 2025

Met for the second coding session.
The goals were:

1) Add ALL the questionnaires to the mobile app.
2) Deploy the model Python code on AWS and make sure that it works.
3) Connect the mobile app to the AWS to make sure the data goes back and forth.

We haven't finished all the UI, but we were able to send data back and forth between the app and the server.

February, 20, 2026

As the deadline was coming, we started actively working on the project structure before submitting it to the Science Fair platform. We met to clarify and finish method, analysis, and background sections.
As a part of this meeting, we identified the following gaps:

- For the "Method" section, we don't have a definition of our key concepts: risk factors (static, semi-static and dynamic), alert signs. Also we don't have a summary of static and semi-static risk factors.
- We need a better explanation on the model limitation, testing and validation.

Homework:
Inga - read about similar healthcare predictive models to add the most successful ones to the background section. Also, refine our required definitions.
Eileen - reach out to Haisa and work on the sections related to the model.

February, 22, 2026 (online meeting summary)

The meeting participants, including Inga, Eileen, Tatiana, Olga, Ruzia, and Haisa, discussed the categorization and alignment of risk factors for the project, agreeing to apply the impact of pregnancy trimesters at the immunodeficiency group level for simplicity and to present static risk factors in a separate table. The team agreed that the assigned weights for comorbidities were based on clinical judgment, not solely statistical data, and they confirmed the necessity of explaining the model validation

process using a quasi-outcome scenario as the model currently relies on simulated data. Tatiana volunteered to create a draft workflow, Inga Deryabina took on the 'method procedure' task and mobile app elements, and Haisa was assigned to prepare for the next meeting by discussing limitations, stability, and validation, and creating a workflow diagram for the model, ahead of the project submission deadline around March 4th.

Suggested next steps

- Inga Deryabina will move the trimester impact from the infection table and insert it into the other risk factors table if the group decides that trimester impact will be per type of immuno deficiency.
- Tatiana K will review and modify the weights of the comorbidities.
- Inga Deryabina will copy and paste Haisa's explanation of why they can mix risk factors and alert signs into the project document.
- Ruzia will ask Eileen Niftaliyeva to forward Haisa Alpha's update email.
- The group will meet next Saturday at 1:00 p.m. to discuss the validation of the model and address the data gaps before submission.
- Tatiana K and Olga will meet online before the March 4th submission to review the final version of the project document.
- The group will add an explanation to the methods section about how the waiting was based on clinical judgment and literature, and create a diagram or picture of the whole process for the project document as a visual aid.
- Haisa will prepare for the next Saturday meeting to discuss how to present the project's limitation, stability, and validation of the model.
- Inga Deryabina will fill out the part about the mobile app before submission.
- Inga Deryabina will assign method procedure to pull out all definitions, sort out the text, and map between infections and symptoms/alert signs.
- Haisa will create a workflow diagram for the model and a quick summary about the hypothesis, what the model does, and the validation sensitivity for the poster.

February 28 2026

Final wrap-up meeting before submission on March 4th.

We spent 5 hours reviewing and refining the project content (added - conclusion, future development, all the quotes and references).
We refreshed our understanding of supervised vs unsupervised models.
We reviewed all our risk factors, alert signs and weights to make sure they are consistent across the project.
We discussed how we'll be wrapping up the coding part.
We got a lot of encouragement from our mentors and we are good to go!