

Cellular Programs

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Saarland University

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Chair of Computational Biology

Assignment 6

Handed out: 24.06.25

Due: 01.07.2025 10.00 am

Submit your solutions by e-mail with a single PDF attachment

to ansc00053@uni-saarland.de

AND to: kerstin.gronow-p@bioinformatik.uni-saarland.de

Label your pdf solution as **MATRICULATIONNR_YOURNAME.pdf**.

Every student should submit his/her own solution. Plagiarism of solutions will be penalized. Indicate whether you used AI tools. Label your assignment sheet with your name and matriculation number. Don't exceed specified page lengths by more than 0.25 pages.

All problems refer to the new paper **C: Bai et al. Nature Comm 16, 474 (2025)**.

The paper studies how STELLA proteins inhibit the activity of UHRF1 in human cancer cells.

Problem 1:

Fig. 2b Why do the Western blots for DNMT3A and DNMT3B show multiple bands, whereas DNMT1 shows essentially 1 band? What could the multiple bands reflect? (0.1 pages)

Problem 2:

Is about Fig. 4

(a) What do the tumor growth curves (Figs. 4a,b) and survival curves (Fig. 4c) reflect? Death of human patients, death of human cell lines, or death of mice? (0.1 pages each)

(b) Do these tumors reflect human tumors or mouse tumors?

(c) Why were these experiments conducted in immune-deficient mice?

Problem 3:

On p.10 right side, the authors tested lipid nanoparticle (LNP) delivery of mRNA encoding mSTELLA into CRC cells. What happens at the molecular level after the LNP enters the cell? What is the point of decorating the LNP with a "SV40 nuclear localization signal"? How and in which cellular compartment does the mRNA cargo (mSTELLA encoding mRNA) exert its effect? (0.25 page)

Hint: please consider the localization of the involved mRNA and proteins.