In Silico Activity Prediction and Docking Studies of the Binding Mechanisms of Levofloxacin Structure Derivatives to Active Receptor Sites of Bacterial Type IIA Topoisomerases

Elena V. Uspenskaya[1]*, Vasilisa A. Sukhanova[1], Ekaterina Kuzmina[1], Tatyana V. Pleteneva1, Olga V. Levitskaya[1], Timur M. Garaev[2], Anton V. Syroeshkin[1]

Table S1: Formula for the (R) topological indice of a chemical graph G.

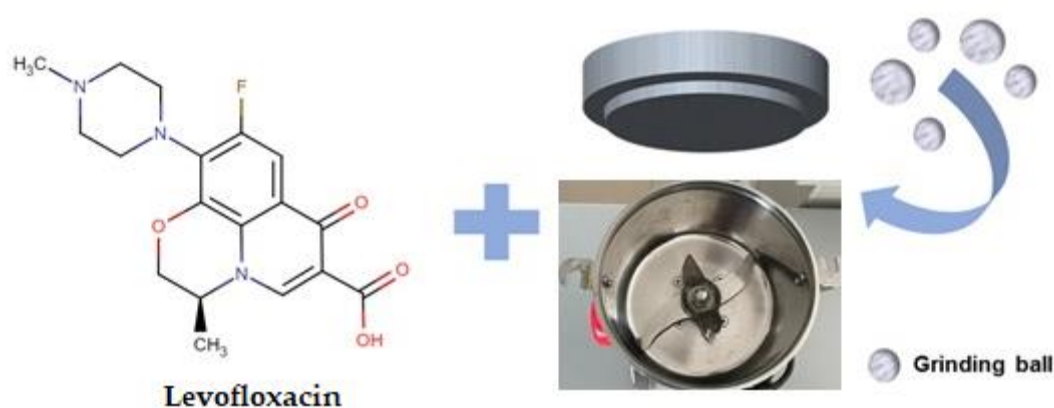| Topological Index	Description	Formula of Topological Indices
Rouvray (R)	The total sum of the distance is another topological index, which is twice the Index W. Чем больше значение индекса, тем более связной является молекула.	$$R = \sum_{j=1}^{A} \cdot \sum_{i=1}^{A} d_{ji} = \sum_{i=1}^{A} = 2W$$

Figure S1: TrbCh method of RMS of Lvf.

Legend (Левофлоксацин_исх):
1 - ингибитор TOP2
2 - ингтибитор синтеза ДНК
3 - ноотроп
4 - хинолоновый антимикробный агент
5 - антибактериальный
6 - антинеопластическеий (миелома)
7 - антагонист рецепторов анафилотоксина
8 - рак предстательной железы
9 - ингибитор L-глатамат NAD-оксидоредуктазы
10 - лечение нейродегенеративных заболеваний
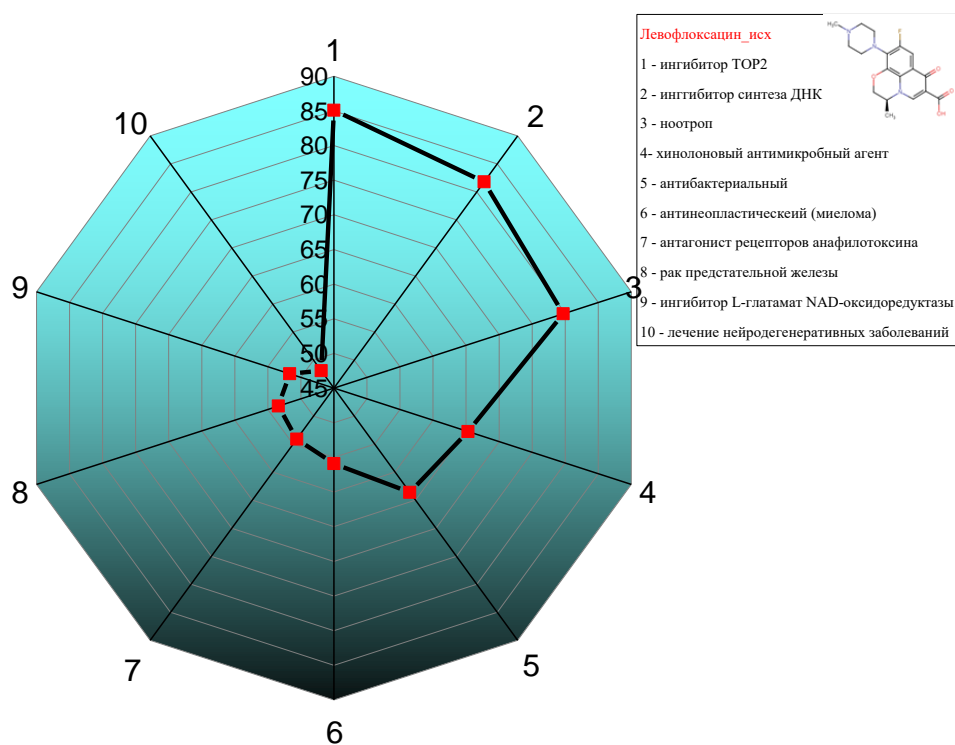
Figure S2: The PASS Soft results for Lvf's derivates.

1. Ing TOP2
2. Ing DNA
3. Nootrop
4. Quinolon
5. Antibac
6. Myeloma
7. Anaph. rec. Antg
8. Prostat cancer treat.
9. L-Gl NAD
10. Neurodeg. dis. treat
11. CYP 1A2 Ingb
12. P-Glycoprot. Sebstr
13. Mood dis. treat

Lvf_Native   Lvf_Dezoxy
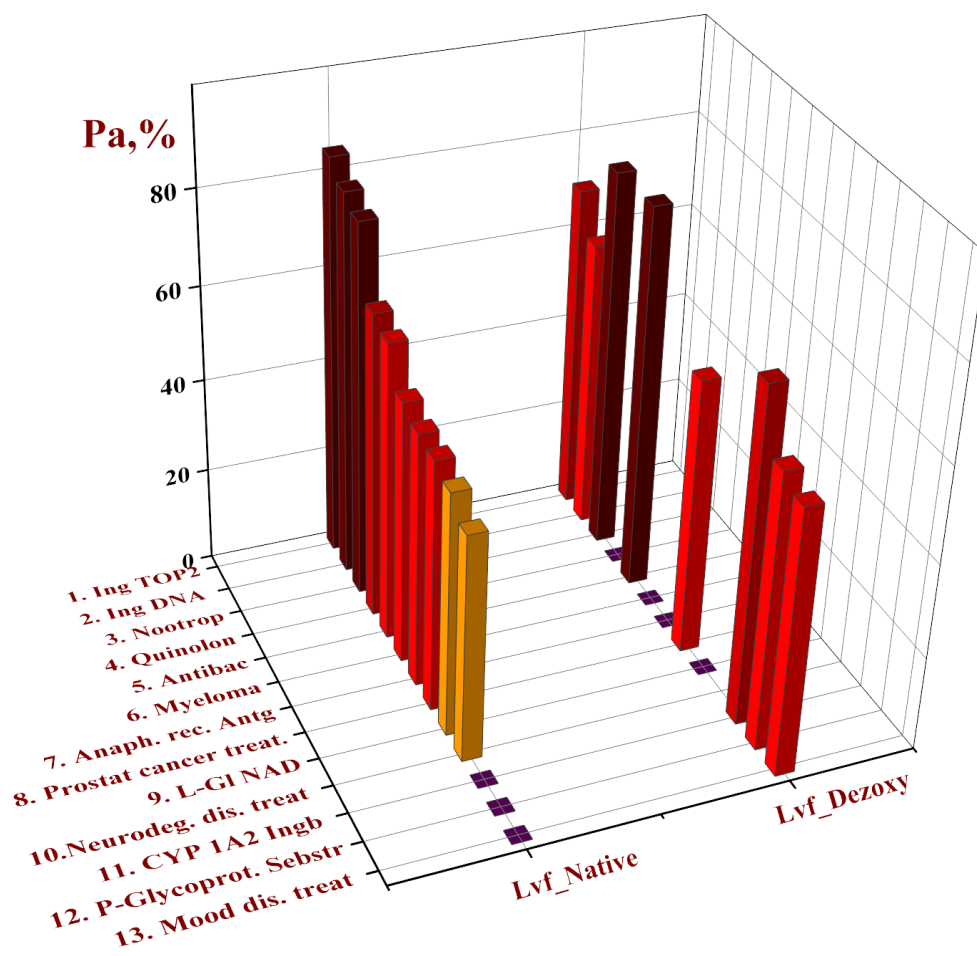
Figure S3: The Pa for the RMS of.

LFX basic
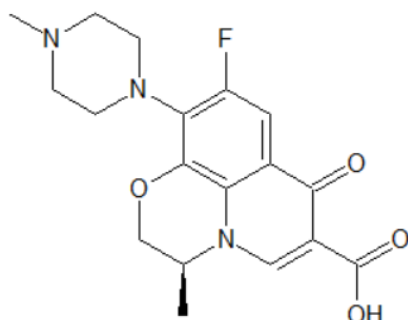
Pa	Pi	Activity
0,851	0,003	Topoisomerase II inhibitor
0,818	0,004	DNA synthesis inhibitor
0,797	0,018	Nootropic
0,653	0,001	Antibiotic Quinolone-like
0,636	0,007	Antibacterial
0,559	0,006	Antineoplastic (multiple myeloma)
0,534	0,007	Prostate cancer treatment
0,541	0,052	Anaphylatoxin receptor antagonist
0,517	0,057	Glutamate-5-semialdehyde dehydrogenase

○ All   ● Pa>Pi   ○ Pa>0,3   ○ Pa>0,7   ok

Wiener -1.#J	Rouvray -1.#J	Balaban -1.#J	Detour -1.#J	Electropy -1.#J
597.6840	1193.6060	2.0036	3227.9390	28.7045

LFX without piperazine
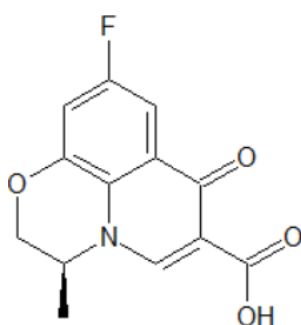
Pa	Pi	Activity
0,839	0,001	Antibacterial, ophthalmic
0,756	0,003	Topoisomerase II inhibitor
0,753	0,027	Nootropic
0,634	0,008	DNA synthesis inhibitor
0,625	0,037	Glutamate-5-semialdehyde dehydrogenase inhibitor
0,599	0,013	Antiinfective
0,575	0,010	Antibacterial
0,513	0,014	P-glycoprotein substrate

○ All   ● Pa>Pi   ○ Pa>0,3   ○ Pa>0,7   ok

Wiener -1.#J	Rouvray -1.#J	Balaban -1.#J	Detour -1.#J	Electropy -1.#J
234.3270	467.1780	2.4284	1480.9860	19.6346

LFX no COOH

Pa	Pi	Activity
0,818	0,001	Antibacterial, ophthalmic
0,811	0,015	Nootropic
0,716	0,004	CYP1A2 inhibitor
0,699	0,003	Topoisomerase II inhibitor
0,695	0,005	CYP1A inhibitor
0,620	0,009	DNA synthesis inhibitor
0,589	0,005	Prostate cancer treatment
0,591	0,009	P-glycoprotein substrate
0,568	0,015	Mood disorders treatment

○ All   ● Pa>Pi   ○ Pa>0,3   ○ Pa>0,7   ok

Wiener -1.#J	Rouvray -1.#J	Balaban -1.#J	Detour -1.#J	Electropy -1.#J
427.3360	853.4100	1.9777	2478.9310	22.5301

LFX no F

Pa	Pi	Activity
0,818	0,001	Antibacterial, ophthalmic
0,811	0,015	Nootropic
0,716	0,004	CYP1A2 inhibitor
0,699	0,003	Topoisomerase II inhibitor
0,695	0,005	CYP1A inhibitor
0,620	0,009	DNA synthesis inhibitor
0,589	0,005	Prostate cancer treatment
0,591	0,009	P-glycoprotein substrate
0,568	0,015	Mood disorders treatment

○ All ● Pa>Pi ○ Pa>0,3 ○ Pa>0,7 [ok]
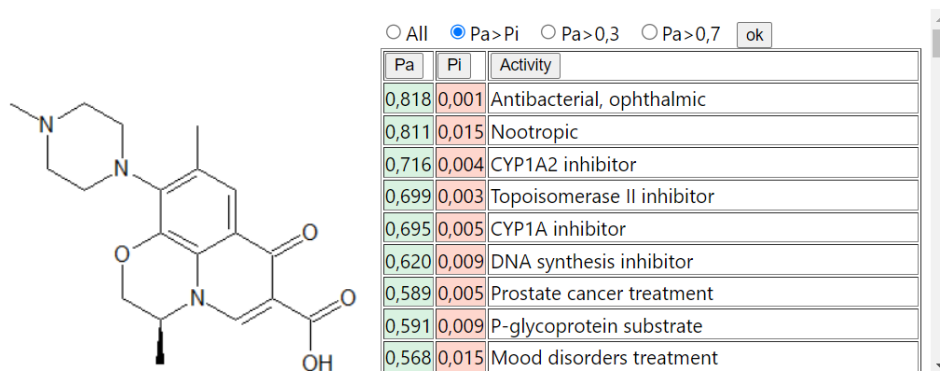
Wiener -1.#J	Rouvray -1.#J	Balaban -1.#J	Detour -1.#J	Electropy -1.#J
601.5135	1201.5980	1.9925	3236.0975	24.4566

LFX naked

Pa	Pi	Activity
0,669	0,049	Nootropic
0,549	0,006	Prostate cancer treatment
0,518	0,009	CYP1A2 inhibitor
0,500	0,010	CYP1A inhibitor
0,497	0,015	P-glycoprotein substrate
0,472	0,005	Topoisomerase II inhibitor
0,487	0,019	DNA synthesis inhibitor
0,528	0,063	Antineoplastic
0,455	0,024	Antineoplastic (breast cancer)

○ All ● Pa>Pi ○ Pa>0,3 ○ Pa>0,7 [ok]
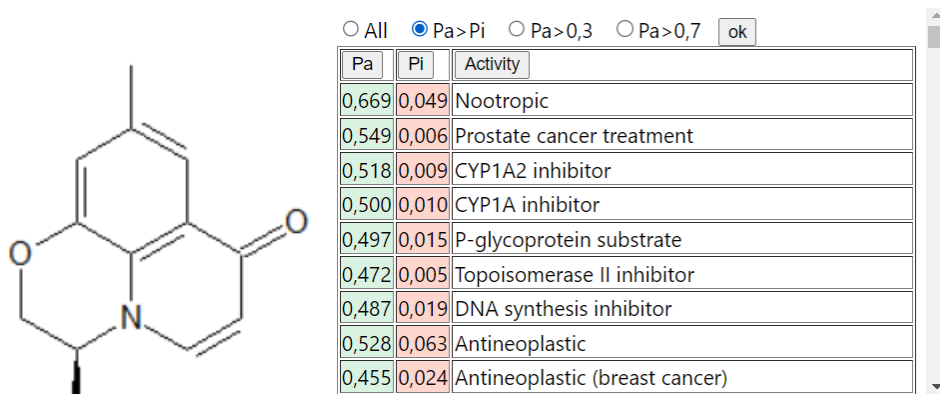
Wiener -1.#J	Rouvray -1.#J	Balaban -1.#J	Detour -1.#J	Electropy -1.#J
147.1820	293.7210	2.3744	1023.8795	10.7142

LFX totally naked

Pa	Pi	Activity
0,712	0,034	Membrane permeability inhibitor
0,660	0,004	Mediator release inhibitor
0,651	0,018	27-Hydroxycholesterol 7alpha-monooxygenase inhibitor
0,615	0,018	Gastrin inhibitor
0,646	0,050	Glycosylphosphatidylinositol phospholipase D inhibitor
0,642	0,054	Nicotinic alpha6beta3beta4alpha5 receptor antagonist
0,612	0,028	Alkane 1-monooxygenase inhibitor

○ All ● Pa>Pi ○ Pa>0,3 ○ Pa>0,7 [ok]
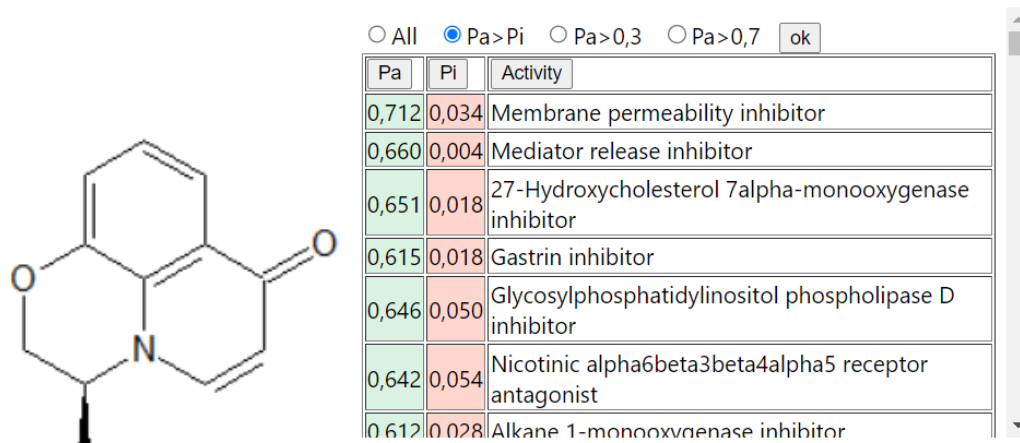
Wiener -1.#J	Rouvray -1.#J	Balaban -1.#J	Detour -1.#J	Electropy -1.#J
121.8700	243.0970	2.3729	887.6155	10.4147

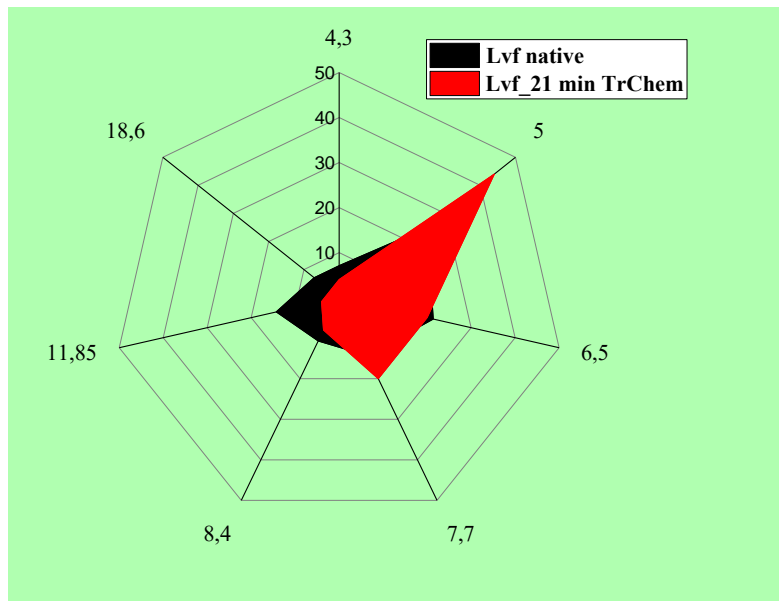**Scheme S1:** PASS (Prediction of Activity Spectra for Substances) Online for RMS and PMS of Lvf

Figure S4: Optical Microscope granulometry of RMS of Lvf.