

Uvod u Statistiku

Nedelja 1 - Vežbe

Dr Nikola N. Grubor

Kurs

Opšte

1. Lekcija ($\geq 51\%$ → kviz)
2. Bodovi = lekcija + kviz (vremenski ograničeno)
3. Dodatno gradivno nije obavezno
4. Pitanja na forumu/konsultacijama

Kurs

Tehnički

1. R programsko okruženje
2. EZR
3. Praktični deo ispita rešavanje problema

The NEW ENGLAND JOURNAL *of MEDICINE*

ESTABLISHED IN 1812

NOVEMBER 26, 2015

VOL. 373 NO. 22

A Randomized Trial of Intensive versus Standard Blood-Pressure Control

The SPRINT Research Group*

ABSTRACT

BACKGROUND

The most appropriate targets for systolic blood pressure to reduce cardiovascular morbidity and mortality among persons without diabetes remain uncertain.

The members of the writing committee (Jackson T. Wright, Jr., M.D., Ph.D., Jeff D. Williamson, M.D., M.H.S., Paul K.

Ko je postavio granicu? Zašto?

14.09.2023. 18:36

Zdrav način života može da spreči depresiju, potvrdilo istraživanje

Vođenje zdravog načina života dugo je povezivano sa fizičkim...

13.09.2023. 18:58

Doktor potvrdio da viralni „lek“ za migrenu zaista deluje

Nakon što je TikTokerka Andrea Eder objavila video u...

The screenshot shows the PubMed search interface. At the top, there is a search bar with the query "("2022"[Date - Publication])". Below the search bar are buttons for "Advanced", "Create alert", and "Create RSS". At the bottom of the search bar are three buttons: "Save", "Email", and "Send to". Below the search bar, there is a link to "MY NCBI FILTERS" with a filter icon. To the right of the filter link, it says "1,773,651 results".

1,773,651

HEMATOLOGIJA		
K-KRVNA SLIKA		
REZULTAT	JEDINICA	REF. VREDNOST
9,77	$\times 10^9/L$	4 - 12
2,15	$\times 10^9/L$	1-5
0,38	$\times 10^9/L$	0.1-1
7,24	$\times 10^9/L$	2-8
22,0	%	25-50
3,9	%	2-10
74,1	%	50-80
4,90	$\times 10^{12}/L$	4-6.2
135	g/L	110-170
0,407	m/L	0.350-0.550
82,9	fL	80 - 100
27,5	pg	26 - 34
332	g/L	310-355



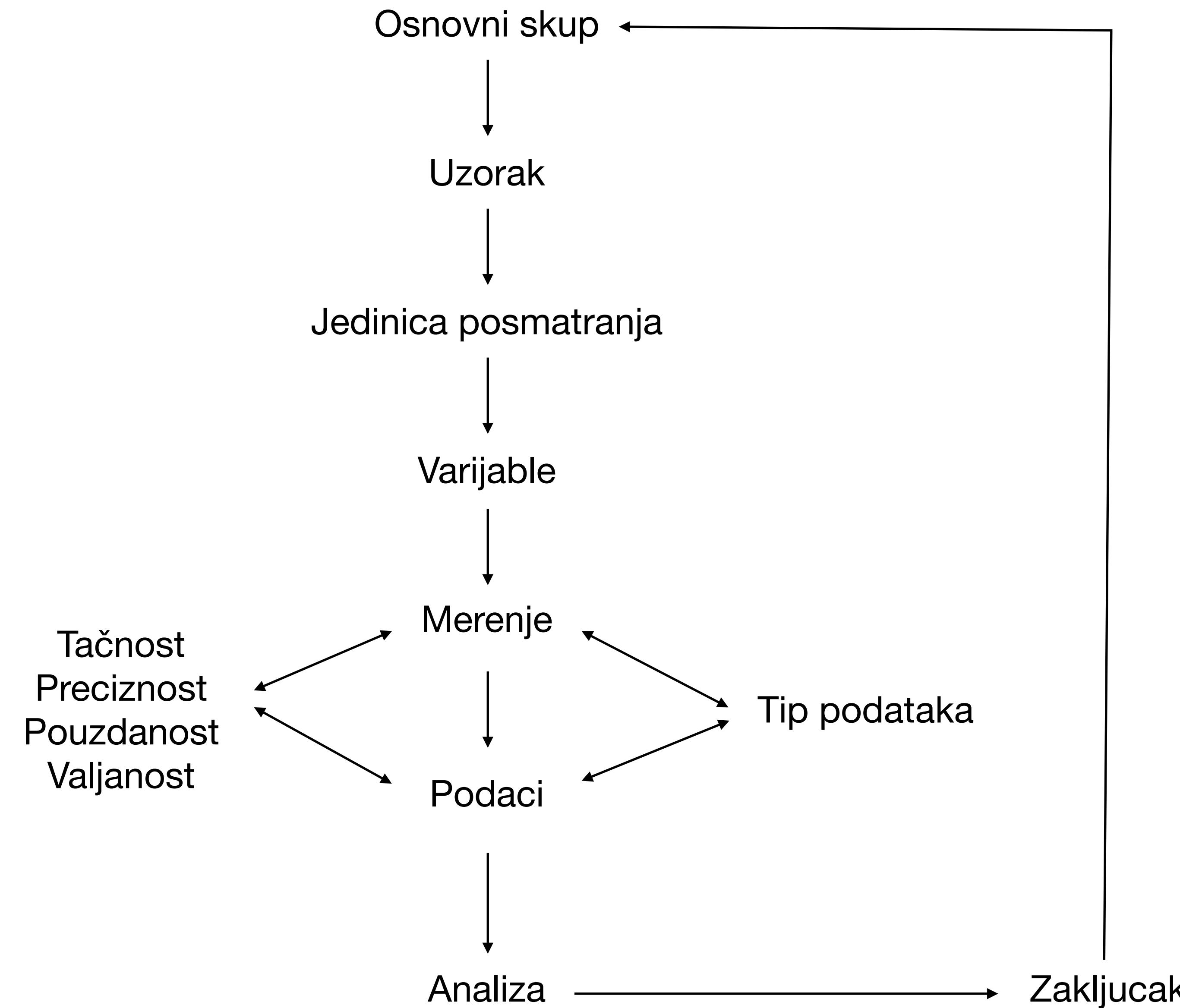
Richard Horton, Editor-in-Chief, *Lancet*



“The case against science is straightforward: **much of the scientific literature, perhaps half, may simply be untrue**. Afflicted by studies with small sample sizes, tiny effects, invalid exploratory analyses, and flagrant conflicts of interest, together with an obsession for pursuing fashionable trends of dubious importance, science has taken a turn towards darkness.”

Richard Horton, *Lancet* Editor

**Statistika je nauka o odlučivanju
u uslovima nesigurnosti**



Istraživačko pitanje



Osnovni skup



Uzorak



Jedinica posmatranja



Varijable

Istraživačko pitanje

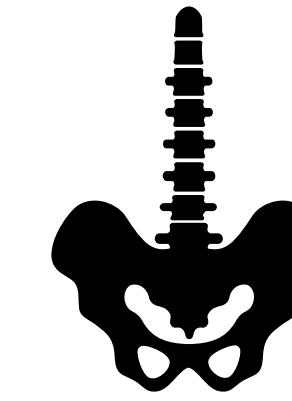
Osnovni skup

Uzorak

Jedinica posmatranja

Varijable

*“Da li je stepen degeneracije
lumbosakruma na radiografiji
povezan sa bolom?”*

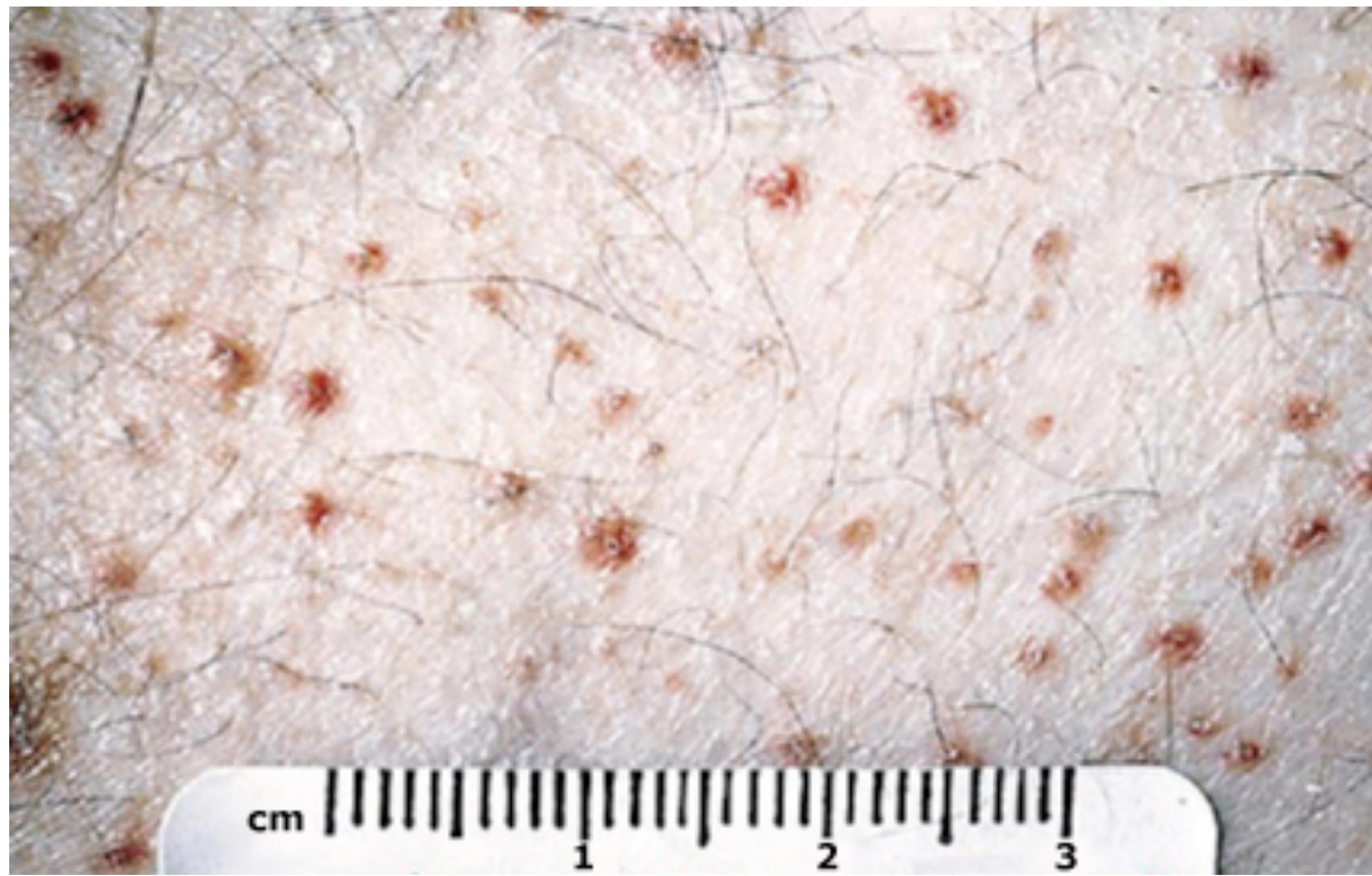


Pacijenti sa lumboishialgijom

n pacijenata

Pacijent

Stepen degeneracije, bol





ROBERT THOM



James Lind (1716 – 1794)



James Lind



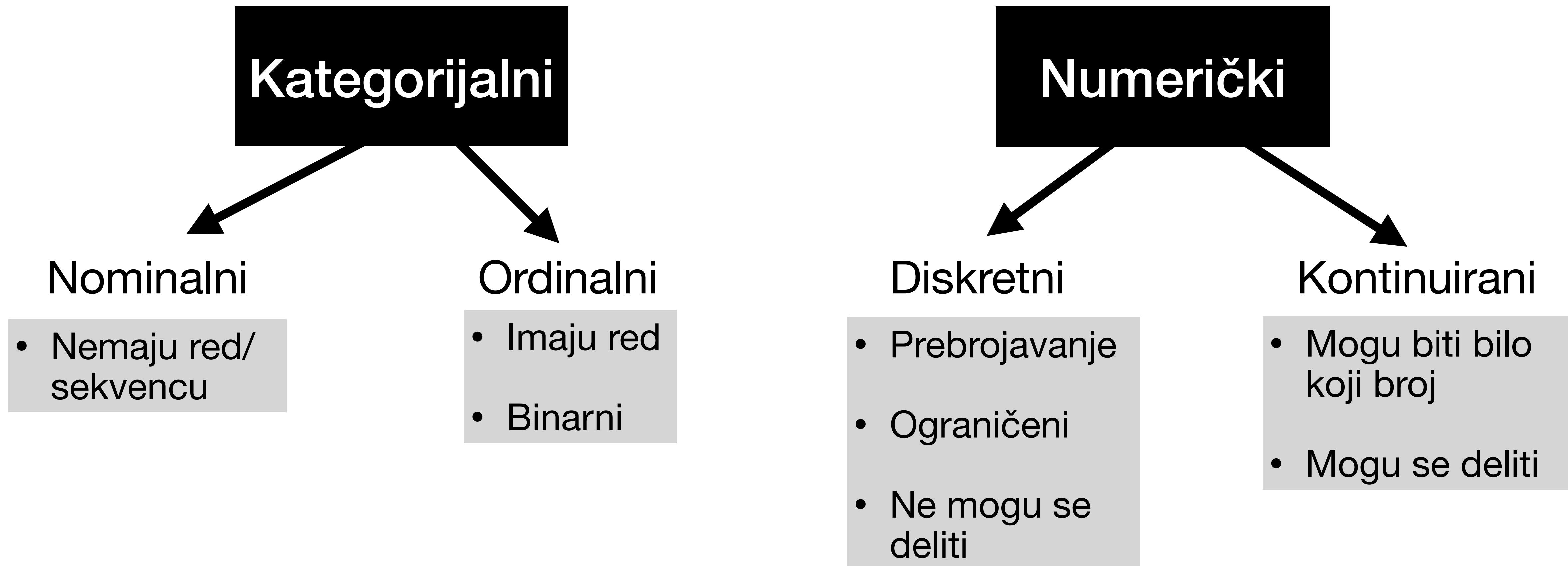
Albert Szent-Györgyi



SCURVY

study_id	treatment	dosing_regimen_for_scurvy	gum_roat_d6	skin_sores_d6	weakness_of_the_knees_d6	lassitude_d6	fit_for_duty_d6
1	cider	1 quart per day	2_mode_rate	2_moderate	2_moderate	2_mode_rate	0_no
2	cider	1 quart per day	2_mode_rate	1_mild	2_moderate	3_severe	0_no
3	dilute_sulfuric_acid	25 drops of elixir of vitriol, three times a day	1_mild	3_severe	3_severe	3_severe	0_no
4	dilute_sulfuric_acid	25 drops of elixir of vitriol, three times a day	2_mode_rate	3_severe	3_severe	3_severe	0_no
5	vinegar	two spoonfuls, three times daily	3_severe	3_severe	3_severe	3_severe	0_no
6	vinegar	two spoonfuls, three times daily	3_severe	3_severe	3_severe	3_severe	0_no
7	sea_water	half pint daily	3_severe	3_severe	3_severe	3_severe	0_no
8	sea_water	half pint daily	3_severe	3_severe	3_severe	3_severe	0_no
9	citrus	two lemons and an orange daily	1_mild	1_mild	0_none	1_mild	0_no
10	citrus	two lemons and an orange daily	0_none	0_none	0_none	0_none	1_yes
11	purgative_mixture	a nutmeg-sized paste of garlic, mustard seed, horseradish, balsam of Peru, and gum myrrh three times a day	3_severe	3_severe	3_severe	3_severe	0_no
12	purgative_mixture	a nutmeg-sized paste of garlic, mustard seed, horseradish, balsam of Peru, and gum myrrh three times a day	3_severe	3_severe	3_severe	3_severe	0_no

Tipovi podataka



ABO

Bol (0-10)

M/Ž

Stadijum (I-IV)

TA (mmHg)

Srčana fr (otk/min)

Starost

Nominalni

Ordinalni

Nominalni (binarni)

Ordinalni

Numerički (kont.)

Numerički* (diskretni)

Numerički (kont.)

Diskretni

Kontinuirani

**Godina
Mesec**

tidydata

id	star	pol	pusac	n_cig	visina_cm	masa_kg	bmi	bmi_K
1	50	Muski	Pusac	12	187	81	23,2	Normalna uhranjenost
2	56	Muski	Nepusac	0	190	119	33	Gojaznost
3	60	Muski	Nepusac	0	170	72	24,9	Normalna uhranjenost
4	51	Muski	Nepusac	0	180	92	28,4	Prekomerna masa
5	56	Muski	Nepusac	0	178	82	25,9	Prekomerna masa

tidydata

id	star	pol	pusac	n_cig	visina_cm	masa_kg	bmi	bmi_K
1	55	Muski	Pusac	12	180	81	21,2	Normalna uhranjenost
2	56	Muski	Nepusac	0	190	119	33	Gojaznost
3	60	Muski	Nepusac	0	170	72	24,9	Normalna uhranjenost
4	51	Muski	Nepusac	0	180	92	28,4	Prekomerna masa
5	53	Muski	Nepusac	0	170	82	27,9	Prekomerna masa

varijable

tidydata

id	star	pol	pusac	n_cig	visina_cm	masa_kg	bmi	bmi_K
1		Muski	Pusac	12	187	81	26,2	Normalna uhranjelost
2	56	Muski	Nepusac	0	190	119	33	Gojaznost
3		Muski	Nepusac	0	170	72	21,8	Normalna uhranjelost
4	51	Muski	Nepusac	0	180	92	28,4	Prekomerna masa
5		Muski	Nepusac	0	178	82	25,9	Prekomerna masa

opservacije

tidydata

id	star	pol	pusac	n_cig	visina_cm	masa_kg	bmi	bmi_K
1	50	Muski	Pusac	12	187	81	23,2	Normalna ulaganjenost
2	56	Muski	Nepusac	0	190	119	33	Gojaznost
3	60	Muski	Lepusa	0	170	72	24,9	Normalna ulaganjenost
4	51	Muski	Nepusac	0	180	92	28,4	Prekomerna masa
5	56	Muski	Lepusa	0	178	82	25,9	Prekomerna masa

vrednosti

id	star	pol	pusac	n_cig	visina_	masa_	bmi	bmi_K
1	50	Muski	Pusac	12	187	81	23,2	Normalna
2	56	Muski	Nepus	0	190	119	33	Gojazno
3	60	Muski	Nepus ac	0	170	72	24,9	Normalna
4	51	Muski	Nepus ac	0	180	92	28,4	Prekomerna
5	56	Muski	Nepus ac	0	178	82	25,9	Prekomerna

varijable

id	star	pol	pusac	n_cig	visina_	masa_	bmi	bmi_K
1	50	Muski	Pusac	12	187	81	23,2	Normalna
2	56	Muski	Nepus	0	190	119	33	Gojazno
3	60	Muski	Nepus ac	0	170	72	24,9	Normalna
4	51	Muski	Nepus ac	0	180	92	28,4	Prekomerna
5	56	Muski	Nepus ac	0	178	82	25,9	Prekomerna

vrednosti

id	star	pol	pusac	n_cig	visina_	masa_	bmi	bmi_K
1	50	Muski	Pusac	12	187	81	23,2	Normalna
2	56	Muski	Nepus	0	190	119	33	Gojazno
3	60	Muski	Nepus ac	0	170	72	24,9	Normalna
4	51	Muski	Nepus ac	0	180	92	28,4	Prekomerna
5	56	Muski	Nepus ac	0	178	82	25,9	Prekomerna

opservacije



Scientists rename human genes to stop Microsoft Excel from misreading them as dates

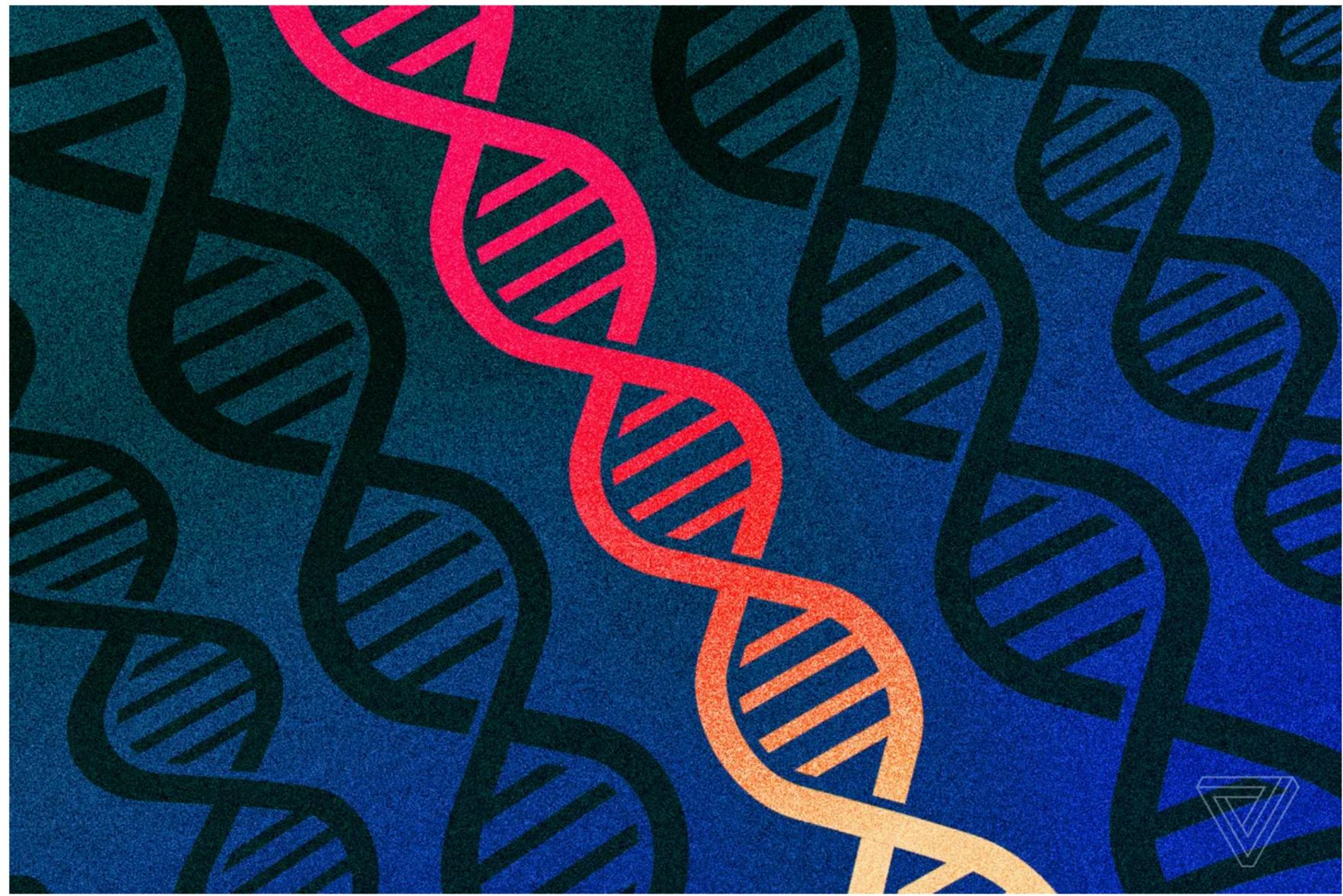


Illustration by Alex Castro / The Verge

/ Sometimes it's easier to re
genetics than update Excel

By [James Vincent](#), a senior reporter who has covered AI, robotics, eight years at The Verge.

Aug 6, 2020, 2:44 PM GMT+2 | □ 0 Comments / 0 New



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Autocorrect errors in Excel still creating genomics headache

Despite geneticists being warned about spreadsheet problems, 30% of published papers contain mangled gene names in supplementary data.



Greške

???

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG									
1																																										
2	lake site May 29 2012						29-May		lake site Jun 12. 2012					12-Jun		lake site Jun 19. 2012				19-Jun		Lake site Jun 26. 2012				26-Jun																
3			Bug1	bug2			avr	SEM	plot	bug1	bug2			avr	SEM	plot	bug1	bug2	gene ral			avr	SEM	plot	bug1	bug2	gener al															
4	1	T1	1	1	2		T1	2.6	0.51	1	T1	6	85	91	T1	30.4	15.47126	1	T1	17	80	97		T1	77.8	30.384865	1	T1	52	191	243	avr	SEM									
5	2	T1	1	2	3		T2	0.2	0.2	2	T1	8	13	21	T2	0.2	0.2	2	T1	44	136	180	T1	1.8	1.5620499	2	T1	50	270	320	T1	141.6	60.313									
6	3	T1	1	3	4	control	0.2	0.2	3	T1	11	0	11	control	0.6	0.6	3	T1	18	0	18	control	0.4	0.244949	3	T1	6	0	6	T2	0.2	0.2										
7	4	T1	1	0	1				4	T1	0	6	6				4	T1	0	14	14				4	T1	0	39	39	control	0	0										
8	5	T1	0	3	3				5	T1	3	20	23				5	T1	10	70	80				5	T1	4	96	100													
9	6	T2	1	0	1				6	T2	0	0	0				6	T2	1	7	8				6	T2	0	1	1													
10	7	T2	0	0	0				7	T2	0	0	0				7	T2	0	1	1				7	T2	0	0	0													
11	8	T2	0	0	0				8	T2	1	0	1				8	T2	0	0	0				8	T2	0	0	0													
12	9	T2	0	0	0				9	T2	0	0	0				9	T2	0	0	0				9	T2	0	0	0													
13	10	T2	0	0	0				10	T2	0	0	0				10	T2	0	0	0				10	T2	0	0	0													
14	11	control	0	0	0				11	control	0	0	0				11	control	0	0	0				11	control	0	0	0													
15	12	control	0	0	0				12	control	0	0	0				12	control	0	0	0				12	control	0	0	0													
16	13	control	0	0	0				13	control	0	0	0				13	control	0	0	0				13	control	0	0	0													
17	14	control	0	0	0				14	control	0	0	0				14	control	0	1	1				14	control	0	0	0													
18	15	control	1	0	1				15	control	3	0	3				15	control	0	1	1				15	control	0	0	0													
19																																										
20																																										
21	Barn site May 29. 2012						29-May		Barn site Jun 12. 2012					12-Jun		Barn site Jun 19. 2012				19-Jun		Barn Site Jun 26. 2012				26-Jun																
22		plot	bug1	bug2	gen eral			avr	SEM	plot	bug1	bug2	gene ral			avr	SEM	plot	bug1	bug2	gene ral			avr	SEM	plot	bug1	bug2	gener al													
23	1	T1	3	3	6			T1	2.4	1.288	1	T1	21	0	21		2	T1	36	74	110		T1	30.6	20.10124	2	T1	65	502	567		T1	119.4	111.92882	1	T1	0	0	0	avr	SEM	
24	2	T1	1	4	5				25	3	T1	0	0	0	T1	0.4	0.245	4	T1	7	0	7	T2	1	0.774597	5	T1	10	7	17	T2	5	2.1908902	2	T1	44	2057	2101	T1	431.8	417.33	
25	3	T1	0	0	0				26	4	T1	0	0	0	T2	0.4	0.316	5	T1	2	0	2	control	2.2	1.714643	5	T1	0	2	2	control	2.8	0.969536	3	T1	12	20	32	T2	0.4	0.4	
26	4	T1	0	0	0				27	5	T1	0	1	1	T2	0	0	6	T2	1	0	1				6	T2	0	8	8				5	T1	0	10	10				
27	5	T1	0	1	1				28	6	T2	0	0	0	T2	0	0	7	T2	0	4	4				7	T2	0	12	12				6	T2	0	0	0				
28	6	T2	0	0	0				29	7	T2	0	0	0	T2	0	0	8	T2	0	0	0				8	T2	0	0	0				7	T2	0	0	0				
29	7	T2	0	0	0				30	8	T2	0	1	1	T2	0	0	9	T2	0	0	0				9	T2	3	0	3				8	T2	0	0	0				
30	8	T2	0	1	1				31	9	T2	0	1	1	T2	0	0	10	T2	0	0	0				10	T2	2	0	2				9	T2	0	0	0				
31	9	T2	0	1	1				32	10	T2	0	0	0	T2	0	0	11	control	1	0	1				11	control	0	5	5				10	T2	0	2	2				
32	10	T2	0	0	0				33	11	control	0	0	0	T2	0	0	12	control	0	0	0				12	control	1	1	2				11	control	0	2	2				
33	11	control	0	0	0				34	12	control	0	1																													

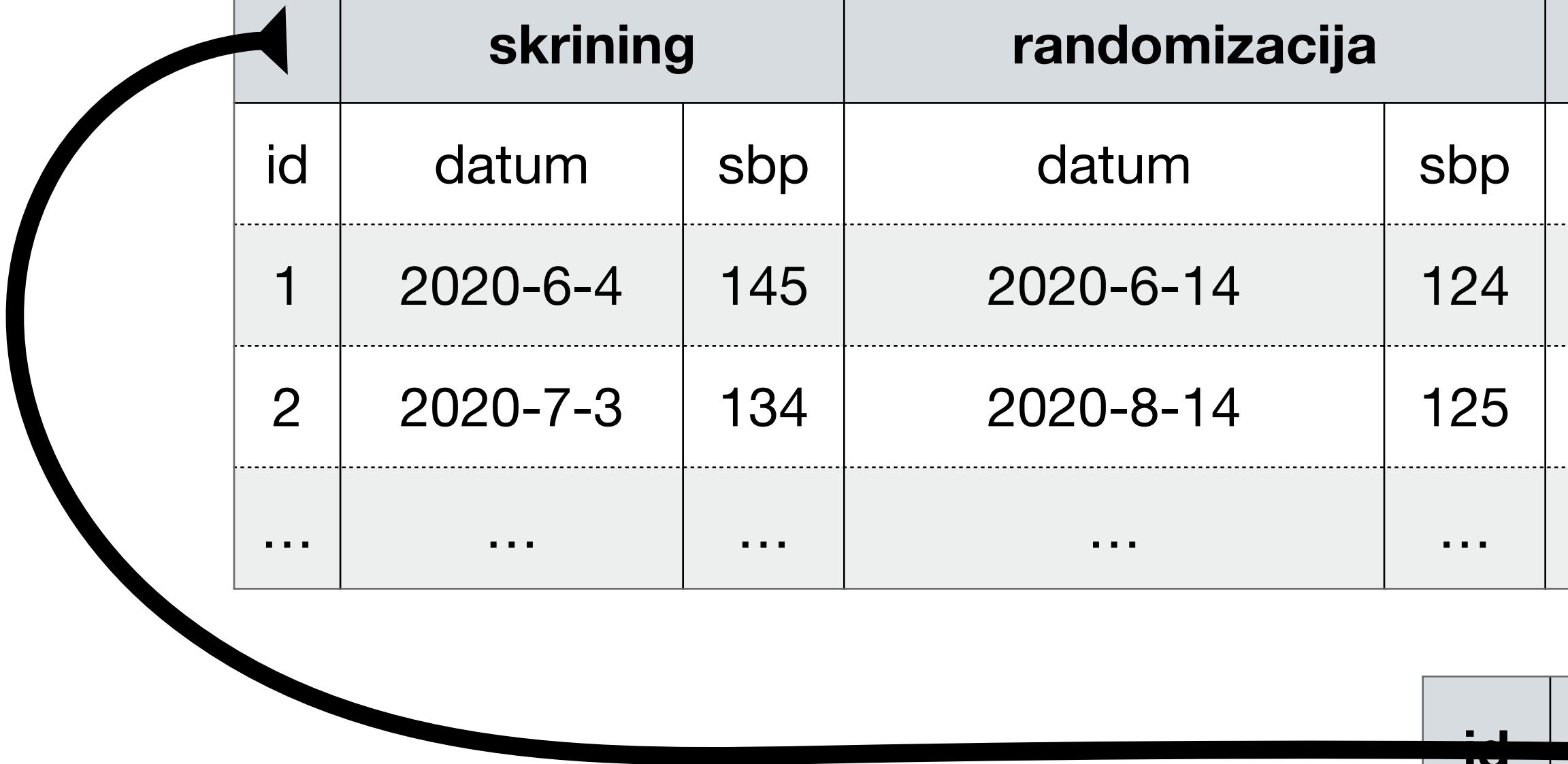
Greške

id	skrining		randomizacija		intervencija	
	datum	sbp	datum	sbp	datum	sbp
1	2020-6-4	145	2020-6-14	124	2020-6-25	126
2	2020-7-3	134	2020-8-14	125	2020-8-25	153
...						

Greške

Ponovljene kolone

id	skrining		randomizacija		intervencija	
	datum	sbp	datum	sbp	datum	sbp
1	2020-6-4	145	2020-6-14	124	2020-6-25	126
2	2020-7-3	134	2020-8-14	125	2020-8-25	153
...

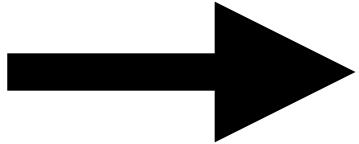


id	faza	datum	sbp
		skrining	2020-6-4
1	randomizacija	2020-6-14	124
1	intervencija	2020-6-25	126
...

Greške

Unosi podataka

id	sbp_skrining
1	120/80 mmHg
2	135/90 mmHg
3	145/70 mmHg

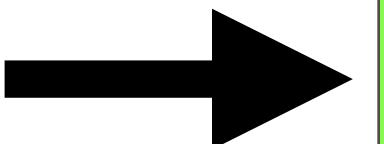


id	sp	dp	intervencija
1	120	80	skrining
2	135	90	skrining
3	145	70	skrining

Greške

Unosi podataka

id	sbp_1	sbp_2
1	120	130
2	135	120
3	145	180



id	kontrola	sbp
1	1	120
1	2	130
2	1	135
2	2	120
3	1	145
3	2	180

Greške

Unosi podataka

grupa	smrt	pop
0-19	1	
20-39		1500
40-69	12	1800
>70	16	900

Greške

Unosi podataka

grupa	smrt	pop
0-19	1	
20-39	0	1500
40-69	12	1800
>70	16	900

Kako se upisuju podaci?

- Granularni podaci ($120/80 \rightarrow 120, 80$)
- Bez mernih jedinica
- Prazno polje ili NA kad je nepoznato, nula za opservaciju



R Commander

R Console

```
R version 4.0.0 (2020-04-24) -- "Arbor Day"
Copyright (C) 2020 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
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'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> |
```

