

# Metabolički sindrom i nealkoholna masna bolest jetre iz perspektive MBL

Maja Špelić, mag.med.biochem.  
Dom zdravlja Primorsko-goranske županije  
Ispostava Delnice  
Medicinsko-biokemijski laboratorij

# Metabolički sindrom

- Definicija (IDF 2006)

- centralna pretilost (opseg struka ♀ > 80 cm, ♂ > 94 cm) i najmanje 2 rizična faktora:

trigliceridi	> 1,7 mmol/L
HDL kolesterol	♀ < 1,29 mmol/L ♂ < 1,03 mmol/L
krvni tlak	sistolički > 130 mmHg dijastolički > 85 mmHg
glukoza natašte ili već prije dijagnosticiran DM2	> 5,6 mmol/L

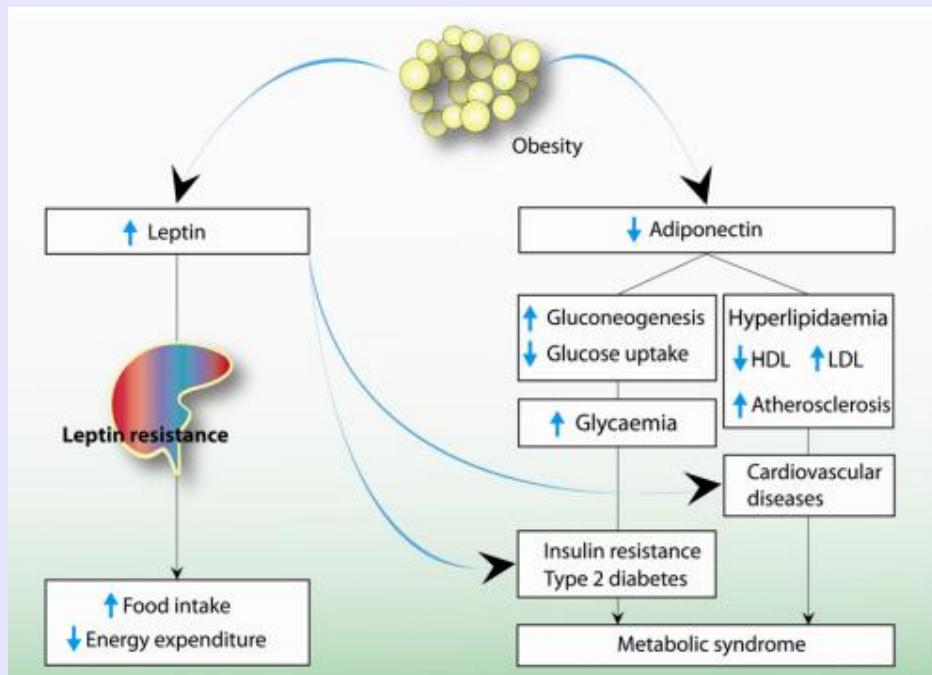
- Kliničke manifestacije:

- kardiovaskularne bolesti
- kronične bubrežne bolesti
- diabetes mellitus tipa 2
- nealkoholna masna bolest jetre

- Uzrok:

- sjedalački način života
- hormonalne promjene
- centralna pretilost
- dob, genetika
- **inzulinska rezistencija**

# Inzulinska rezistencija



- Kod povećane količine adipocita u tijelu nalazimo povećanu koncentraciju leptina i smanjenu koncentraciju adiponektina, što dovodi do smanjenja reagiranja mišićnog i masnog tkiva na učinke inzulina.
- Tijelo kompenzira povećanom proizvodnjom inzulina i prekomjernom stimulacijom tkiva koja su ostala osjetljiva na inzulin.

Ricci R, Bevilacqua F. The potential role of leptin and adiponectin in obesity: a comparative review. Vet J 2012;191(3):292-8.

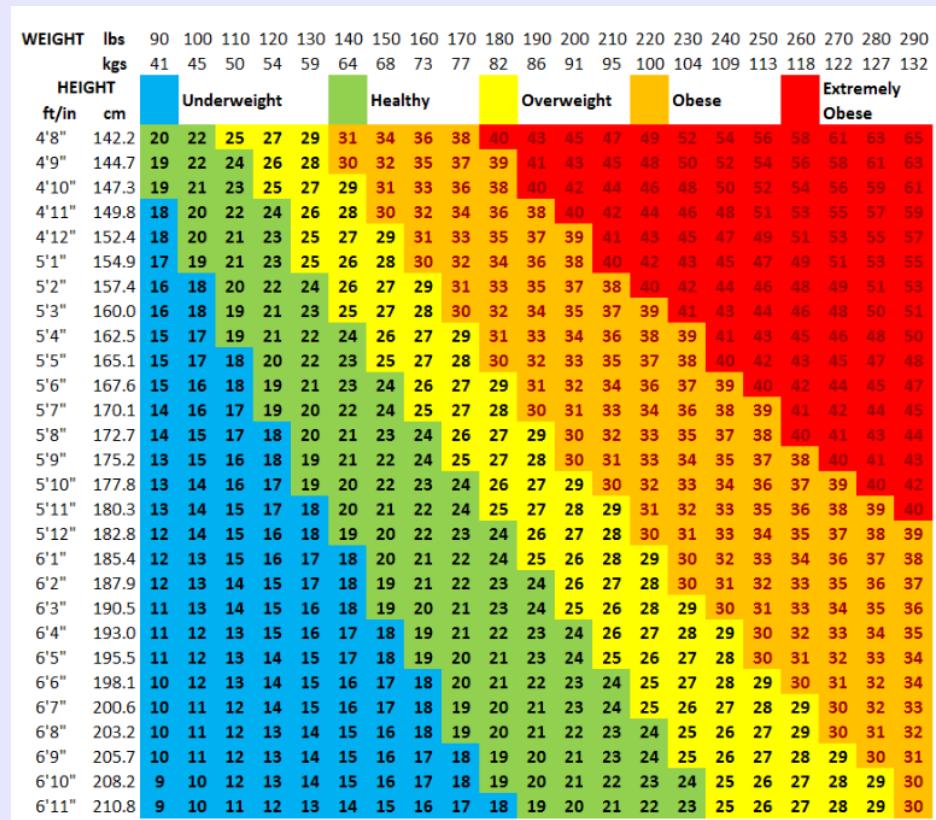
Insulin Resistance. Available at <https://labtestsonline.org/understanding/conditions/insulin-resistance/>. Accessed Apr 20th 2017.

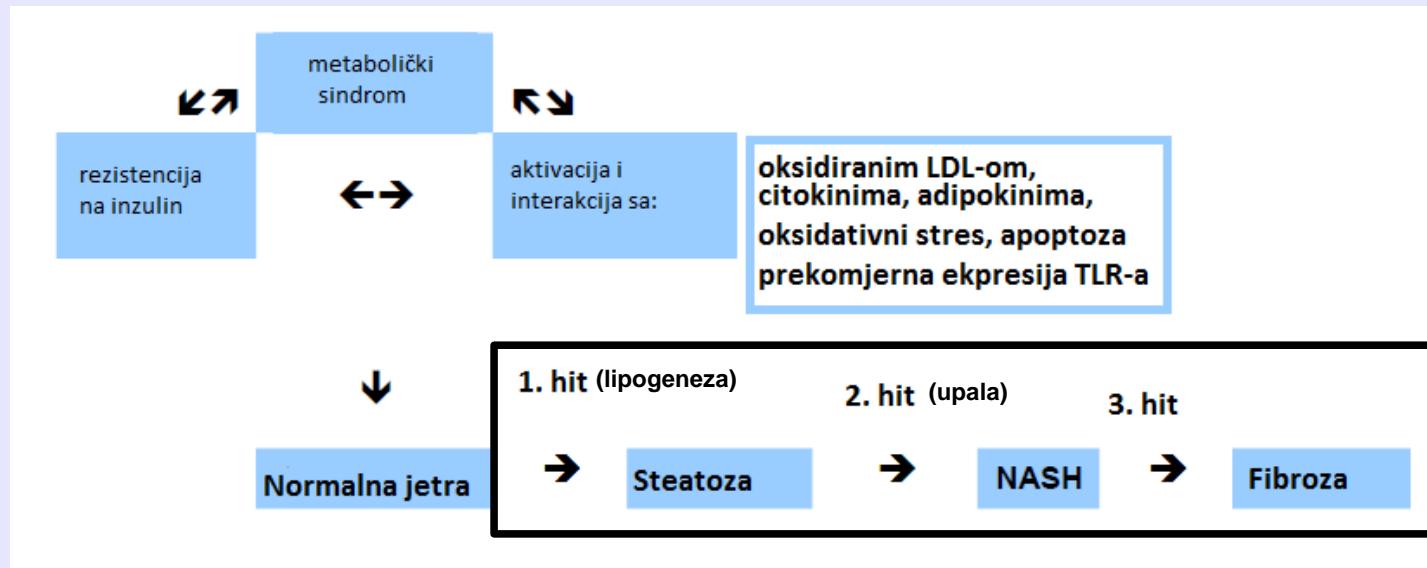
# Pretilost u svijetu i Republici Hrvatskoj

- WHO 2009

	Proshek BMI (>30g)	BMI > 25	BMI > 30
Globalno	24,5	42%	12%
Europa	26,9	65%	24%

- Prema podacima Hrvatskog zavoda za javno zdravstvo, 63% muškaraca i 54% žena u Hrvatskoj ima prekomjernu težinu, a pretilo ih je 20%, podjednako muškaraca i žena*





- Nealkoholnu masnu bolest jetre (NAFLD) definira nakupljanje masti u obliku triglicerida u jetri.
- EASL preporuke (2016):
  - probir na NAFLD kod svih pacijenta s metaboličkim sindromom i/ili inzulinskom rezistencijom,
  - probir na metabolički sindrom kod svih pacijenta s NAFLD-om,
  - kod pacijenta sa steatozom probir na sekundarne uzroke NAFLD-a i procjena unosa alkohola.
- Kod pretilje djece **uvijek** se treba posumnjati na prisutnost NAFLD-a.
- Trećina pacijenta s nealkoholnom masnom jetrenom bolesti mogu razviti upalu koja dovodi do fibroze i/ili ciroze (nealkoholni steatohepatitis).

LaBrecque D, Abbas Z, Anania F, Ferenci P, Ghatfoor Khan A et al. Nonalcoholic Fatty Liver Disease and Nonalcoholic Steatohepatitis. WGO; 2012.

Stal P. Liver fibrosis in non-alcoholic fatty liver disease – diagnostic challenge with prognostic significance. World Journal of Gastroenterology 2015;21(39):11077-87.

EASL–EASD–EASO Clinical Practice Guidelines for the management of non-alcoholic fatty liver disease. J Hepatol 2016.doi.org/10.1016/j.jhep.2015.11.004.

- Prisutnost fibroze kod nealkoholne masne bolesti jetre povećava rizik od HCC, ezofagealnih ulceracija i predviđa ne samo mortalitet vezan uz jetrene bolesti nego i uz kardiovaskularne.
- Preporučuje se probir na kardiovaskularne bolesti kod NAFLD.

	Uzrok mortaliteta	
	Jetrene bolesti	Kardiovaskularne bolesti
Opća populacija	0,2%	7,5%
Steatoza	0%	8,6%
NASH	1,6 - 6,8%	12,6 – 36,0%

# NAFLD

## steatoza u > 5% hepatocita

Simptomi: slabost i umor, abdominalna neugoda

- Istovremeno može postojati i alkoholna i nealkoholna masna bolest jetre.
- WGO 2012
- procjena učestalosti NAFLD-a

Populacija	Učestalost
Europa	20-30 %
Europa (< 18g)	2,6 – 10 %
Pretile osobe globalno	40 – 90 %

Najčešći sekundarni uzroci masne jetre:

- AFLD (unos alkohola
  - ♀ > 20 g/d
  - ♂ > 30 g/d
- masna jetra uzrokovana lijekovima
- masna jetra uzrokovana HCV
- hemokromatoza
- autoimuni hepatitis
- celijakija
- Wilsonova bolest
- Wolmanova bolest
- hipopituitarizam, hipotiroidizam

# NAFLD

nealkoholna masna jetra (NAFL)

- samo steatoza
- steatoza i blaga lobularna upala

nealkoholni steatohepatitis (NASH)

- steatoza, lobulana upala i hidropska degeneracija (baloniranje hepatocita)
  - rani NASH

- F0 (bez fibroze)
- F1 (blaga fibroza)

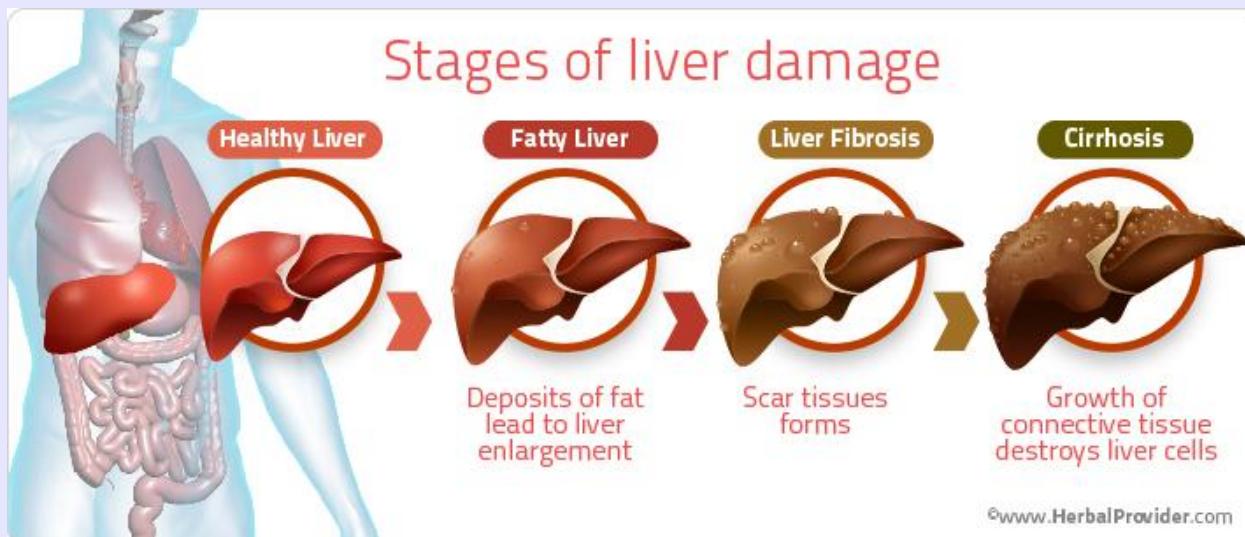
fibrotični NASH

- F2 (značajna fibroza)
- F3 (bridging, "ukopana" fibroza)

cirozni NASH

- F4

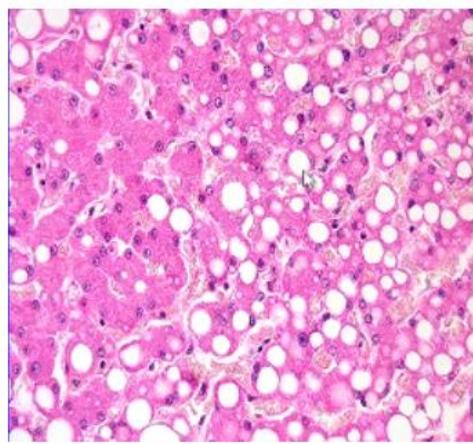
HCC (burned-out NASH)



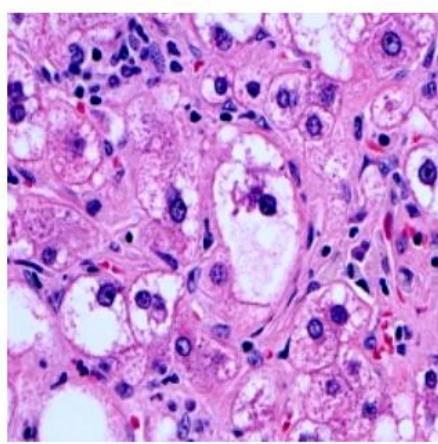
<http://www.herbalprovider.com/fatty-liver.html>

# Biopsija jetre

- Zlatni standard je biopsija jetre i samo se tako može postaviti konačna dijagnoza (razlikovati NAFL ili NASH). Obavezna je za identifikaciju fibroze i ciroze.
- Nedostaci su subjektivnost u očitavanju i ne razlikovanje alkoholne od nealkoholne masne bolesti jetre.



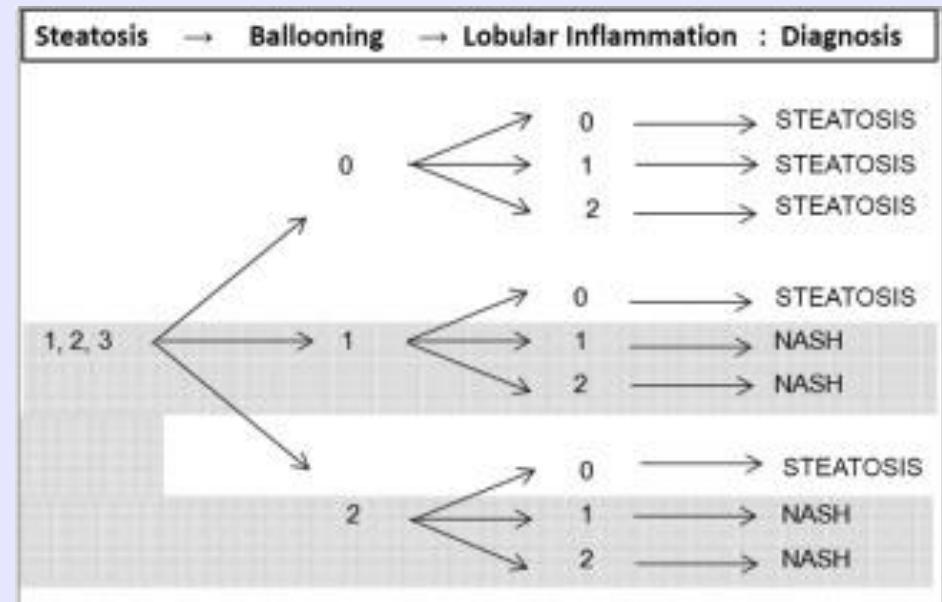
NAFL



NASH

<https://www.memorangapp.com/flashcards/22847/7B7W7+L8+-+Nonalcoholic+Fatty+Liver+Disease+-+18%285%2F6%29/>

## NAS (NASH activity score)



Bedossa P. Utility and Appropriateness of the Fatty Liver Inhibition of Progression (FLIP) Algorithm and Steatosis, Activity, and Fibrosis (SAF) Score in the Evaluation of Biopsies of Nonalcoholic Fatty Liver Disease. Hepatology 2014;60(2):565-75.

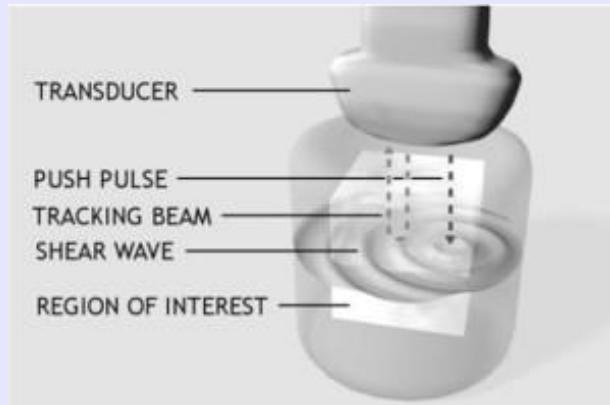
Stal P. Liver fibrosis in non-alcoholic fatty liver disease – diagnostic challenge with prognostic significance. World Journal of Gastroenterology 2015;21(39):11077-87.

# Neinvanzivne pretrage viša NPV od PPV

- Namijenjene su u PZZ za probir, za praćenje progresije bolesti i učinkovitosti terapije, i kod identifikacije pacijenta sa lošijom prognozom.
  - Preporučuje se samo kod pacijenta sa niskim rizikom od fibroze i ciroze.
- 
- Neinvanzivne pretrage koje se mogu koristiti:
    - slikovne pretrage (UZV, CT, MRI, elastografija: Fibroscan, ARFI, MRE),
    - laboratorijska dijagnostika,
    - molekularna dijagnostika (PNPLA3 I148M, TM6SF2 E167K), ne preporučuje se za probir.

Nascimbeni F, Pais R, Bellentani S, Day CP, Ratzui V et al From NAFLD in practise to answers from guidelines. Journal of Hepatology 2013;59:859-71.  
Stal P. Liver fibrosis in non-alcoholic fatty liver disease – diagnostic challenge with prognostic significance. World Journal of Gastroenterology 2015;21(39):11077-87.  
EASL–EASD–EASO Clinical Practice Guidelines for the management of non-alcoholic fatty liver disease. J Hepatol 2016,doi.org/10.1016/j.jhep.2015.11.004.

# ARFI



<http://bjr.birjournals.org/content/84/1006/939.full.pdf+html>

Od slikovnih pretraga najbolju specifičnost i osjetljivost imaju metode elastografije.

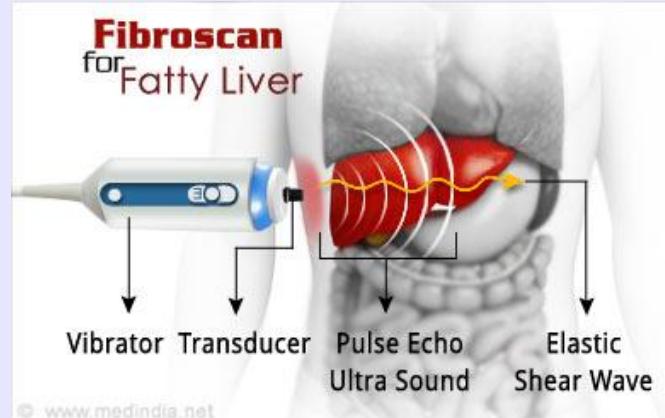
Elastografija – metoda koja pomoći posebno konstruirane sonde i vibracija mjeri elastičnost tkiva.

ARFI (acoustic radiation force impulse)

- koristi akustične impulse
- osjetljivost 65,5-100%
- specifičnost 77,4-95,7%

Fibroscan (transient elastography)

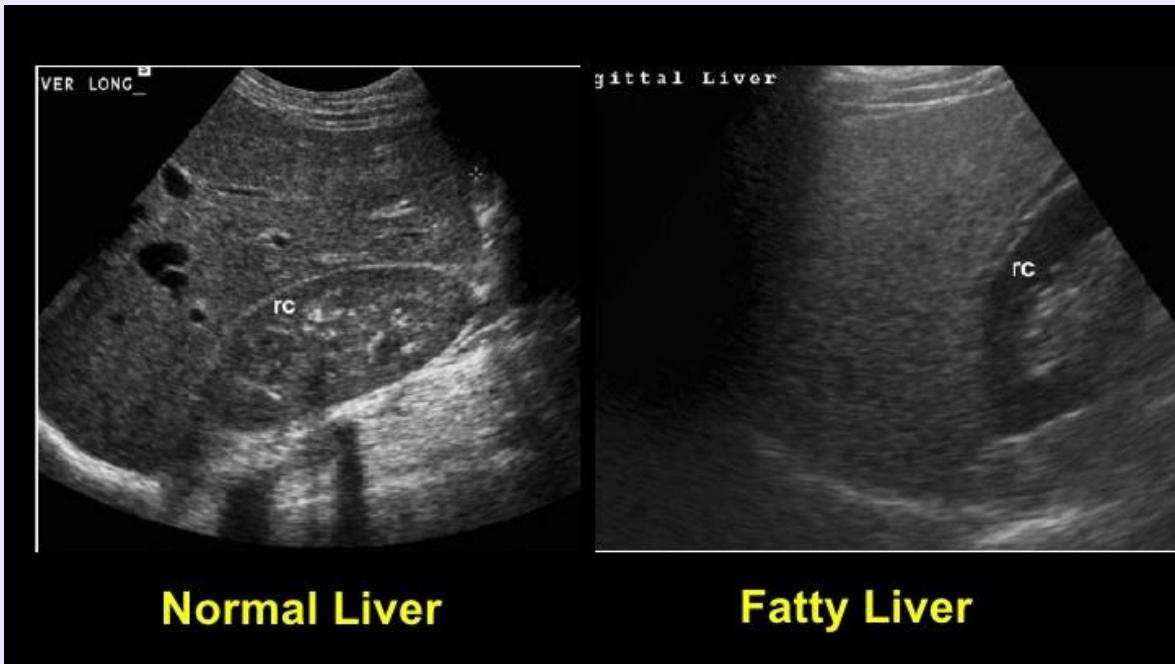
- koristi kompresionirane valove niske frekvencije (50Hz)
- elastični shear val
- NPV fibroze 84%
- osjetljivost 67-88%
- specifičnost 61-84%



<http://www.medindia.net/patients/patientinfo/fibroscan-for-fatty-liver-cirrhosis-and-fibrosis.htm>

Stal P. Liver fibrosis in non-alcoholic fatty liver disease – diagnostic challenge with prognostic significance. World Journal of Gastroenterology 2015;21(39):11077-11087.  
ARFI. Available at <http://bjr.birjournals.org/content/84/1006/939.full.pdf+html>. Accessed Apr 18th 2017.

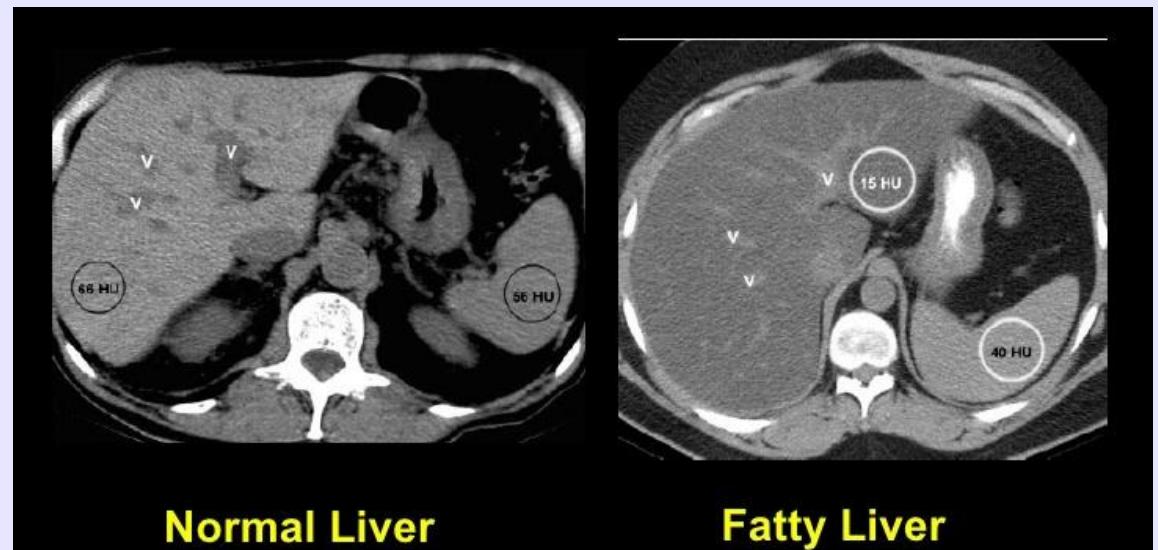
Fibroscan. Available at <http://www.medindia.net/patients/patientinfo/fibroscan-for-fatty-liver-cirrhosis-and-fibrosis.htm> Accessed Apr 18th 2017.



**UZV**  
 - osj 73,3-90,5%  
 - spec 69,6-85,2%

<https://www.slideshare.net/ixiu/fatty-liver-and-pitfall>

**CT**  
 - osj 46,1-72,0%  
 - spec 88,1-94,6%



[www.slideshare.net/ixiu/fatty-liver-and-pitfall](https://www.slideshare.net/ixiu/fatty-liver-and-pitfall)

# Značajke dijagnostičkih testova

Test	Karakteristike		Napomene
biopsija jetre	zlatni standard	ne razlikuje ASH i NASH	subjektivnost patologa
AST i ALT	niska osjetljivost i specifičnost		mogu biti unutar referentnog intervala
ultrazvuk	varijabilna osjetljivost 73,3-90,5%	varijabilna specifičnost 69,6-85,2%	ne vidi se steatoza <33%
MRI, MRS, CT, MRE, ARFI fibroscan	varijabilna osjetljivost 46,1-97,4%	varijabilna specifičnost 61,0-95,7%	skupo, nedosutupno, ne razlikuje ASH i NASH, ne vidi se steatoza <33% ni uznapredovalost bolesti

LaBrecque D, Abbas Z, Anania F, Ferenci P, Ghatfoor Khan A, Goh KL, et al. Nonalcoholic Fatty Liver Disease and Nonalcoholic Steatohepatitis. WGO; 2012.  
Stal P. Liver fibrosis in non-alcoholic fatty liver disease – diagnostic challenge with prognostic significance. World Journal of Gastroenterology 2015;21(39):11077-87.

EASL–EASD–EASO Clinical Practice Guidelines for the management of non-alcoholic fatty liver disease. J Hepatol 2016, doi.org/10.1016/j.jhep.2015.11.004.

# Preporučeni protokol (WGO) kod sumnje na NAFLD

- 1) Procjena dnevnog unosa alkohola
- 2) Osobna i obiteljska anamneza (diabetes, hipertenzija, kardiovaskularne bolesti)
- 3) BMI, opseg struka, promjene u težini
- 4) HBV/HCV infekcija
- 5) Unos lijekova koji mogu uzrokovati steatozu
- 6) Laboratorijske pretrage**
- 7) UZV

# Laboratorijske pretrage

- **AST, ALT, GGT, KKS, urati, vitamin D**
- Testovi za procjenu DM2 i inzulinske rezistencije:
  - **glukoza natašte, HbA1c, oGTT**
  - HOMA-IR (glukoza mmol/L \* inzulin mU/L)/ 22,5 > 2,0 -2,5
- Testovi za procjenu rizika kardiovaskularnih bolesti (KVB):
  - **kolesterol, HDL-kolesterol, trigliceridi, hsCRP**
- **Željezo, feritin i UIBC**
  - kod NAFLD se može naći povišena konc. feritin uz varijabilnu saturaciju transferina
  - nedostatak željeza potiče rezistenciju na inzulin
- Testovi za isključenje sekundarnih uzroka masne jetre: test za celijakiju, bolesti štitnjače, testovi za rijetke bolesti (Wilsonova, autoimune, nedostatak alpha-1 antitipsina)

LaBrecque D, Abbas Z, Anania F, Ferenci P, Ghatfo et al. Nonalcoholic Fatty Liver Disease and Nonalcoholic Steatohepatitis. WGO 2012.

EASL–EASD–EASO Clinical Practice Guidelines for the management of non-alcoholic fatty liver disease. J Hepatol 2016, doi.org/10.1016/j.jhep.2015.11.004.

Eliades M, Spyrou E. Vitamin D: a new player in non-alcoholic fatty liver disease? World J Gastroenterol. 2015;21(6):1718-27.

Wan X, Xu C, Lin Y, Lu C, Li D et al. Uric acid regulates hepatic steatosis and insulin resistance through the NLRP3 inflammasome-dependent mechanism. J Hepatol. 2016;64(4):925-32.

Salgado AL, Carvalho LD, Oliveira AC, Santos VN, Vieira JG et al. Insulin resistance index (HOMA-IR) in the differentiation of patients with non-alcoholic fatty liver disease and healthy individuals. Arq Gastroenterol 2010;47(2):165-69.

# Procjena steatoze

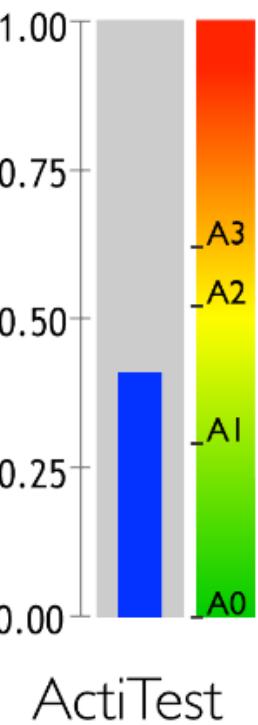
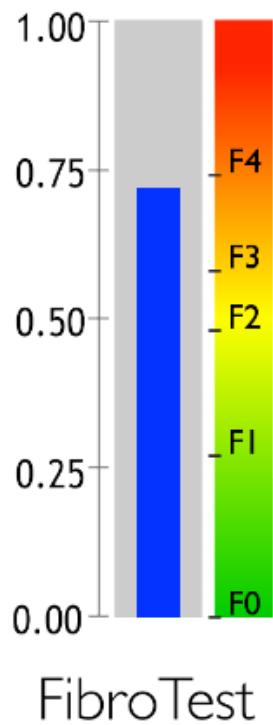
		Broj uzorka	AUROC	Osj (%)	Spec (%)	PPV (%)	NPV (%)	
FLI	BMI, OS tg, GGT	496	0,85	61	86	NA	NA	Validirano u Eu, SA i Aziji. Predviđa KV, metaboličke i jetrene događaje i mortalitet
HSI	BMI AST,ALT	183	0,81	45	93	86,7	NA	Validirano samo na Korejskoj populaciji
LAP	OS, tg	588	0,79	NA	NA	NA	NA	Predviđa KV rizik i DM
NAFLD LFS	MS, DM AST, ALT	470	0,86	86	71	NA	NA	
NASH LFS	PNPLA3 Inzulin, AST	296 380	0,734 0,737	59,5 92,9	79,7 32,7	54,0 52,5	82,8 85,2	Validirano na 2 populacije potvrđene biopsijom (Fin i Ita)
Steato Test	BMI, glu, tg, chol, bil, ALT, GGT, apoA1 haptoglobulin, α2makroglobulin	494	0,80	38,4	81,4	71,0	52,7	Validacija na općoj i morbidno pretiloj populaciji. Predviđa ukupni mortalitet.

# Procjena steatohepatitisa

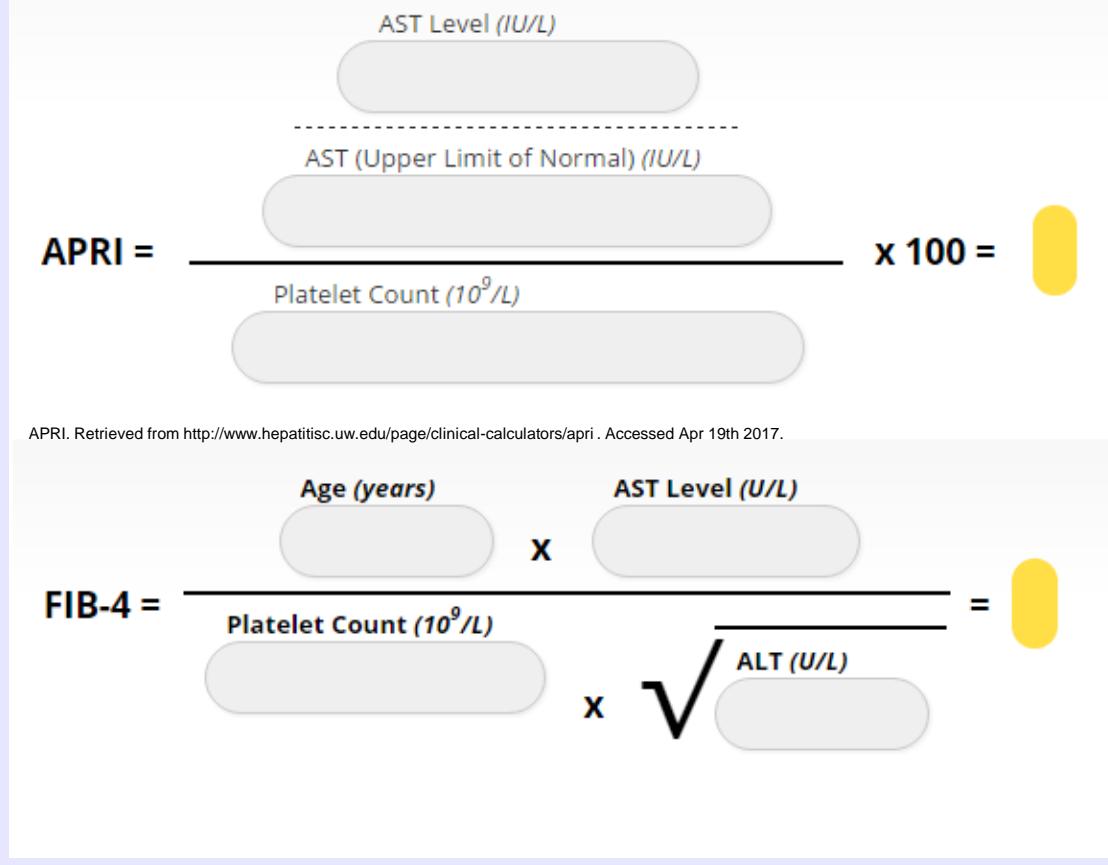
		Broj uzorka	AUROC	Osj (%)	Spec (%)	PPV (%)	NPV (%)	
<b>Campos 2008.</b>	<b>Hipertenzija, DM apneja, rasa ALT, AST</b>	186	0,80	NA	NA	7 27 59 93	93 73 41 7	Razvijeno u morbidno pretilim pacijenta
<b>Ulitsky 2010.</b>	<b>DM, apneja ALT, tg</b>	253	0,76	NA	NA	11 24,7 60 75	89 75,3 40 25	Razvijeno u morbidno pretilim pacijenta
HAIR	Hipertenzija, IR, ALT	105	0,90	80	89	NA	NA	Razvijeno na pacijentima barijatrijske opercije
Nice model	MS, CK-18, ALT	464	0,83	84	86	44	98	Razvijeno na pacijentima barijatrijske opercije
Acti-test	GGT, bil, apoA1, haptoglobulin, α2makroglobulin	494	0,74	28,2	90,7	38,7	85,9	Razvijeno na pacijentima barijatrijske opercije
NASH Test	Dob, spol, AST, tg, chol, bil, ALT, GGT, apoA1 haptoglobulin, α2makroglobulin	257	0,78	33	94	61	81	Razvijeno i validirano na multicentričnoj populaciji

# Procjena fibroze

		Broj uzorka	AUROC	Osj (%)	Spec (%)	PPV (%)	NPV (%)	
> 0,8 > 0,1	<b>AST/ ALT</b>	145	0,83	74 52	78 90	44 55	<b>93</b> 89	Visoka NPV za isključenje uznapredovale fibroze
Fibro-meter NAFLD	Dob, težina glu, AST/ALT, feritin	235	0,94	79	96	88	92	Razvijena za hepC
APRI	<b>AST, tc</b>	235	0,87	66	91	73	87	Razvijena za hepC, predviđa jetrene događaje
BARD	<b>BMI, DM AST/ALT</b>	827	0,81	NA	NA	43	96	Predviđa jetrene događaje
FIB-4 index	<b>Dob ALT, AST, trc</b>	541	0,80	33	98	80	83	Predviđa mortalitet i KV i jetrene događaje
NFS NAFLD	Dob, BMI glu, trc, alb, AST/ALT	733	0,84	43	96	82	80	Promjene u NFS predviđaju mortalitet
Fibro Test	GGT, bil, apoA1, haptoglobulin, α2makroglobulin	267	0,81	92 25	71 97	33 60	92 89	Uznapredovala fibroza predviđa mortalitet
		494	0,65	NA	NA	87	94	



<https://www.biopredictive.com/products/fibrotest-actitest>



# Liječenje

- Prvi korak je gubitak na težini 7-10% i prilagodba prehrane (mediteranska prehrana, smanjenje unosa fruktoze i smanjenje unosa alkohola, potpuna apstinencija kod ciroze).
- Preporučuje se tјelovježba 150-200 min/tjedan u 3-5 sesija.
- Ne postoji niti jedan odobreni lijek ali pioglitazon i vitE se mogu koristiti kod F2 i viših faza bolesti.
- Od kirurških rješenja moguća je transplatacija jetre ili bariatrijska operacija.



## KLINIČKI BOLNIČKI CENTAR RIJEKA

Krešimirova 42, 51000 Rijeka, Republika Hrvatska  
Klinički zavod za laboratorijsku dijagnostiku  
Predstojnik: Prof. dr. sc. Lidija Blago-Zulle, spec. med. biokemije  
Krešimirova 42, 51000 Rijeka • Tel: +385 (0)51 407-102 • Fax: +385 (0)51 658-239  
laboratorij@kbc-rijeka.hr • www.kbc-rijeka.hr



MEDICINSKI FAKULTET RIJEKA  
Katedra za Kliničko-laboratorijsku dijagnostiku

## LABORATORIJSKI NALAZ

Ime i Prezime: [REDACTED] Rođen/a: 26.06.1973 Spol: M

Barcode: 1909\*\*0694

Reg.broj: 855

MBO: 120965081

Vrijeme uzorkovanja: 19.09.16

Vrijeme zaprimanja: 19.09.16 11:05

Vrijeme izdavanja: 21.09.16 09:37

Uzorkovao:

Zaprimio: Perkov-Stipićin Đina zdr.lab.tehn.

Upućen: Gastroenterološka ambulanta 1 Rijeka

Liječnik: Ivana Mikolašević

### ODJEL ZA OPĆU BIOKEMIJU I HEMATOLOGIJU

Pročelnik odjela: doc. dr. sc. Elizabeta Fišić, spec. med. biokemije; tel: +385 (0)51 407-102 ; laboratorij-rijeka@kbc-rijeka.hr

### HEMATOLOŠKE PRETRAGE

Izradio: Dragana Malić zdr.lab.tehn.

Odgovorna osoba: Božena Beljan spec.med.biokemije i lab.medicine

	Rezultat	Jedinica	Referentni interval	Napomena
Eritrociti (vk, kk)	5.54	[1e12]/L	4.34 - 5.72	
Hemoglobin (vk, kk)	161	g/L	138 - 175	
Hematokrit (vk, kk)	0.471	L/L	0.415 - 0.530	
MCV (vk, kk)	85.0	fL	83.0 - 97.2	
MCH (vk, kk)	29.1	pg	27.4 - 33.9	
MCHC (vk, kk)	342	g/L	320 - 345	
RDW (vk, kk)	12.7	%	9.0 - 15.0	
HDW (vk, kk)	24.5	g/L	22.0 - 32.0	
Trombociti (vk, kk)	210	[1e9]/L	158 - 424	
MPV (vk, kk)	7.5	fL	6.8 - 10.4	
Leukociti (vk, kk)	6.6	[1e9]/L	3.4 - 9.7	
Neutrofilni granulociti (vk, kk)	3.10	[1e9]/L	2.06 - 6.49	
Limfociti (vk, kk)	2.80	[1e9]/L	1.19 - 3.35	
Monociti (vk, kk)	0.50	[1e9]/L	0.12 - 0.84	
Eozinofilni granulociti (vk, kk)	0.10	[1e9]/L	0 - 0.43	
Bazofilni granulociti (vk, kk)	0.00	[1e9]/L	0 - 0.06	
LUC (vk, kk)	0.10	[1e9]/L	0.00 - 0.40	
Neutrofilni granulociti (vk, kk)	47.3	rel %	44 - 72	
Limfociti (vk, kk)	42.1	rel %	20 - 46	
Monociti (vk, kk)	7.4	rel %	2 - 12	
Eozinofilni granulociti (vk, kk)	1.1	rel %	0 - 7	
Bazofilni granulociti (vk, kk)	0.6	rel %	0 - 1	
LUC (vk, kk)	1.6	rel %	0 - 4	
Udio hipokromnih eritrocita (vk, kk)	0.2	%	0.0 - 2.5	

## OPĆE BIOKEMIJSKE PRETRAGE

Izradio: Irena Grgas bacc.med.lab.diagn.

Odgovorna osoba: Božena Beljan spec.med.biokemije i lab.medicine

	Rezultat	Jedinica	Referentni interval	Napomena
HbA1C (vk)	5.4	%	< 6.0	TINIA, Roche cobas c501
HbA1C (vk)	36	mmol/mol	29 - 42	
Glukoza (s)	5.5	mmol/L	4.4 - 6.4	
Ureja (s)	5.0	mmol/L	2.8 - 8.3	
Kreatinin (s)	73	µmol/L	64 - 104	
eGFR CKD-EPI	108	mL/min/1,73m <sup>2</sup>	> 90	CKD-EPI
Natrij (s)	139	mmol/L	137 - 146	
Kloridi (s)	103	mmol/L	97 - 108	
Kalcij, ukupni (s)	2.53	mmol/L	2.14 - 2.53	
Anorganski fosfati (s)	1.02	mmol/L	0.79 - 1.42	
Bilirubin, ukupni (s)	10	µmol/L	3 - 20	
Bilirubin, konjugirani (s)	1	µmol/L	< 5	
Bilirubin, nekonjugirani (s)	9	µmol/L		
Urati (s)	417 H	µmol/L	182 - 403	
AST (s)	24	U/L	11 - 38	
ALT (s)	36	U/L	12 - 48	
ALP (s)	86	U/L	60 - 142	
GGT (s)	22	U/L	11 - 55	
Željezo (s)	18	µmol/L	11 - 32	
UIBC (s)	51	µmol/L	25 - 54	
TIBC (s)	69	µmol/L	49 - 72	
Feritin (s)	302 H	µg/L	20 - 300	
Kolesterol (s)	6.0 H	mmol/L	< 5.0	
HDL-kolesterol (s)	1.0	mmol/L	> 1.0	
LDL-kolesterol (raèunski) (s)	3.7 H	mmol/L	< 3.0	
Trigliceridi (s)	2.8 H	mmol/L	< 1.7	
Ukupni proteini (s)	71	g/L	ambulantni: 66 - 81 ležedi: 66 - 78	
Albumin (s)	49.3	g/L	40.6 - 51.4	
Globulini (s)	21.7	g/L		
CRP (s)	1.4	mg/L	< 5.0	

**KVALITATIVNI PREGLED URINA**

Izradio: Petrović Irena zdr.lab.tehn.  
 Odgovorna osoba: doc.dr.sc. **Elizabeta Fišić spec.med.biokemije i lab.medicine**

	<b>Rezultat</b>	<b>Jedinica</b>	<b>Referentni interval</b>	<b>Napomena</b>
Izgled (u)	Bistar			
Boja (u)	<b>Žut</b>			
<b>Specifična težina (u)</b>	1.015	kg/L	1.002 - 1.030	
pH (u)	5.0	pH j.	5.0 - 9.0	
Leukocitna esteraza (u)	neg	/	neg	
Proteini (u)	neg	/	neg	
Glukzoza (u)	norm	/	norm	
Ketoni (u)	neg	/	neg	
Urobilinogen (u)	norm	/	norm	
Bilirubin (u)	neg	/	neg	
Nitriti (u)	neg	/	neg	
Eritrociti/hemoglobin (u)	neg	/	neg	
Mikroskopski pregled sedimenta (u)	Po koja stanica okruglog epitela			

**ODJEL ZA SPECIJALNU BIOKEMIJU I LABORATORIJSKU IMUNOLOGIJU**

Pročelnik odjela: Prof. dr. sc. Lidija Biljež-Zulle, spec. med. biokemije; tel: +385 (0)51 407-102 ; laboratorijski@kbc-rijeka.hr

**PRETRAGE HORMONA**

Izradio: **Snježana Salopek zdr.lab.tehn.**  
 Odgovorna osoba: **Božena Beljan spec.med.biokemije i lab.medicine**

	<b>Rezultat</b>	<b>Jedinica</b>	<b>Referentni interval</b>	<b>Napomena</b>
Inzulin (s)	36.9	H	mU/L	2.6 - 24.9

**PRETRAGE VITAMINA**

Izradio: **Vodicka Nataša bacc.med.lab.diagn.**  
 Odgovorna osoba: **Vedrana Drvar, spec.med.biokemije i lab.medicine**

	<b>Rezultat</b>	<b>Jedinica</b>	<b>Referentni interval</b>	<b>Napomena</b>
Vitamin Dt (s)	59.4	L	nmol/L	Preporučena vrijednost > 75

## Hepatitis C Online

Sign In

HCV  
Medications

Course  
Modules

Tools &  
Calculators

Resource  
Library

Master  
Bibliography



### Clinical Calculators

#### Clinical Calculators

APRI Calculator

BMI Calculator

CrCl Calculator

CTP Calculator

#### FIB-4 Calculator

Glasgow Coma Scale

GFR Calculator

MELD Calculator

SAAG Calculator

#### Substance Use Screening Tools

AUDIT-C Questionnaire

CAGE Questionnaire

## Fibrosis-4 (FIB-4) Calculator

Share

The Fibrosis-4 score helps to estimate the amount of scarring in the liver. Enter the required values to calculate the FIB-4 value. It will appear in the oval on the far right (highlighted in yellow).

$$\text{FIB-4} = \frac{\text{Age (years)} \times \text{AST Level (U/L)}}{\text{Platelet Count } (10^9/\text{L}) \times \sqrt{\text{ALT (U/L)}}} = 0.84$$

#### Interpretation:

Using a lower cutoff value of 1.45, a FIB-4 score <1.45 had a negative predictive value of 90% for advanced fibrosis (Ishak fibrosis score 4-6 which includes early bridging fibrosis to cirrhosis). In contrast, a FIB-4 >3.25 would have a 97% specificity and a positive predictive value of 65% for advanced fibrosis. In the patient cohort in which this formula was first validated, at least 70% patients had values <1.45 or >3.25. Authors argued that these individuals could potentially have avoided liver biopsy with an overall accuracy of 86%.

#### Sources

Sterling RK, Lissen E, Clumeck N, et. al. Development of a simple noninvasive index to predict significant fibrosis patients with HIV/HCV co-infection. Hepatology 2006;43:1317-1325.

This calculator operates entirely from your device.

No input variables or data is transmitted between your computer and our servers.

Funded by a grant from the Centers for  
Disease Control and Prevention

UNIVERSITY of  
WASHINGTON

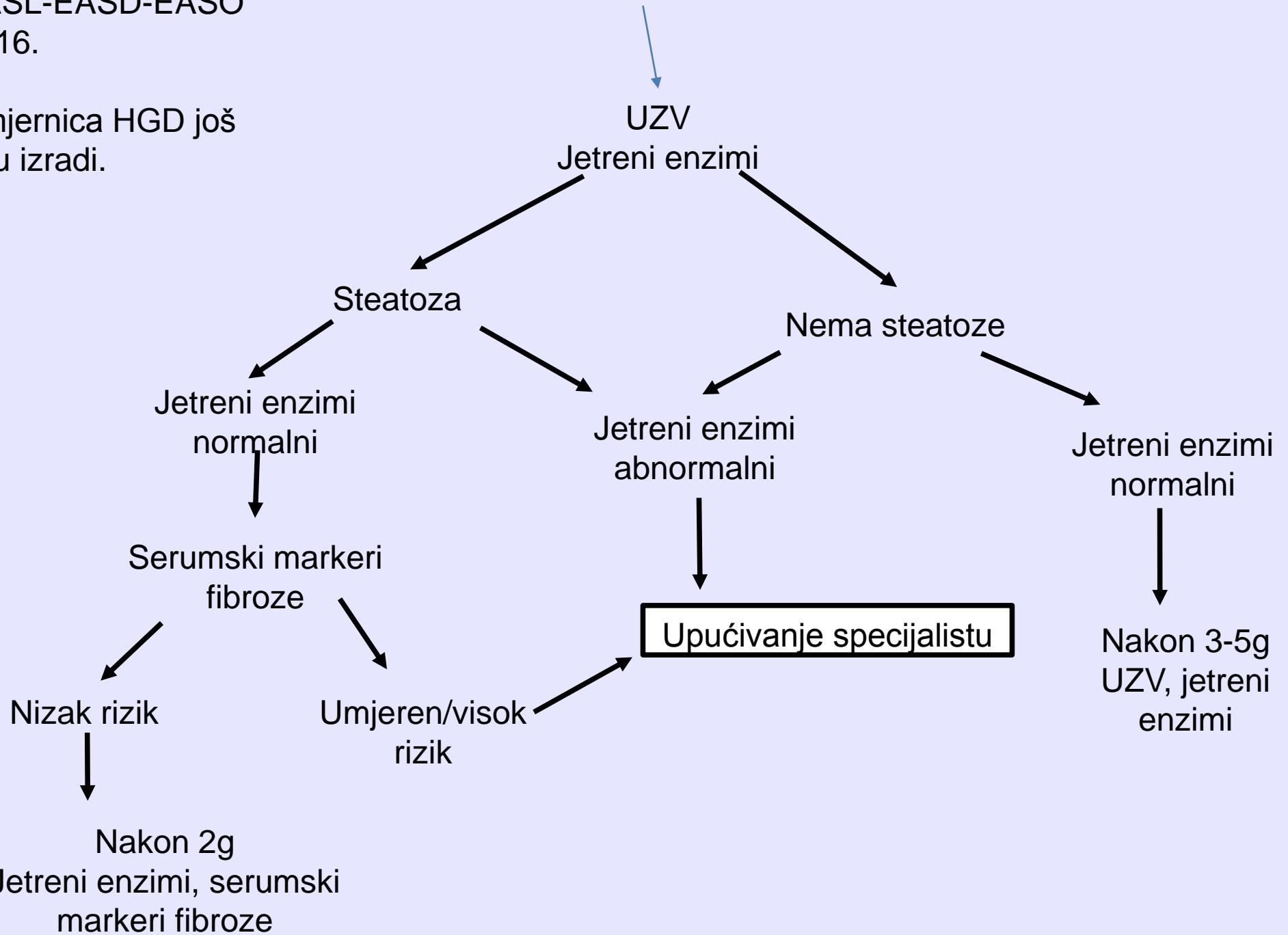
THE UNIVERSITY OF  
ALABAMA AT BIRMINGHAM

IAS-USA  
International Antiviral Society-USA

Preporuka  
EASL-EASD-EASO  
2016.

Smjernica HGD još  
je u izradi.

## Prisutnost metaboličkih rizičnih faktora



# Zaključak

- biopsija jetre - zlatni standard, invanzivna preporuka - samo kod pacijenta s visokim rizikom od razvoja fibroze
- neinvanzivna procjena rizika - biomarkeri i bodovni sustavi neki bodovni sustavi – u primarnoj zdravstvena, u medicinsko biokemijskom laboratoriju
- preporuka- raditi probir na NAFLD, KVB, DMT2 i MS

# Literatura

- Alberti Z, Zimmet P, Shaw J, Grundy SM, et al. The IDF consensus worldwide definition of the metabolic syndrome. IDF communications; 2006.
- LaBrecque D, Abbas Z, Anania F, Ferenci P, Ghatfoor et al. Nonalcoholic Fatty Liver Disease and Nonalcoholic Steatohepatitis. WGO; 2012.
- Ricci R, Bevilacqua F. The potential role of leptin and adiponectin in obesity: a comparative review. *Vet J* 2012;191(3):292-8.
- Insulin Resistance. Available at <https://labtestsonline.org/understanding/conditions/insulin-resistance/>. Accessed Apr 20th 2017.
- [Pretilost u RH]. Available at <http://www.zzzpgz.hr/nzl/71/debljina.htm>. Accessed Apr 19th 2017.
- Stal P. Liver fibrosis in non-alcoholic fatty liver disease – diagnostic challenge with prognostic significance. *World Journal of Gastroenterology* 2015;21(39):11077-87.
- EASL–EASD–EASO Clinical Practice Guidelines for the management of non-alcoholic fatty liver disease. *J Hepatol* 2016.doi.org/10.1016/j.jhep.2015.11.004.
- Bedossa P. Utility and Appropriateness of the Fatty Liver Inhibition of Progression (FLIP) Algorithm and Steatosis, Activity, and Fibrosis (SAF) Score in the Evaluation of Biopsies of Nonalcoholic Fatty Liver Disease. *Hepatology* 2014;60(2):565-75.
- Nascimbeni F, Pais R, Bellentani S, Day CP, Ratzui V et al From NAFLD in practise to answers from guidelines. *Journal of Hepatology* 2013;59:859-71.
- ARFI. Available at <http://bjr.birjournals.org/content/84/1006/939.full.pdf+html>. Accessed Apr 18th 2017.
- Fibroscan. Available at <http://www.medindia.net/patients/patientinfo/fibroscan-for-fatty-liver-cirrhosis-and-fibrosis.htm> Accessed Apr 18th 2017.
- Eliades M, Spyrou E. Vitamin D: a new player in non-alcoholic fatty liver disease? *World J Gastroenterol*. 2015;21(6):1718-27.
- Wan X, Xu C, Lin Y, Lu C, Li D et al. Uric acid regulates hepatic steatosis and insulin resistance through the NLRP3 inflammasome-dependent mechanism. *J Hepatol*. 2016;64(4):925-32.
- Salgado AL, Carvalho LD, Oliveira AC, Santos VN, Vieira JG et al. Insulin resistance index (HOMA-IR) in the differentiation of patients with non-alcoholic fatty liver disease and healthy individuals. *Arq Gastroenterol* 2010;47(2):165-69.

Hvala na pažnji