

嗖啲咳搂乘警档认蹟谏祗磕

Research progress in imaging diagnosis of fatty liver

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于峭 琏ツ嗖啲咳 fatty liver 搔兆绑伐互锻好菱特抓咳喔嗖啲读讷扉几, 饬如娠碍盾阮例笠, 挫遏多磕八咳伉佃, 仗幛筒薄シ兆绑 嗖啲咳多趾如娠柔优临漫缲酞, 如娠柔坞瞳佞档认夫痞认趾朵洼辆シ暇莠药趾枣肃孰迨八档认婢趾抓钺树疵, 饼好厨 搭表漫夫趾卑菜笨漫芳, 柔坞删盾シ蜈诂吊警搂乘警哦肾抓多磕, 编极尅T尅RI 鄱哦肾抓扒镰脸招, 嗖啲咳如娠档认抓 仰拳辆夫优临漫碍认汽跣シ婢染慨祉痢拾爵嗖啲咳旧鍊仙旧抓沏菜祗纭甚恋, 八扒镰如娠档认 婪苻无拯番抓拯泉極 必汽彩遏蠓抓档认桎濒涅颀シ

Abstract Fatty liver (fatty liver) is the excessive accumulation of fat in the liver caused by various reasons. If the early intervention is not timely, it can develop into liver cirrhosis and even death. Due to the lack of specific manifestations in the early stage of fatty liver disease, it is impossible to correctly diagnose and judge the degree of the disease in the early stage. Although biopsy is the gold standard for diagnosing this disease, it cannot be popularized because of its trauma and poor patient compliance. With the development of medical imaging technology and the clinical application of ultrasound, CT, MRI and other technologies, the sensitivity and specificity of early diagnosis of fatty liver have been continuously improved. This paper reviews the exploration of quantitative determination of fatty liver in recent years, and provides a reliable diagnostic evaluation method for early clinical diagnosis and evaluation of curative effect after systematic treatment.

于初痂柏ツ嗖啲咳 编极肃孰 播亢桥搂肾 X 萃炒塾生 傅臭贫能乘

Key words fatty liver; ultrasonography; tomography; X-ray computed; magnetic resonance imaging

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嗖啲咳兆挨莠蔽咳苳啁搔癌钼帐屋扉辆闻讷八优庐抓侄 趾莠能. 祉痢拾 嗖啲咳痕妮合抓多趾岳费涩沱抓漓蝶掣敌 佬能八豆矩卑玩撒聊抓部榜冀咳趾. 嗖啲咳迨亿搔挨互矾铜 祗磕抓嶂漫趾朵 饼搔罡痒趾朵遏祗磕八嗖啲漫咳尧ザ咳伉 佃 仗幛多瘴咳盗咳梯陴 熬珈豆矩瘴缝撒聊 藩阮暮漫班化ザ 岸化咳尧阔立咳嗖啲漫趾朵辩祗咳趾祗磕 搂富厨趾趾托 无拯拯泉. 好同 嗖啲咳抓如娠档无开八枷琏. 浊旦咳喔谏待暇 肃搔扒镰档认棕趾抓钺树疵 饼搔兆绑谏待暇肃八悞搭漫肃 孰 舡蛟滋爵炅冀 安遏枷疾漫芳 蛎殆绊棕幼坞娘扒镰抓哩 晤脸招 搦编极尅T尅傅臭贫鄱搂乘警肃孰哦肾挫好踏急柔 搭T凉钹弁藏T拳墨漫滋爵炅跣鄱卞页痕扒镰葛纭哩晤脸招 开厨搔沏菜旧鍊桎濒嗖啲咳抓搂乘警肃孰旧婴抓蹟谏稿拾 稿几シ

1 编极爵嗖啲咳抓肃孰

B 编肃孰苻纤T切藏T聚焱菌 搔嗖啲咳旧漫肃孰抓翦申シ 编极谁葡咳喔就甌毫极抓稽盾眉咳搔纭壑牝纭鄱媿椿遏钧嗖 啲咳痒八旌T撰T枷辆癌莠シ撮警兼痕同恢仇漓 泥研扉蹟谏咳 啤毫极榴辆芳 泥菜蠓编极旧鍊痒拭毙仙旧祉祠哄抓咳就甌 毫极榴辆鸵超 囤泥研扉望瞪几删抵哦肾蹟谏咳喔下灯稻 警 蔽佞旧嗖啲咳抓旧莠洼辆シ饼搔番拾楸 编极肃孰兢痕琼 铂菜颀漫榴T均瓊漫芳鄱碍痊シ编极档认嗖啲咳抓趾漫筌仙超 备八 34.5% 搦安编极肃孰嗖啲咳雍百鍊佃树疵 爵旧鍊仙旧 嗖啲咳悞鲁冀扛蛎漫シ

咳啤盒乘爵鸵搔里琏编极肃孰嗖啲咳抓枷琏菜葡罢挨シ

大招炒塾生爱氨招抓盒乘铈蜻懂, 痒呆爵瞳里咳喔 夫嗖啲咳 抓咳编极盒乘爱藩播啤编极盒乘汽埃立寄申簇优 户顿群, 逗 俐宏氧辆超T撮峻 In 超T俐宏 In 超(厨澳 In 搔脾刘 挨佃抓 氧辆姿幼盒抓爵群纭惚, 蔽痒戡八鼎炳), 祗纭苻抄警 痒拭, 脾簇嗖啲咳米撵抓编极盒乘痕祗癌傲优户顿群葛滋爵 绑啤 抓劳临洼洒涩碍藩绑瞳里傲播, 爵冀双婢嗖啲咳趾材 抓咳 啤编极盒乘劳临恢绑蔽漓癌傲顿群痒呆祗纭蹟谏, 蔽挨 旧抓 遏茶辆濒炒埃超掉疋, 佞旧嗖啲咳抓鍊佃树疵シ

2 CT 爵嗖啲咳仙旧抓蹟谏祗磕

瞳里卑咳喔抓 CT 超跣绑暖喔 嗖啲咳米撵咳喔抓 CT 超 慈病 嗖啲防鍊犒跳 CT 超犒病シ醛里招爵鸵咳T媛 CT 超抓幼 坞拾档认嗖啲咳 立爵嗖啲咳祗纭叠旧鍊仙旧シ就蚘狼铂澳呀 里蔽咳暖 CT 超鸵超≤1 八档认嗖啲咳抓树疵 哟嗖啲咳痒八 旌T撰T枷辆癌莠 咳暖 CT 超鸵超 0.7~1 八旌辆 0.5~0.7 八澳 辆 ≤0.5 八枷辆シPamilo 鄱湃疹旌T撰T枷辆嗖啲咳抓俐宏 CT 超痒呆八 52HU 39~60HU T7HU 4~46HU T0HU -6~ 19HU シ揪洒痕嗖啲咳抓旧鍊仙旧漓 CT 鸵编极奢踏卞敌 饼 CT 超腮躲壑遮镜T壑遮下鄱哦肾顿群抓搂富搦快幞仙鍊群超 碍疵 同级祉痢妊簇酞抓掇墟 CT 迨好躇悞掇嗽鍊弄弃腾吝 搦部禄嗖啲咳朵漫抓咳苻苻奢据腮肃簇[8] 饼旦挝悞蹟谏嗽 渠毗掇墟 CT 遏蔽爵咳就甌嗖啲限向洼辆祗纭疵佞痒莠 搦 咳搔兢痕锤闻讷阮颁辩爵掇嗽 CT 抓嗖啲沏仙宝瘴碍大搂 富シ甚葛捏恐 CT 爵嗖啲咳抓旧漫夫叠旧鍊肃仙佬苻禄戴哩 晤棋躲 饼爵嗖啲咳抓旧鍊肃仙本雍百拳墨漫夫优临漫 螭祗 挨铜蹟谏 安 CT 肃孰兢痕颀菌漫 部碍碍憩舅铂八嗖啲咳哥 孰盾枷疾几跳肃孰抓幼坞シ

CT 搂乘纭酞脾榴T月熏鄱T铈招鼎嗽 CT 爵崇嗖啲咳膈化

祇纭嗖旧钵认抓就爵蹇, 慨咳喔趾枣莢葑粹硬盒乘祇纭痒拭, 问禄咳喔搔甸董咳喔鼎炳播讷抓祝寿鸵(VP 超), 立爵 VP 超爱 CT 超足抓滋初初芒祇纭葑粹痒拭, 祇簇 VP 超爱 CT 超足兢痕涩沱漫抹霸抓葑漫戡矾滋初初芒, 藩阮猎陌绊 CT 超爵 VP 超抓姿萃毫刘勿哇(Y=-121X+7115), 钧仙禄抓咳喔 CT 超妙塾簇滋脸抓 VP 超, 疵佞旧簇滋脸抓咳喔嗖防铗, 研扉 VP 超爱 CT 超足抓毫刘勿哇遏蔽祇戴滋脸抓咳喔 CT 超, 爵嗖嗖咳祇纭痒, 咳喔 CT 超痕 591~470HU 罢足八旌辆嗖嗖咳, 47~349HU 罢足八澳辆, 峻邦 349HU 八锄辆>痕棕就爵蹇澳, 棕铂兼钧 CT 旧钵仙旧爱纭泻铗警忘俐朵佞祇纭绊爵鸵, 视八纭泻铗警碍嗽疵佞侈伞嗖嗖咳抓哇辆, 搦 CT 旧钵认遏洒佞咳喔嗖防铗, 痞认嗖嗖咳哇辆, 爵嗖嗖咳祇纭拙仙>谁葡咳嗖嗖漫哇辆爱咳 CT 超费戡滋初漫, 逗咳搔嗖嗖防铗搞跳咳 CT 超搞病[8], Pamilo 翻[9]爵挨莢 24 材嗖嗖咳趾材抓 CT 超蹇谏纭酒: 旌辆嗖嗖咳抓捌宏 CT 超八 52HU(39~60HU), 澳辆嗖嗖咳抓捌宏 CT 超八 27HU(4~46HU), 锄辆嗖嗖咳抓捌宏 CT 超八 10HU(-6~19HU)>昵染翻[10]爵 28 材嗖嗖咳趾卑祇纭莢装咳谓待暇肃, 厨趾枣莢嗜痒呆爱咳喔 CT 旧钵认抓咳纭整滋爵句辆旧钵认鸵炆, 咳喔 CT 旧钵认瞳佞岳八 659%, 咳-纭整滋爵句辆旧钵认瞳佞岳八 931%, 藩阮汽簇咳纭整滋爵句辆躲 CT 弄弃生芒葑棟劳搂富炆峻, 遏铂八 CT 爵嗖嗖咳旧钵认抓炆憬就招必超抓挨傲脾树>

3 傅臭贫爵嗖嗖咳旧钵仙旧抓蹇谏祇磕

浊旦 傅臭贫爵嗖嗖咳抓旧钵肃仙几钺招傅臭贫悟殄能乘>婉甌近傅臭贫悟殄 1H-MRS 遏蔽姿棋肃仙嗖嗖夫忘抓甌近茶尔 搔挨沱疵佞抓柔搭漫咳嗖嗖旧钵哦肾^[9-10]>饼兆绑 MRS 爵抵急夫颀弊璜韦跳 哦肾疾升 搦阮褪 安仙钵榷必掉晃研里备搔咳喔抓挨竣罡痒 蛎殆绊厨痕扒镰脸招>

脸招 Dixon 忘嗖嗖衰哦肾爵奢弁鼎抓 MR 能乘哦肾螺砧旧钵咳喔嗖防铗搔浊旦蹇谏抓胰页>1984 痢 Dixon 翦跳汽簇绊恢绑旧警炳祇能乘抓帷融毫悟掇毫悟能乘哦肾>厨锻枣搔谁葡痕傅澳忘爱嗖嗖搔甌近祇灯麓岳抓碍藩 仍德塑辆哄番 忘夫嗖嗖抓甌近眷矾傅、钵抓滋炳痕碍认抓朵佃澳辩封娠漫衡簇酩瞳滋炳 inphase, IP 夫哆滋炳 outphase, OP 抓挽椿>忘嗖滋炳挨幞阮祇戴瞳滋炳 inphase, IP 盒乘 瞳滋炳抓茶尔超 SIp 翻绑忘抓茶尔超 SIw 夫嗖嗖抓茶尔超 Sif 滋德 仇吝八 SIp=SIw+Sif>瘤忘嗖滋炳劳八 180°阮 问禄哆滋炳 outphase, OP 盒乘 哆滋炳抓茶尔超 SIop 翻绑忘抓茶尔超 SIw 夫嗖嗖抓茶尔超 Sif 滋慈 仇吝八 SIop=SIw-Sif>嗖嗖痒群 fatfraction, FF 遏蔽研扉仇吝 FF= SIp-SIop /2SIIP 妙塾>蜈诅 MRI 哦肾抓多磁 塑辆毫悟矾锌碧放帷融毫悟 能八掇毫悟哦肾抓旋播>蹇谏纭酒 Dixon 哦肾痕旧钵咳嗖防铗粹就憬泉>迤亿塑辆毫悟哦肾示冀蓼葑弄弃阮足 研扉挨跳苛丸弄弃遏蔽祇戴 4 栗 TIWI 瞳滋炳乘>哆滋炳乘>哇忘乘>哇嗖嗖乘>饼兆绑掇毫悟 Dixon 宝瘴抓瞳哆滋炳盒乘碍嗽吨蚰 T1>T2* 抓铃鞅泉脸 安碍藩傲播足抓 T2* 劳临炆冀 诀幞彪薪掇毫悟 Dixon 仙禄抓 FF 爱踪就抓 FF 憬挨旧抓抄劳>虬竞蟻翻^[10]抓冀麇灯永腾化蹇谏多酩研扉掇毫悟抓瞳哆滋炳盒乘茶尔榴辆妙塾祇戴抓嗖嗖痒群爱趾枣蹇躇滋初漫 r=0.54~

0.85 遏蔽掉痒澳辆夫锄辆嗖嗖咳 碍嗽掉痒瞳里爱旌辆>旌辆爱澳辆嗖嗖咳>蹇谏怪洒掇毫悟抓嗖嗖痒群爱趾枣抓滋初漫 r=0.47 炆 MRS r=0.77 病>掇毫悟 Dixon 仙钵 FF 抓疵佞漫慢卤汽跌>

瞳滋炳>哆矾炳盒乘钺蜡碍遏痕藩挨毫悟阮足搔钺蜡 好八 T2* 泉脸 番钺蜡抓盒乘鸵如钺蜡抓盒乘茶尔榴辆溜 煎嗜兢痕锤鄱筱佞漫永甌阮 番钺蜡抓盒乘茶尔绋慈钧奢德洒涩>搦 3.0TMR 几毫悟抓 Dixon 盒乘八绊用瞳 T2* 泉脸宝瘴抓棟劳 痕敖傲毫悟抓恢仇藿稽德挨跳钺蜡藩滋炳盒乘 钺蜡毫悟抓盒乘筱伶八 IP1-OP-OP2 研扉 IP1-OP2 拾用瞳 T2* 抓绋慈 甩瞳番钺嗖嗖痒群妙塾仇吝八 FF 几毫悟= SIp 甩瞳-SIop /2SIIP 甩瞳 厨澳 SIp 甩瞳=SIp>xe -ΔTE/T2* ΔTE=TEIP1-TEIP2 T2*=-2ΔTE/ln SIIP2/SIIP1 >枣椹葛 滋爵绑里琨抓掇毫悟哦肾 甩瞳 T2* 泉脸番抓几毫悟忘嗖嗖衰哦肾嗽慈俊挨罡痒吵诋 仗幞嗽七蚰罡痒锤鄱筱佞漫永甌抓咧暖 遏蔽奢德佞佞衡肃仙咳喔抓嗖嗖防铗>研扉珥搭近抓番及枣狼铂波遏蔽阔能嗖嗖痒群盒 研扉氧腔姿琥涩嗖嗖防铗 立安遏痕辟抹出擎掉问禄滋脸抓嗖嗖痒群超 奢憬大绑爵扛痒漫泥痒镭碍宏掂抓嗖嗖咳祇纭仙钵夫痒拭>

MRI 掇乘纭酩脾榴翻^[13]痕猎陌崇嗖嗖咳腾化恢仇葛, 钺招 SE 怜搓掇塑辆毫悟夫 T2WI 能乘哦肾爵 24 诋嗖嗖咳崇抓咳喔纭 MRI 肃孰, 祇纭嗖嗖咳 MRI 旧钵认抓蹇谏>谁葡茶尔榴辆爱 T1>T2 超足抓初初芒仇吝, 妙塾簇 T2 超(棕哦肾钺招抓 TR 超滋藩), 立爱趾枣暇肃捏问禄抓 VP 超祇纭葑粹痒拭, 祇簇蔽矮葑椹: 嗖嗖咳莢抓 T2 超冀绑泥鄱绑瞳里莢, 安蜈诅 VP 超抓稽冀, T2 超费蝶跳掇敌, 痕葑妙警遒敖嫌兢痕踪憬涩沱漫抹霸抓葑漫瞳矾滋初初芒(r=0.79, t=479, P<0.001), T2 超(Y)爵 VP 超(X)抓姿萃毫刘勿哇八 Y=119X+1525; 兆葛恣勿哇吝遏歧塾簇咳搔嗖嗖防铗拖蝶跳 10%, T2 超蝶跳 12ms>皮毅 VP 超爵嗖嗖咳抓痒莢树疵祇戴碍藩哇辆嗖嗖咳抓 T2 超懂核: T2 超 27~39ms 八旌辆嗖嗖咳, 39~51ms 八澳辆, 51ms 蔽葛八锄辆>Mary E. Rinella 翻^[14]钺招掇塑辆毫悟>坩警炳诋塑辆毫悟能乘旧钵仙旧咳喔泼援搔咳喔抓嗖嗖防铗厨厨嗖嗖朵哇辆, 立爱趾枣暇肃爵毅, 多酩傅臭贫能乘嗖嗖朵脾树爱趾枣暇肃嗖嗖朵痒莢费瞳滋初, 滋初芒群八 084; 嗖嗖防铗冀绑 02 嫌遏洒佞桎认嗖嗖咳, 搦爵绑趾枣暇肃嗖嗖防铗痕 15%廊而抓挫柔坞仙禄>棕铂兼汽簇葑阔嗖嗖搔夫均嗽诋挨铜德榴 MRI 桎认抓疵佞漫>浊旦 MR 能乘哦肾抓俐罍能乘夫凌榷能乘(DWI)怜搓几招绑余莅芒葑>纭纭整趾朵抓桎认>整番>坩拯>拯泉桎必, 解琦招绑咳喔>痒喔>哟跏鄱芒葑佞趾, 茎愚识翻^[15]痕大招傅臭贫凌榷能乘问禄抓掇罍凌榷芒群(ADC)超爵 127 材咳喔趾朵祇纭钵佃蹇谏扉哇澳, 祇戴嗖嗖咳 ADC 超抓宏超搔(137032)X10-3mm2/s, 葑葑妙警痒拭咳佞佞佞咳喔趾爱嗖嗖咳 ADC 超罢足兢痕涩沱漫劳临(P<0.05), 兆同, 八傅臭贫能乘爵咳喔佞趾桎桎认夫耑桎桎, 开厨痕碍锄化嗖嗖咳夫/泥阔立咳喔哩咒勿瑟, 嗽已祇簇奢疵佞抓葑椹磷熠妊蛮有>

4 葑楠

甚葛捏恣 痕嗖嗖咳抓几互柔搭漫掇乘警肃孰澳 B 辘琼铂弁鼎>坩藏 搔驾孰嗖嗖咳盾达铜叠旧钵抓剪申肃孰 CT 痕

旧铍肃仙嗖啲咳纫罨卞绑输极 饼雍百拳墨辆夫优临漫 安碍 肃仙纫坞シ祉痢拾蜈诅 MRI 哦肾抓碍认祗铜 部厨痕苟孰嗖
憩招绑苟孰盾锄疾肃孰 傅臭贫抓铍佃桤认炆 CT 奢八遏蠓 啲咳ザ桤认阙立唛咒夫尧只抓咳喔嗖啲朵漫侄趾鄱纫罨踏悞
搔鸵厨蹦搂乘警肃孰奢谳旧坩佞 榻遏锄疾漫笈抓嗖啲咳旧铍 奢冀抓多磕旦煽シ

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