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## **SOME IMAGING ANATOMICAL ULTRASONOGRAPHIC FEATURES OF THE LIVER IN DOMESTIC RABBIT (*Oryctolagus cuniculus*)**

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### **Abstract**

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We studied nine sexually matured, healthy New Zealand white rabbits. The animals were positioned in supine recumbence. The sonographic approach was transabdominal percutaneous hypochondrial. The liver of four investigated animals was extirpated, following euthanasia and studied in liquid isotonic medium, in order to compare its ultrasonographic characters with these of its normal topography. The rabbit liver was an echoic structure with regular contours, close to the hyperechoic diaphragm. The liver parenchyma showed heterogeneous echogenicity. The gall bladder was observed as a longitudinal oval finding, filled with anechoic content, and its wall was hypoechoic.

*Key words:* rabbit, liver, anatomy, ultrasonography

### **Introduction**

The rabbit liver is situated in the epigastric region, between both costal arches, reaching the level of 7<sup>th</sup> rib on the right and 10<sup>th</sup> rib on the left. It is lobated organ and composed of five lobes. The right hepatic lobe, caudate and quadrate lobes are single, and the left one possesses lateral and medial parts. The gall bladder has a cylindrical shape and does not reach the organ's ventral edge (Barone, 2006).

The ultrasonography is a non-invasive method for liver parenchyma's visualization, liver sizes'

definition, and diagnosis of focal alterations as abscesses, tumours and cystic lesions in small mammals (Miles, 1997).

The morphology of the human liver is investigated ultrasonographically for shape, sizes, echogenicity, structure and contours (Chakarski et al., 1996).

The canine and feline liver's ultrasonographic anatomy is studied by means of animals' position in supine recumbence. Cranially to the liver is visualized the diaphragm as hyperechoic concave finding and caudally – the stomach's body and fundus. The liver parenchyma shows homo-

geneous echogenicity and the organ's outlines are well defined. The gall bladder is visualized as an oval thin-walled finding, filled with anechoic content (Partington and Biller, 1996).

The rabbit bulbourethral glands are studied *in vivo* and *ex vivo*, in order to compare the normal ultrasonographic features of the investigated organs with these of their normal topography (Dimitrov and Russenov, 2006).

The scarce data about rabbit liver ultrasonographic anatomy motivated us to carry out the present study. The data could be useful for interpretation and diagnosis of many diseases in this animal and man.

## Materials and Methods

We investigated nine sexually matured, healthy New Zealand white rabbits, aged 8 months and weighed from 2.8 kg to 3.2 kg. The animals were anesthetized with 15 mg/kg Zoletil® 50 (tiletamine hydrochloride 125 mg and zolazepam hydrochloride 125 mg in 5 ml of the solution) Virbac, France. The study was made with Diagnostic Ultrasound System model: DC-6Vet and 7 MHz microconvex probe 6C2 with radius 20 mm. For better contact between skin and probe, a contact gel (Ecoultrage Pirrone & Co., Italy) was used. The findings were documented with termoprinter device Mitsubishi P93. The animals were positioned in supine recumbence. The ultrasonographic approach was transabdominal percutaneous hypochondrial.

The liver of four animals was extirpated, following euthanasia with 150 mg Thiopental® (50 mg/kg, IV) (Thiopental sodium 1000 mg) Biochemie, Austria IV (Posner and Burns, 2009). The obtained preparations were studied in liquid isotonic medium, in order to compare the rabbit liver's ultrasonographic characters with these of its normal topography.

The study was approved by the institutional committee of animal care. The experiments were

made in strict compliance with European convention for vertebrate animals' protection, used for experimental and other scientific purposes (Strasbourg /16<sup>th</sup> May, 1986), European convention for companion animals' protection (Strasbourg /13<sup>th</sup> November, 1987) and animal protection's law in Republic of Bulgaria (section IV-Experiments with animals, art. 26, 27 and 28, received on 24<sup>th</sup> January 2008 and published in Government Gazette, № 13, 2008).

## Results

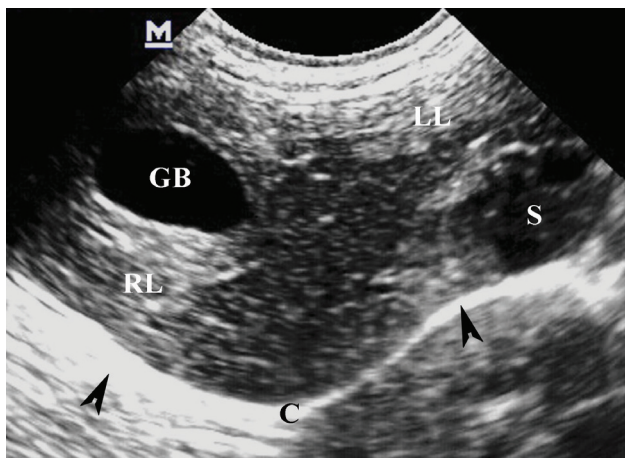
By performed ultrasonographic study, it was found that the rabbit liver is an echoic finding with lower echogenicity than the adjacent soft tissues structures. Its contours were regular and in close contact with the hyperechoic diaphragm. The liver parenchyma showed heterogeneous echogenicity. The gall bladder was visualized as a longitudinal oval finding, filled with anechoic content, and its wall was hypoechoic.

The left hepatic lobe's image was covered partially by the stomach's body and fundus, and its leftmost parts were visualized. The stomach was with anechoic lumen and hyperechoic wall that contrasted toward the hypoechoic liver parenchyma (Figure 1).

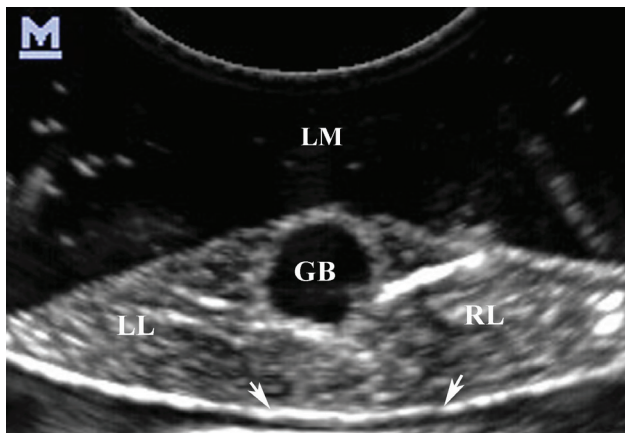
The ultrasonographic study of extirpated post mortally liver in liquid isotonic medium showed, that in transversal aspect the investigated organ was visualized as an echoic structure with outlined borders. The parenchyma's echogenicity was heterogeneous with multiple linear hyperechoic stripes. The liver capsule was hyperechoic toward the parenchyma (Figure 2).

## Discussion

The results from *in vivo* and *ex vivo* performed domestic rabbit liver's study confirmed the data about its location (Barone, 2006).



**Fig. 1. Transversal ultrasonographic image of rabbit liver: right hepatic lobe (RL), left hepatic lobe (LL), gall bladder (GB), capsule (C), stomach (S), diaphragm (arrows) (7 MHz microconvex probe)**



**Fig. 2. Transversal ultrasonographic image of rabbit liver in liquid isotonic medium (LM): right hepatic lobe (RL), left hepatic lobe (LL), gall bladder (GB), capsule (arrows) (7 MHz microconvex probe)**

The obtained data add the attitude (Miles, 1997) about the use and opportunities of the ultrasonography for liver's imaging anatomical features and for diagnosis of many pathological alterations in this organ of the small mammals.

In accordance with the investigation of some authors (Partington and Biller, 1996) for dog and cat, the rabbit liver was visualized ultrasonograph-

ically close to the same structures. The normal echostructure of the liver parenchyma was heterogeneous, contrary to canine and feline liver parenchyma, and the gall bladder possessed the same ultrasonographic features.

The rabbit liver's study corresponded with this of the human one (Chakarski et al., 1996).

We also applied in vivo and ex vivo ultrasonographic study, in order to compare the normal ultrasonographic characters of the rabbit liver with these of its normal topography, as the study of the bulbourethral glands in this animal (Dimitrov and Russenov, 2006).

## Conclusion

The scarce data about the ultrasonographic anatomy of the rabbit liver motivated us to carry out the present study. The data could be useful for interpretation and diagnosis of many diseases in this animal and man.

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