

# 処女,妊娠,泌乳および離乳期のマウス乳腺静脈の大きさの変化

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## Changes of Venous Size in Mouse Mammary Glands from Virgin through Pregnancy, Lactation, and Post-weaning

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The distribution of blood vessels and the relationship between the mammary tissue and blood vessels in mouse mammary glands have been investigated [1, 2, 4-8]. However, there are few reports concerning the measurement of the venous diameter in mammary gland. The purpose of this study is to investigate the changes in venous size in the 1st abdomino-inguinal mammary gland in female mice from the virgin through pregnancy, lactation, and post-weaning.

Ninety nine JCL-ICR female mice in stages of virgin (90 days of age), pregnancy (5, 10, 15, 19 days of pregnancy), lactation (0, 5, 10, 15, 20 days postpartum), and post-weaning (5, 10, 15, 20 days after weaning) were used. Each group in experiment stages consisted of 6 or more mice. The animals were killed and the *V. epigastrica caudalis superficialis*, *V. circumflexa ilium profunda*, *V. femoralis* of the left side, and the *V. cava caudalis* were carefully dissected and measured with a dissection microscope using the Forbes and Taku method [3]. By this technique, the external diameter of the *V. cava caudalis* was measured just cranial portion to the confluence of the *V. circumflexa ilium profunda*.

The average venous diameters of the virgin, pregnant, lactating and post-weaning mice are shown in Fig. 1. The external diameter of the *V. epigastrica caudalis superficialis*, which is one of the large veins draining the abdomino-inguinal mammary gland, was 300  $\mu\text{m}$  in virgin mice. It gradually became larger in the pregnant stage and reached its maximum size during the lactation, which was more than twice the size in the virgin stage. During the stage of post-weaning, the vein reduced to the size seen in an early

pregnancy, i.e., 354  $\mu\text{m}$ . The *V. circumflexa ilium profunda* showed the same tendency. The *V. femoralis* proximal to the *V. epigastrica caudalis superficialis* showed about 700  $\mu\text{m}$  in external diameter from 10th to 15th day of lactation. During the involution of the mammary gland, the diameter reduced to the size which was attained in an early pregnancy. However, the *V. femoralis* distal to the *V. epigastrica caudalis superficialis* was almost unchanged in size throughout the various experimental stages. The external diameter of the *V. cava caudalis* which was 1764  $\mu\text{m}$  in virgin mice, gradually increased during the pregnancy. It rapidly reduced in size on the first postpartum day, and then, attained the maximum, i.e., 2100  $\mu\text{m}$  on the 10th day of lactation.

Turner [9] reported for the bovine that a great quantity of blood is necessary to produce milk. Furthermore, decreases in venous blood pressure and flow are necessary for a sufficient absorption. Using a <sup>32</sup>P assay, Nishinakagawa [5] demonstrated that the blood flow in the mouse mammary gland increases in step with pregnancy, reaching its maximum rate on the 12th day of lactation, then decreases after weaning. Forbes and Taku [3] reported that the *V. cava caudalis* and *V. femoralis* are clearly larger during the lactation than in nonlactating mice. In our experiment, all the veins except the distal portion of the *V. femoralis* were especially enlarged during the lactation. The maintenance of size of the distal portion of the *V. femoralis* together with the increase in sizes of both proximal the *V. femoralis* and the *V. epigastrica caudalis superficialis* would certainly shunt more blood through the mammary gland. The dilations of these blood vessels support the concept that the additional blood circulation through the mammary gland is advantageous for milk production.

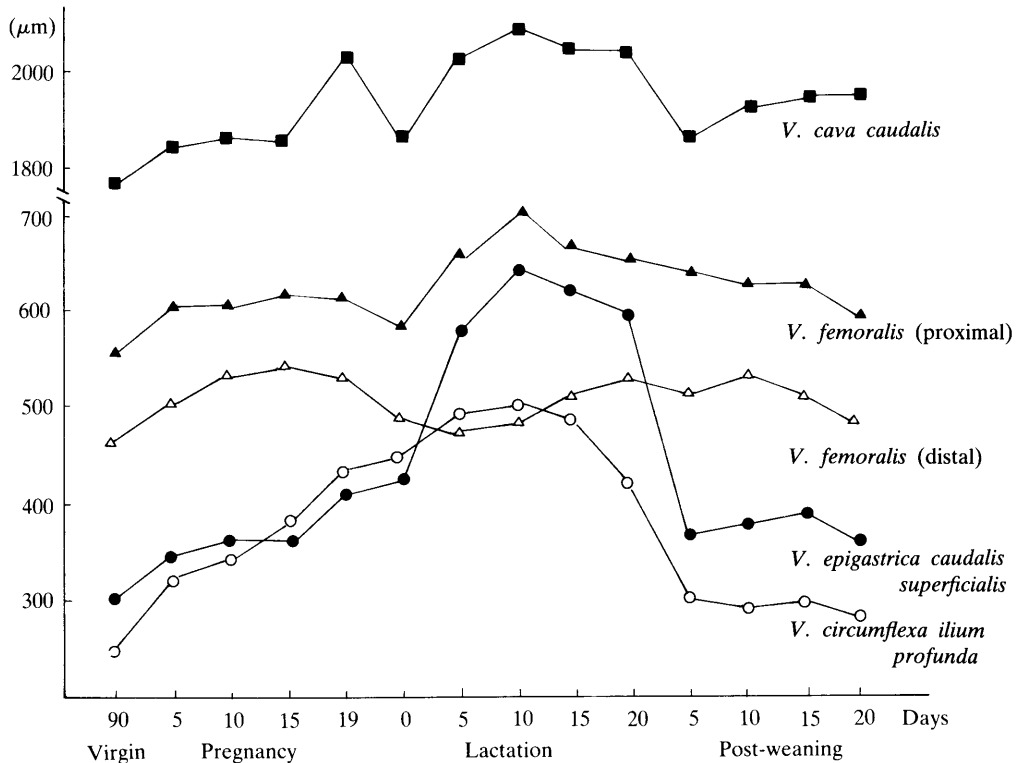


Fig. 1. Average vein diameters from virgin, pregnant, lactating and post-weaning mice.

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要 約

処女, 妊娠, 泌乳および離乳期のマウス乳腺静脈の大きさの変化(短報): 岩松 茂・西中川駿<sup>1)</sup>・大塚関一<sup>1)</sup> (長崎県北家畜保健衛生所, <sup>1)</sup>鹿児島大学農学部家畜解剖学教室)——マウス乳腺に分布する静脈の外径を, 処女, 妊娠, 泌乳および離乳期を通して, 実体顕微鏡下で計測した。腹鼠径部第一乳腺に分布する浅後腹壁および深腸骨回旋静脈の外径は, 妊娠に伴い徐々に大きくなり, 泌乳期で最大となり, 離乳期では著しく減少した。また, 後大静脈, 大腿静脈近位部もほぼ同じ傾向を示した。泌乳期で, 血管の外径が大きくなることは, 多量の血液が乳腺内を循環し, 乳の産生に関与していることが示唆された。