

**Color Doppler Ultrasound (US):
Basis, mapping and surveillance for hemodialysis access
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The role of ultrasound to assess blood vessel for the hemodialysis can be divided into three major categories. First is the evaluation of arterial and venous system before vascular access creation for hemodialysis. It is necessary to have a minimum diameter of artery and vein of 2 mm or more in order to make a well matured fistula and confirm that there is no vascular calcification or atheromatous plaque in the artery. Furthermore, veins must have continuous conduit with good distensibility. Secondly, it is the role of ultrasound in the everyday access surveillance. It is important to ensure adequate blood flow for maintaining adequate hemodialysis adequacy. If abnormality occurs functionally, it is impossible to maintain an appropriate blood flow rate because of frequent alarm sign for increased arterial pressure and venous pressure during dialysis. When abnormal findings are found in the physical examination, it is possible to detect the relevant causes of access dysfunction such as presence of stenosis, thrombosis, accessory or collateral vein in vascular access by ultrasound. For example, adequate dialysis can be performed by changing the puncture site based on the result of ultrasound. Also, it is possible to puncture access using ultrasound when traveling so deeply from the skin that the needling is difficult. The third is diagnosis and treatment of complications. For proper treatment it is important to evaluate the exact causes of access dysfunction, in this respect, ultrasound has a very important role. Ultrasound may proceed for morphological and functional evaluation. The morphological evaluation is performed by grasping morphological abnormalities such as access stenosis, thrombosis, running abnormality, etc. Functional evaluation is performed by using brachial artery blood flow and resistance index (RI, resistive index), Doppler pattern, and graft blood flow and the like. By combining these two evaluation results and the abnormality in the physical examination, it is possible to select the treatment target. In recent years, ultrasound guided angioplasty is increasing because of the burden of contrast medium and radiation exposure. Ultrasound is a powerful tool in the creation, management and treatment of hemodialysis vascular access. If the ultrasound is appropriately used, it is expected that it will be very helpful for the management of the hemodialysis vascular access which is the life line of the dialysis patient and the improvement of the prognosis for dialysis patients.