# OVARIAN CANCER: A DIAGNOSTICIAN'S DIRECTIVE
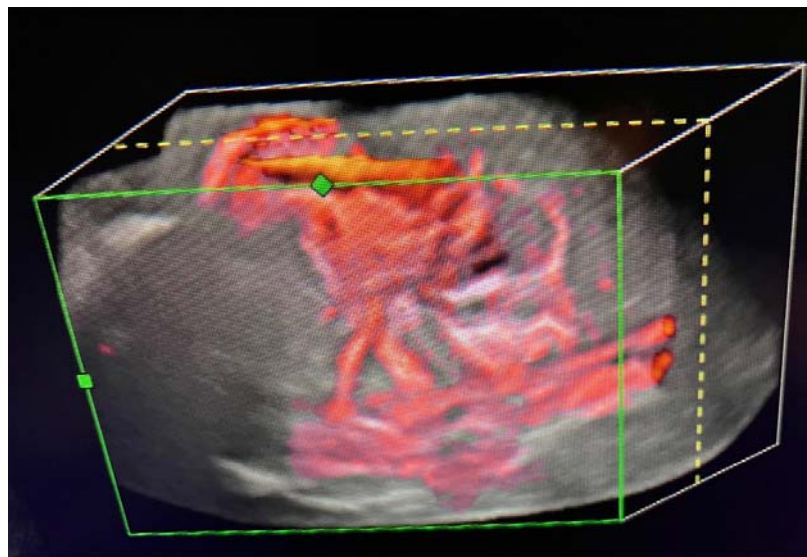By: Dr. Robert L. Bard

Ovarian Cancer continues to be identified as the "SILENT DISEASE" primarily due to its ability to remain undetected until it has metastasized. Often, metastasis goes to the liver and bones, starting off with a very small cystic area in the ovary. Ideally, we need specialized equipment that can show 3 and 4cm tiny cystic areas in an organ that normally has 2-3cm cysts where the mass often goes undetected. The way we accomplish this is to do high resolution ultrasound scans with 3D reconstruction and with Doppler blood vessel ultrasound imaging. Because a normal ovarian follicle cyst is clear and has no tumor vessels in it, we distinguish a benign normal ovulation cyst from a cyst that is suspicious and could grow or metastasize. We observe the lining of the cyst where a benign cystic area is smooth outside and inside, while a cancerous cyst has inner wall irregularity, thickening and possibly a serrated outside as well. More importantly, since tumor growth relies on feeding blood vessels we image the vascular network with the same ultrasound probe that finds the suspicious cystic area.
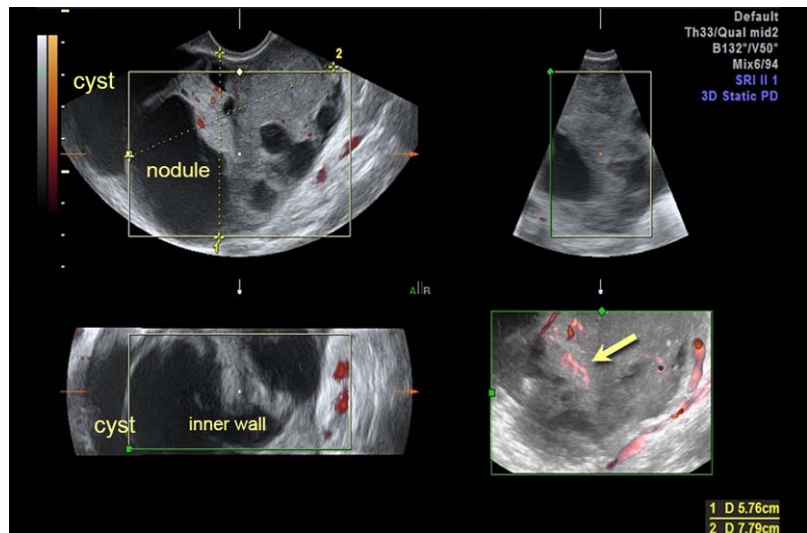


Initial screening for bloating shows a partly cystic / partly solid mass of 8cm in diameter with early vessel blood flow suggestive of suspicious nature (yellow arrow} on 3D ultrasound.

**TREATMENT WITH IMAGE GUIDANCE**
In 1980, my partner and I co-authored the first textbook on ultrasound of the pelvis, including gynecologic tumors. At that point, we could distinguish between a solid area and a benign fluid filled cyst. We were able to detect ovarian cysts (which are normal in the reproductive area). Technology continued to evolve with higher resolution scanning and 3D imaging 20 years ago that is used for scanning the faces of baby in the womb. One could visibly see the fingers and the nose as well. As this technology became more refined quantification of tumor vessels in the ovary became available about 10 years ago whereby the volumetric imaging of a tumor is able to see the entire 3D outline of a tumor and its malignant blood supply. This made it possible to find



3D Doppler Image Reconstruction: The tumor that was followed clinically has enlarged from 8cm to 12cm in five (5) months. The early neovascularity has increased from 2% to 11% of the volume. The irregular and tortuous feeding vessels now encompass the entire solid component of the previous partly cystic mass and extend further around the cyst wall.

out where the cancer was (and where it wasn't) as well as if and where it was spreading. By simply moving the probe to nearby areas tracking the ovarian pathology metastasis to the liver or lymph nodes allowed staging so

some MRI or nuclear scans were avoided. In some cases, bones involvement or lung fluid from metastatic disease is demonstrable.

Normal blood flow from tumor vessels is distinguished by specific velocity changes. Malignant flow graph is smoother while inflammatory blood vessels have a "spiky" graphic display. More importantly, in addition to seeing the abnormal circulation we measure the aggression by the number of tumor vessels in the area. An elevated number of tumor vessels in the area helps determine the level of treatment. Under continued monitoring, treatment success is measured by the reduction in vessel density.  Diagnostic imaging greatly assists in navigating the selected treatment modality as well as its dosage/intensity.

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