TESTS THAT MAY HELP INFORM A PERSONAL TREATMENT PLAN

	TEST TYPE	PURPOSE	WHEN	SAMPLE REQUIRED	LEAD TIME FOR RESULTS	PROS	CONS
Functional drug testing	**In vivo PDX mouse model (Patient Derived Xenograft)**	The patient's tumor cells are implanted in mice, where the tumors grow. Drugs are then tested on the mice to measure effectiveness.	At any resection	Fresh tumor tissue containing living cells*	6-18 months. Highly variable as not all tumors grow. Tumor must first grow and then be transplanted to other mice. Success rate for tumor growth is ~50-60%.	• May provide comparative data on drug effectiveness on patient tumor tissue. • May provide information of drug-drug synergies • Even if genetic testing doesn't reveal any actionable targets, you can test therapies recommended by your oncologist. • Clinically relevant treatment suggestions, independent of histology or genetic testing.	• Tumor tissue may not grow successfully in the mice. • Long lead time • Expensive • Results dependent on which mouse model is used for implantation. (*e.g.* Many mouse models are not immunocompetent and therefore Immunotherapy drugs cannot be evaluated.) • Results ex vivo may not translate to humans; does not account for tumor microenvironment factors. • Does not support high-throughput drug testing.
	3D Tumor Organoid Models	Patient's tumor cells are added to a mixture of proteins that solidifies to a jello like substance, allowing the tumor cells to grow in in a 3D model and recapitulate the structure of cells that grow in the body. Drugs are then tested on the organoid to measure effectiveness.	At any resection	Fresh tumor tissue containing living cells*	1-6 weeks	• May provide comparative data on drug effectiveness on patient tumor tissue. • Feasible to test antibodies against a tumor target. • Many components of the microenvironment are incorporated into the testing which can account for proliferation and survival. • May provide information of drug drug synergies • Even if genetic testing doesn't reveal any actionable targets, you can test therapies recommended by your oncologist. • Clinically relevant treatment suggestions, independent of histology or genetic testing. • Tests against medium to large panels of drugs (~40-500) • Faster turnaround than PDX.	• Tumor tissue may not grow successfully into an organoid. • Immunotherapy drugs are more challenging to evaluate and the ability to test is dependent on the model. • Results ex vivo may not translate to humans; does not account for tumor microenvironment factors. • Test method lacks a microenvironment (how tumor cells interact with other cells in the tumor and surrounding tissue) which contributes to essential cellular functions in migration proliferation, differentiation and survival.
	2D Cell Line Models	Patient's tumor tissue is slightly modified to adhere to a solid surface, then tested in vitro against a panel of drugs to determine which are most effective against cancer cells while least toxic to healthy cells	At any resection	Fresh tumor tissue containing living cells*	1 month or longer	• May provide comparative data on drug effectiveness on patient tumor tissue. • May provide information of drug drug synergies • Even if genetic testing doesn't reveal any actionable targets, you can test therapies recommended by your oncologist. • Clinically relevant treatment suggestions, independent of histology or genetic testing. • Supports high throughput drug testing. (200+) • Faster turnaround than PDX. • Report highlights drugs that not only kill cancer cells but minimize toxicity to healthy cells.	• Immunotherapy drugs and antibodies cannot be tested. • Results ex vivo may not translate to humans; does not account for tumor microenvironment factors. • Test method lacks many crucial signaling factors, such as cell-cell and cell-matrix interactions, which contribute to essential cellular functions in proliferation, differentiation and survival. • Often used as a research tool and further testing may be required

*Tissue can be usually sent either fresh or viably frozen (i.e. frozen in a manner that preserves cells so that they are viable when properly thawed). It is important to coordinate with the receiving laboratory.

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