MSD® Liver Injury Panel 1 (rat) Assay Kit

For quantitative determination in rat serum and plasma

Alzheimer's Disease
BioProcess
Cardiac
Cell Signaling
Clinical Immunology
Cytokines
Hypoxia
Immunogenicity
Inflammation
Metabolic
Oncology
Toxicology
Vascular

Catalog Numbers

Liver Injury Panel 1 (rat) Assay Kit	
Kit size	
1 plate	K15187D-1
5 plates	K15187D-2
25 plates	K15187D-4

Arginase-1, also known as **Liver Type Arginase,** is the final enzyme of the urea cycle.[1] It is a ubiquitous cytosolic enzyme expressed at high levels in the liver of ureotelic animals and plays a key role in the disposal of excess nitrogen from amino acid and nucleotide metabolism. **Alpha Glutathione S-Transferase (αGST)** is a detoxification enzyme that catalyzes the conjugation of toxins to GST.[2] Both Arginase-1 and αGST have recently gained attention from the toxicology community due to their high levels in the liver, rapid release in the blood stream following liver injury, and short half-life in plasma.[3-6] These collective advantages may justify their use as alternative liver injury biomarkers over the conventional markers, alanine amino transferase (ALT) and aspartate amino transferase (AST). ALT and AST are widely distributed in a variety of tissues, and their elevated concentrations do not necessarily indicate hepatic disorder.[3,7] Arginase-1 and αGST offer an advantage in drug safety testing since they are found in the serum and plasma of both rats and humans; suggesting that they can be used to bridge pre-clinical and clinical studies.[7]

The MSD Liver Injury Panel 1 (rat) Assay is available on 96-well 4-spot plate. This datasheet outlines the performance of the assay.

Assay Sensitivity

	Arginase-1 (ng/mL)	αGST (ng/mL)
LLOD	0.032	0.42

The lower limit of detection (LLOD) is the calculated concentration of the signal that is 2.5 standard deviations over the zero calibrator.

MSD Advantage

- ➤ **Mutiplexing:** Multiple analytes can be measured in one well using typical sample volumes of 25 µL or less without compromising speed or performance
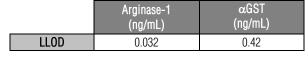- ➤ **Large dynamic range**: Linear range of up to five logs enables the measurement of native levels of biomarkers in normal and diseased samples without multiple dilutions
- ➤ **Minimal background:** The stimulation mechanism (electricity) is decoupled from the signal (light)
- ➤ **Simple protocols:** Only labels near the electrode surface are detected, enabling assays with fewer washes
- ➤ **Flexibility:** Labels are stable, non-radioactive, and conveniently conjugated to biological molecules
- ➤ **High sensitivity and precision:** Multiple excitation cycles of each label enhance light levels and improve sensitivity

For a complete list of products, please visit our website at www.mesoscale.com
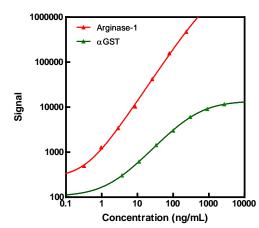
Typical Standard Curve

The following standard curves are an example of the dynamic range of the Liver Injury Panel 1 (rat) Assay.

Arginase-1			αGST		
Conc. (ng/mL)	Average Signal	%CV	Conc. (ng/mL)	Average Signal	%CV
0	99	10.0	0	127	7.3
0.32	496	6.1	3.7	304	9.0
0.96	1280	10.4	11	617	7.2
2.9	3416	1.3	33	1432	2.8
8.7	10352	1.4	100	3012	4.6
26	41933	5.0	300	6072	3.0
78	157125	4.7	901	9114	2.1
234	473734	6.5	2703	11623	2.7

Linearity

To assess linearity, serum, EDTA plasma, and heparin plasma samples were diluted 2.5-fold, 5-fold, 10-fold, and 20-fold prior to testing. The concentrations shown below have been corrected for dilution (concentration = measured x dilution factor). Percent recovery is calculated as the measured concentration divided by the concentration measured from the previous dilution (expected).

% Recovery = (measured x dilution factor) / expected x 100

Sample	Fold Dilution	Arginase-1			αGST		
		Conc. (ng/mL)	Conc. %CV	% Recovery	Conc. (ng/mL)	Conc. %CV	% Recovery
Serum	2.5	4.8	9.8		129	2.1	
	5	5.8	13.4	120	143	5.4	111
	10	5.9	5.2	102	140	6.9	98
	20	<LLOD	-	-	121	10.6	86
EDTA Plasma	2.5	4.5	0.4		32	2.4	
	5	4.9	14.3	108	33	3.3	102
	10	5.7	4.2	116	33	0.4	103
	20	<LLOD	-	-	32	2.9	96
Heparin Plasma	2.5	2.1	8.3		48	6.9	
	5	2.5	7.7	121	55	6.0	115
	10	2.6	2.7	102	<LLOD	-	-
	20	<LLOD	-	-	<LLOD	-	-

Spike Recovery

Normal serum, EDTA plasma, and heparin plasma were spiked with the calibrators at multiple levels throughout the range of the assay. The samples were diluted 5-fold and then spiked with calibrator at the levels indicated in the table below.

% Recovery = measured / expected x 100

Sample	Arginase-1				αGST			
	Spike Conc. (ng/mL)	Measured Conc. (ng/mL)	Measured Conc. %CV	% Recovery	Spike Conc. (ng/mL)	Measured Conc. (ng/mL)	Measured Conc. %CV	% Recovery
Serum 1	0	0.85	0.2		0	14	4.2	
	2.9	4.1	3.8	108	34	49	6.4	103
	12	12	1.6	98	135	140	3.9	94
	23	25	1.1	102	270	299	3.1	105
	47	52	7.2	108	541	519	13.0	94
	94	120	4.0	127	1081	945	1.9	86
Serum 2	0	1.1	8.8		0	27	1.4	
	2.9	3.6	0.1	90	34	62	0.9	101
	12	12	1.6	91	135	150	1.8	92
	23	23	0.1	92	270	281	0.7	95
	47	44	0.5	92	541	530	0.3	93
	94	98	1.5	104	1081	914	5.5	82
EDTA Plasma 1	0	1.1	12.8		0	6.7	0.9	
	2.9	3.5	9.1	86	34	33	3.8	83
	12	10	3.3	78	135	94	6.1	66
	23	18	8.8	73	270	171	9.7	62
	47	37	18.6	77	541	298	8.0	54
	94	71	18.7	75	1081	478	6.2	44
EDTA Plasma 2	0	0.51	4.0		0	4.8	5.6	
	2.9	2.6	6.6	74	34	29	10.1	76
	12	10	1.6	84	135	103	0.8	74
	23	20	13.3	83	270	181	2.6	66
	47	38	5.6	80	541	322	8.4	59
	94	72	6.2	77	1081	516	1.9	48
Heparin Plasma 1	0	0.46	5.3		0	9.5	0.7	
	2.9	3.4	1.2	100	34	41	5.4	94
	12	11	5.2	90	135	113	0.4	78
	23	20	0.4	85	270	223	6.0	80
	47	47	2.5	99	541	433	4.0	79
	94	103	0.2	109	1081	850	1.0	78
Heparin Plasma 2	0	0.76	6.9		0	12	5.8	
	2.9	3.6	3.3	97	34	40	0.3	88
	12	11	1.9	91	135	106	3.1	72
	23	24	9.9	99	270	209	9.1	74
	47	53	2.6	111	541	410	1.8	74
	94	117	4.2	124	1081	701	4.7	64

MSD Toxicology Assays

Precision

Control samples for each analyte were measured on each plate. Controls were made by spiking high, mid, and low (no spike) levels of calibrators into rat heparin plasma. They were run in duplicate on each of 12 plates run across multiple days (n=10). The concentrations shown below have not been corrected for dilution.

Average intra-plate %CV is the average %CV of the control replicates within an individual plate.

Inter-plate %CV is the variability of controls across 12 plates over 10 days.

	Control	Plates	Average Conc. (ng/mL)	Average Intra-plate %CV	Inter-plate %CV
Arginase-1	High	12	97	4.0	9.3
	Mid	12	12	6.7	11.3
	Low	12	0.87	4.5	11.0
αGST	High	12	823	11.4	10.3
	Mid	12	140	4.1	9.7
	Low	12	11	5.2	10.4

Samples

Serum, EDTA plasma, and heparin plasma samples collected from normal Sprague-Dawley rats were tested at 5-fold dilution on the Liver Injury Panel 1 (rat) Assay. Shown below are the median and range of concentrations for each sample set. Concentrations have been corrected for sample dilution.

Sample	Statistic	Arginase-1	αGST
Serum	Median (ng/mL)	22	642
	Range (ng/mL)	3.6-109	44-1826
	N	8	8
EDTA Plasma	Median (ng/mL)	4.7	52
	Range (ng/mL)	1.5-12	25-310
	N	8	7
Heparin Plasma	Median (ng/mL)	3.2	46
	Range (ng/mL)	2.2-7.9	21-176
	N	8	8

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