

Supplementary Table 1. Results of univariate analyses on severe LFT toxicities.

	Any Toxicity			Albumin Toxicity			ALP Toxicity			Total Bilirubin Toxicity	
	OR	p		OR	p		OR	p		OR	p
Sex (Male)	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>			<i>Reference</i>	
Female	0.615	0.381		0.611	0.475		0.684	0.523		0.551	0.438
Race (White)	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>			<i>Reference</i>	
Black	0.524	0.352		0.658	0.616		0.404	0.263		0.364	0.359
Primary Diagnosis											
Colorectal adenocarcinoma	4.213	0.022		2.545	0.201		4.552	0.030		3.265	0.164
Neuroendocrine	<i>Not Available¹</i>			<i>Not Available</i>			<i>Not Available</i>			<i>Not Available</i>	
Cholangiocarcinoma	0.713	0.764		<i>Not Available</i>			<i>Not Available</i>			1.886	0.586
Other primaries	0.808	0.763		1.846	0.417		1.091	0.904		0.533	0.570
Liver steatosis	0.422	0.432		<i>Not Available</i>			0.548	0.586		<i>Not Available</i>	
Karnofsky Performance Status	0.967	0.179		0.978	0.454		0.953	0.067		0.988	0.710
KPS < 80 vs. KPS ≥ 80	2.418	0.206		1.667	0.556		3.314	0.093		0.871	0.902
Child-Pugh Class A or B	0.906	0.932		<i>Not Available</i>			1.173	0.890		2.393	0.462
MELD score	1.364	0.068		1.235	0.291		1.235	0.239		1.625	0.020
Pre-treatment hemoglobin	3.467	0.047		9.265	0.040		6.581	0.019		1.447	0.630
Pre-treatment WBC											
High	2.443	0.258		2.625	0.283		3.273	0.139		3.611	0.163
Low	<i>Not Available</i>			<i>Not Available</i>			<i>Not Available</i>			<i>Not Available</i>	
Pre-treatment platelets	<i>Not Available</i>			<i>Not Available</i>			<i>Not Available</i>			<i>Not Available</i>	
Pre-treatment creatinine	0.906	0.932		1.806	0.615		1.173	0.890		2.393	0.462
Pre-treatment INR	9.231	0.016		4.062	0.137		5.636	0.049		5.583	0.075
Pre-treatment albumin	33.600	0.001		<i>Not Available</i>			<i>Not Available</i>			10.138	0.035
Pre-treatment AST	3.552	0.032		5.517	0.039		3.519	0.050		3.871	0.112
Pre-treatment ALT	1.600	0.482		2.260	0.286		0.736	0.711		0.637	0.685
Pre-treatment ALP	12.343	0.018		<i>Not Available</i>			9.237	0.037		4.295	0.184
Pre-treatment total bilirubin	13.071	0.031		8.375	0.047		5.250	0.114		11.500	0.025
Age at treatment	0.976	0.328		0.995	0.866		0.974	0.327		1.014	0.691
Time between initial primary diagnosis and treatment	1.000	0.297		1.000	0.728		1.000	0.260		1.000	0.599
Time between hepatic malignancy diagnosis and treatment	1.000	0.842		1.000	0.374		1.000	0.829		1.000	0.796
< 65 vs. ≥ 65	0.813	0.729		1.424	0.611		0.782	0.704		1.252	0.771
Body Mass Index	0.960	0.520		1.005	0.943		0.960	0.549		1.030	0.720
Body Surface Area	2.588	0.404		6.617	0.172		2.003	0.570		1.853	0.689
Number of lesions (< 10 vs. ≥ 10)	0.897	0.881		0.759	0.747		1.222	0.809		0.273	0.107
Maximum primary index tumor size	1.005	0.439		1.006	0.384		1.000	0.964		1.002	0.830

Sum of 2 max primary index tumors	1.007	0.234		1.007	0.258		1.005	0.357		1.003	0.655
Number of Treatments	0.565	0.123		0.898	0.799		0.559	0.147		0.653	0.389
Total liver volume	1.000	0.945		1.000	0.880		1.000	0.751		1.000	0.933
Total tumor volume	1.000	0.977		1.000	0.737		1.000	0.937		0.999	0.584
% total tumor volume	1.008	0.739		1.015	0.584		1.010	0.692		0.983	0.626
Total tumor volume < 25% vs. ≥ 25%	1.160	0.820		1.684	0.489		1.600	0.482		1.244	0.801
Treated liver volume	1.000	0.956		1.000	0.813		1.000	0.735		1.000	0.865
% liver treated	1.001	0.948		0.977	0.242		1.016	0.385		1.001	0.947
Treated tumor volume	1.000	0.905		1.000	0.697		1.000	0.852		1.000	0.765
% treated tumor volume	1.006	0.681		1.014	0.458		1.002	0.924		0.993	0.779
Treated tumor volume < 25% vs. ≥ 25%	1.709	0.362		2.039	0.311		1.701	0.397		0.912	0.915
Lung shunt	0.892	0.199		0.867	0.226		0.932	0.428		0.995	0.799
Yttrium-90 Dose											
Calculated dose	1.005	0.852		0.997	0.936		1.016	0.598		0.944	0.178
Unadjusted	1.020	0.503		1.057	0.136		1.000	0.990		0.943	0.150
Administered dose	0.997	0.906		0.991	0.784		1.003	0.911		0.933	0.099
Unadjusted	1.006	0.812		1.042	0.239		0.985	0.575		0.951	0.129
Dose to lung	0.824	0.266		0.671	0.124		0.918	0.626		0.961	0.854
Dose to treated liver	1.009	0.622		1.004	0.857		1.021	0.286		0.953	0.091
Dose to entire liver	1.003	0.890		0.975	0.422		1.025	0.355		0.955	0.211
Intra-Procedural Complications											
None	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>			<i>Reference</i>	
Intra-procedural stasis	1.469	0.610		1.687	0.551		1.987	0.370		0.873	0.904
Intra-procedural reflux	<i>Not Available</i>			<i>Not Available</i>			<i>Not Available</i>			<i>Not Available</i>	
3 Month RECIST Radiographic Response	1.912	0.278		1.036	0.955		1.933	0.311		2.873	0.214
6 Month RECIST Radiographic Response	0.708	0.647		<i>Not Available</i>			0.717	0.714		0.726	0.799

¹Variables marked as *Not Available* were excluded from multivariate analysis due to non-convergence and a resultant inability to calculate odds ratios and determine significance.

KPS = Karnofsky Performance Status; MELD = Model for End-Stage Liver Disease; WBC = White Blood Cell; INR = International Normalized Ratio; AST = Aspartate Aminotransferase; ALT = Alanine Aminotransferase; ALP = Alkaline Phosphatase; RECIST = Radiographic Evaluation Criteria in Solid Tumors; LFT = Liver Function Test

Supplementary Table 2. Univariate analyses of treatment type on toxicity incidence.

	Binary Logistic Regression	
	OR	p
Post-Embolization Syndrome	1.129	0.756
No Constitutional Toxicity	1.013	0.961
Fatigue	0.989	0.966
Weight loss	0.437	0.243
Weakness	1.129	0.756
Fever	0.752	0.599
Loss of Appetite	0.826	0.590
Malaise	0.669	0.510
Chills	0.561	0.567
Flu-like	0.870	0.828
No Gastrointestinal Toxicity	1.312	0.311
Abdominal Pain	0.943	0.829
Nausea	0.728	0.302
Emesis	1.093	0.828
Diarrhea	0.366	0.306
Constipation	0.978	0.966
Abdominal Cramps	<i>Not Available¹</i>	
No Hepatic Toxicity	1.410	0.204

Ascites	<i>Not Available</i>	
Jaundice	<i>Not Available</i>	
Encephalopathy	<i>Not Available</i>	
INR	<i>Not Available</i>	
Albumin	0.522	0.061
Aspartate Aminotransferase	0.704	0.447
Alkaline Phosphatase	1.268	0.419
Total Bilirubin	0.754	0.409

¹Variables marked as *Not Available* were non-convergent, and odds ratios and significance could not be calculated.

INR = International Normalized Ratio; n = number; tot = total potential treatments; OR = odds ratio; p = significance value

Supplementary Table 3a. Univariate analyses of any severe LFT toxicity on clinical toxicity incidence.

	Total				No Toxicity				Severe Toxicity			Binary Logistic Regression	
	n	tot	%		n	tot	%		n	tot	%	OR	p
Post-Embolization Syndrome	11	79	13.92		11	62	17.74		0	17	0.00	<i>Not Available</i> ¹	
No Constitutional Toxicity	37	79	46.84		30	62	48.39		7	17	41.18	0.747	0.598
Fatigue	37	79	46.84		28	62	45.16		9	17	52.94	1.366	0.570
Weight loss	4	79	5.06		1	62	1.61		3	17	17.65	13.071	0.031
Weakness	10	79	12.66		7	62	11.29		3	17	17.65	1.684	0.489
Fever	6	79	7.59		3	62	4.84		3	17	17.65	4.214	0.098
Loss of Appetite	13	79	16.46		8	62	12.90		5	17	29.41	2.812	0.113
Malaise	5	79	6.33		4	62	6.45		1	17	5.88	0.906	0.932
Chills	2	79	2.53		1	62	1.61		1	17	5.88	3.812	0.353
Flu-like	4	79	5.06		4	62	6.45		0	17	0.00	<i>Not Available</i>	
No Gastrointestinal Toxicity	36	79	45.57		35	62	56.45		1	17	5.88	0.048	0.004
Abdominal Pain	31	79	39.24		19	62	30.65		12	17	70.59	5.432	0.005
Nausea	20	79	25.32		14	62	22.58		6	17	35.29	1.870	0.290
Emesis	10	79	12.66		7	62	11.29		3	17	17.65	1.684	0.489
Diarrhea	2	79	2.53		2	62	3.23		0	17	0.00	<i>Not Available</i>	
Constipation	6	79	7.59		3	62	4.84		3	17	17.65	4.214	0.098
Abdominal Cramps	1	79	1.27		0	62	0.00		1	17	5.88	<i>Not Available</i>	
No Hepatic Toxicity	43	79	54.43		43	62	69.35		0	17	0.00	<i>Not Available</i>	
Ascites	1	79	1.27		0	62	0.00		1	17	5.88	<i>Not Available</i>	
Jaundice	2	79	2.53		1	62	1.61		1	17	5.88	3.812	0.353

¹Variables marked as *Not Available* were non-convergent, and odds ratios and significance could not be calculated.

n = number; tot = total potential treatments; OR = odds ratio; p = significance value

Supplementary Table 3b. Univariate analyses of severe albumin toxicity on clinical toxicity incidence.

	Total				No Toxicity				Severe Toxicity			Binary Logistic Regression	
	n	tot	%		n	tot	%		n	tot	%	OR	p
Post-Embolization Syndrome	11	79	13.92		11	69	15.94		0	10	0.00	<i>Not Available</i> *	
No Constitutional Toxicity	37	79	46.84		32	69	46.38		5	10	50.00	1.156	0.830
Fatigue	37	79	46.84		33	69	47.83		4	10	40.00	0.727	0.644
Weight loss	4	79	5.06		1	69	1.45		3	10	30.00	29.143	0.006
Weakness	10	79	12.66		8	69	11.59		2	10	20.00	1.906	0.461
Fever	6	79	7.59		5	69	7.25		1	10	10.00	1.422	0.760
Loss of Appetite	13	79	16.46		11	69	15.94		2	10	20.00	1.318	0.747

Malaise	5	79	6.33	4	69	5.80	1	10	10.00	1.806	0.615
Chills	2	79	2.53	1	69	1.45	1	10	10.00	7.556	0.165
Flu-like	4	79	5.06	4	69	5.80	0	10	0.00	Not Available	
No Gastrointestinal Toxicity	36	79	45.57	36	69	52.17	0	10	0.00	Not Available	
Abdominal Pain	31	79	39.24	23	69	33.33	8	10	80.00	8.000	0.012
Nausea	20	79	25.32	18	69	26.09	2	10	20.00	0.708	0.680
Emesis	10	79	12.66	8	69	11.59	2	10	20.00	1.906	0.461
Diarrhea	2	79	2.53	2	69	2.90	0	10	0.00	Not Available	
Constipation	6	79	7.59	5	69	7.25	1	10	10.00	1.422	0.760
Abdominal Cramps	1	79	1.27	1	69	1.45	0	10	0.00	Not Available	
No Hepatic Toxicity	43	79	54.43	43	69	62.32	0	10	0.00	Not Available	
Ascites	1	79	1.27	0	69	0.00	1	10	10.00	Not Available	
Jaundice	2	79	2.53	1	69	1.45	1	10	10.00	7.556	0.165

Supplementary Table 3c. Univariate analyses of severe total bilirubin toxicity on clinical toxicity incidence.

	Total				No Toxicity				Severe Toxicity			Binary Logistic Regression	
	n	tot	%		n	tot	%		n	tot	%	OR	p
Post-Embolization Syndrome	11	79	13.92		11	71	15.49		0	8	0.00	Not Available*	
No Constitutional Toxicity	37	79	46.84		35	71	49.30		2	8	25.00	0.343	0.208
Fatigue	37	79	46.84		32	71	45.07		5	8	62.50	2.031	0.356
Weight loss	4	79	5.06		3	71	4.23		1	8	12.50	3.238	0.336
Weakness	10	79	12.66		8	71	11.27		2	8	25.00	2.625	0.283
Fever	6	79	7.59		5	71	7.04		1	8	12.50	1.886	0.586
Loss of Appetite	13	79	16.46		10	71	14.08		3	8	37.50	3.660	0.107
Malaise	5	79	6.33		5	71	7.04		0	8	0.00	Not Available	
Chills	2	79	2.53		2	71	2.82		0	8	0.00	Not Available	
Flu-like	4	79	5.06		4	71	5.63		0	8	0.00	Not Available	
No Gastrointestinal Toxicity	36	79	45.57		36	71	50.70		0	8	0.00	Not Available	
Abdominal Pain	31	79	39.24		24	71	33.80		7	8	87.50	13.708	0.017
Nausea	20	79	25.32		18	71	25.35		2	8	25.00	0.981	0.983
Emesis	10	79	12.66		9	71	12.68		1	8	12.50	0.984	0.989
Diarrhea	2	79	2.53		2	71	2.82		0	8	0.00	Not Available	
Constipation	6	79	7.59		6	71	8.45		0	8	0.00	Not Available	
Abdominal Cramps	1	79	1.27		0	71	0.00		1	8	12.50	Not Available	
No Hepatic Toxicity	43	79	54.43		43	71	60.56		0	8	0.00	Not Available	
Ascites	1	79	1.27		1	71	1.41		0	8	0.00	Not Available	

Jaundice	2	79	2.53	1	71	1.41	1	8	12.50	10.000	0.117
----------	---	----	------	---	----	------	---	---	-------	--------	-------

Supplementary Table 3d. Univariate analyses of severe alkaline phosphatase toxicity on clinical toxicity incidence.

	Total				No Toxicity				Severe Toxicity				Binary Logistic Regression	
	n	tot	%		n	tot	%		n	tot	%		OR	p
Post-Embolization Syndrome	11	79	13.92		11	65	16.92		0	14	0.00		<i>Not Available*</i>	
No Constitutional Toxicity	37	79	46.84		30	65	46.15		7	14	50.00		1.167	0.794
Fatigue	37	79	46.84		30	65	46.15		7	14	50.00		1.167	0.794
Weight loss	4	79	5.06		3	65	4.62		1	14	7.14		1.590	0.698
Weakness	10	79	12.66		7	65	10.77		3	14	21.43		2.260	0.286
Fever	6	79	7.59		5	65	7.69		1	14	7.14		0.923	0.944
Loss of Appetite	14	79	17.72		9	65	13.85		5	14	35.71		2.489	0.188
Malaise	5	79	6.33		5	65	7.69		0	14	0.00		<i>Not Available</i>	
Chills	2	79	2.53		2	65	3.08		0	14	0.00		<i>Not Available</i>	
Flu-like	4	79	5.06		4	65	6.15		0	14	0.00		<i>Not Available</i>	
No Gastrointestinal Toxicity	36	79	45.57		35	65	53.85		1	14	7.14		0.066	0.011
Abdominal Pain	31	79	39.24		21	65	32.31		10	14	71.43		5.238	0.011
Nausea	20	79	25.32		15	65	23.08		5	14	35.71		1.852	0.329
Emesis	10	79	12.66		8	65	12.31		2	14	14.29		1.187	0.840
Diarrhea	2	79	2.53		2	65	3.08		0	14	0.00		<i>Not Available</i>	
Constipation	6	79	7.59		4	65	6.15		2	14	14.29		2.542	0.312
Abdominal Cramps	1	79	1.27		0	65	0.00		1	14	7.14		<i>Not Available</i>	
No Hepatic Toxicity	43	79	54.43		43	65	66.15		0	14	0.00		<i>Not Available</i>	
Ascites	1	79	1.27		1	65	1.54		0	14	0.00		<i>Not Available</i>	
Jaundice	2	79	2.53		1	65	1.54		1	14	7.14		4.923	0.271