Supplementary Notes for ***De novo*** **prediction of cancer-associated TCRs for non-invasive cancer detection**

Performance of a non-Deep Learning approach to predict cancer-associated TCRs

Given the significant differences of amino acid indices between cancer and non-cancer CDR3s, we initially applied Adaptive Boosting[1] to build an ensemble classifier. The method is described as follows:

The current amino acid index database documented 544 biochemical indices from previous protein structure studies, which can be used as surrogates of the functional and structural impact for amino acids. From the above non-public cancer associated data, we selected CDR3 sequences with length L between 12 and 16 amino acids (AA), and removed the first 2 and the last 3 AAs without structural contact to the pMHC complex. The total feature set is union for each informative AA, e.g. the number of features is (L-5)×544. We used n_L to denote the number of CDR3s with length L for cancer CDR3s (derived from TCGA data), and k_L the number for non-cancer CDR3s (from VDJdb).

We first subsampled 50% of all the sequences from both populations, and used the remaining half of data for cross validation. For each feature, we compared the $0.5n_L$ cancer observations with the $0.5k_L$ non-cancer ones. If the fold change (cancer over non-cancer) was smaller than 1.1, this feature was removed. Let S denote the number of features left. In the above setting, we have a total of $0.5\times(n_L+k_L)$ CDR3 sequences (samples), and S features, with known sample labels ($0.5n_L$ with label 1, and $0.5k_L$ with label -1). Let **Y** denote the sample label vector with length $0.5\times(n_L+k_L)$, and **X** denote the feature matrix with dimension $0.5\times(n_L+k_L)$-by-S. Based on our analysis, we determined that the prediction power for individual features is weak. Therefore, we applied Adaptive Boosting algorithm, an ensemble learning approach that is able to aggregate weak classifiers into a stronger one.

Model training was completed using adaboost() function in R package JOUSBoost[2], with 50 rounds of boosting and tree depth of 10. We selected parameters based on the criteria of minimizing the number of training cycles (rounds) and the complexity of classification tree (depth) while minimizing cross-validation (CV) errors. CV errors were calculated by applying the trained classifier for CDR3 length L (denoted as T_L) to the independent validation data with known class labels. We ran 10 times of subsampling and selected the one with the best cross validation value. The above procedure was repeated for L=12,13,15 and 16, except for L=14, where four-fold cross validation was applied, as we found that this setting achieved smaller CV error. Therefore, in total 5 classifiers were trained, and were denoted as $T_{12\text{-}16}$.

We applied TCRboost to define cancer score in the same way as DeepCAT. Generally, the score by TCRboost can also distinguish cancer patients from healthy donors, but the AUCs are lower. The ROC curves for selected cancer types are displayed in **Figure SA**:

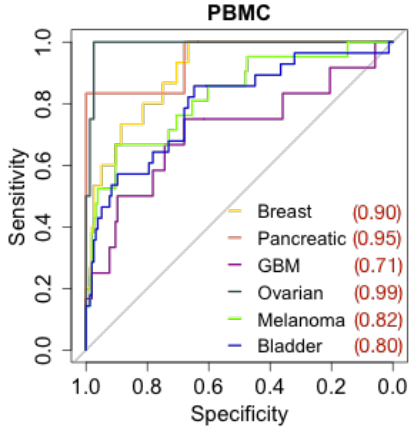

Figure SA: ROC curves for cancer scores predicted using TCRboost.

Compared to cfDNA or ctDNA based methods, the prediction power for early-stage cancer is suboptimal (AUC=0.90). Therefore, we sought to solve this problem with other approaches. The application of deep learning, especially CNN models on sequence data analysis, has significantly advanced, and demonstrated the ability to robustly predict the function of non-coding variants[3] or protein secondary structure[4]. The performance of these predictions was shown to be superior to traditional approaches. Therefore, we were motivated to apply Deep CNN models to study the TCR sequences and developed DeepCAT in this work, which indeed improved the prediction power compared to adaptive boosting. To date, as TCRboost is not part of the main text analysis, the source code was not included in the GitHub repository of DeepCAT. We will be happy to provide the source code (written in R) upon user request.

Distribution of caTCR probabilities from five DeepCAT models and their affects to cancer score estimation

In DeepCAT, we introduced five models each for CDR3 with length 12-16. The outcome for each model is the probability of cancer association, i.e. CDR3 with higher probability is more likely to be associated with cancer. The distributions of the outcomes from the five models are not identical (**Figure SB**). Specifically, CDR3s with lengths 12, 13 and 16 have similar distributions, where length 14 or 15 has lower probability. We used the caTCR probabilities predicted from independent testing data in Figure 2.

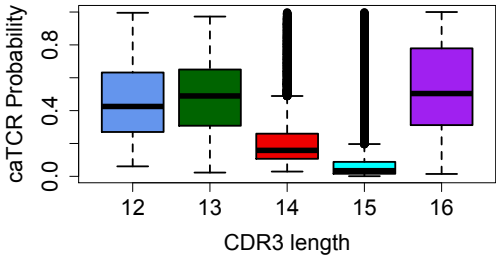

Figure SB: Boxplots showing the distributions of caTCR probabilities estimated from five DeepCAT models.

We next evaluated how this distribution difference affects cancer score calculation and the signals we observed between cancer and normal individuals. We combined all the CDR3s from healthy donor cohorts (Emerson 2017, DeWitt 2015, Kanakry 2016 and Chu 2019), and from cancer patient cohorts. Investigation on CDR3s with length 12-16 revealed higher usage for CDR3s with length 15 and 16 in cancer cohort compared to normal (**Figure SC**).

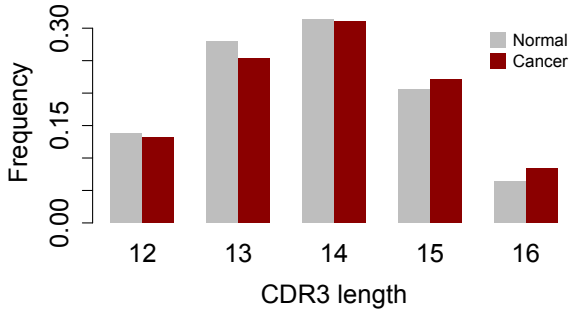

Figure SC: Barplots showing the frequency distribution of CDR3 lengths in normal or cancer cohorts.

We implemented an *in silico* experiment to test how these differences affect cancer score estimation under the null hypothesis that there is no difference in caTCR probability distribution between cancer and normal individuals. Specifically, we simulated 100 'cancer patients' and 100 'normal individuals'. Each individual has 500 TCRs, with lengths following the distributions in **Figure SC** for cancer or normal respectively. The numbers for each CDR3 length were sampled using Multinomial sampler in R. For each

individual, we sample the number of length L CDR3s following the caTCR length distribution of the healthy donor in **Figure SB**. For example, if cancer individual #1 has 72 sequences with length 16, we sampled 72 numbers from the caTCR probabilities estimated from length 16 CDR3s. We used the same caTCR probabilities for both cancer and normal individuals under the null hypothesis. We did not observe higher cancer scores for the cancer patients from this analysis (**Figure SD**). In other words, adjusting for five DeepCAT model outcomes and CDR3 lengths, the expected null distributions of cancer scores for cancer or normal individuals are similar. This result indicates that the observation of higher cancer scores in cancer patients in our study is not an artifact of different CDR3 lengths or caTCR probability distributions.

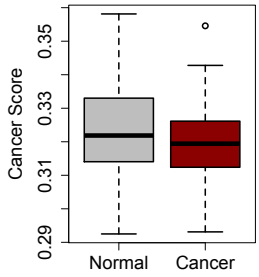

Figure SD. Cancer scores estimations from simulated 100 cancer and 100 normal individuals under the hypothesis that caTCR probabilities follow the same distribution in cancer and normal cohorts.

Proposal of further methodology development to distinguish cancer sites

Although the current DeepCAT method cannot distinguish cancer sites based on the blood TCR-seq data, it is theoretically feasible to do so with the knowledge of TCR sequences specific to known cancer-type-specific antigens. As a proof-of-principle study, we trained CNN models to differentiate melanoma patients from other cancer types using TCRs specific to melanoma-specific antigen, MART-1, or MLANA (27-35 epitope: LAGIGILTV). A total of 2,500 TCRs with known specificity to the LAG epitope were used as positive control. Under the DeepCAT architecture, we trained two models (**Figure SE**). The first model was trained using MART-1 specific TCRs vs TILs from pancreatic tumor (Stromnes et al., 2017). This model was applied to melanoma blood (Robert et al., 2014) versus Pancreatic blood (in house data) CDR3 sequences with moderate prediction power (AUC=0.67, **Figure SF** left panel). The second model was trained on MART-1 specific TCRs vs TILs from breast tumor (Beausang et al., 2017). It was applied to differentiate melanoma blood (Robert et al., 2014) from early-stage breast cancer blood samples (Beausang et al., 2017). The prediction power is AUC=0.74 (**Figure SF** right panel). The low prediction accuracy is expected, as we used only one melanoma-specific antigen. This framework can be easily applied to more training data (other than MART-1 specific TCRs) to distinguish different cancer types in addition to melanoma, pancreatic and breast cancers. Unfortunately, there is currently no other cancer type specific antigen with sufficient TCRs in the literature. In the future, with more knowledge of cancer type specific antigens and their related T cell receptors, it will be practical to implement this method to achieve higher performance that will allow accurate identification of tumor locations based on blood TCR repertoire. In particular, with the recent development of high-throughput barcoded MHC-I multimer sorting technology, we anticipate rapid accumulation of such TCRs for future methodology development.

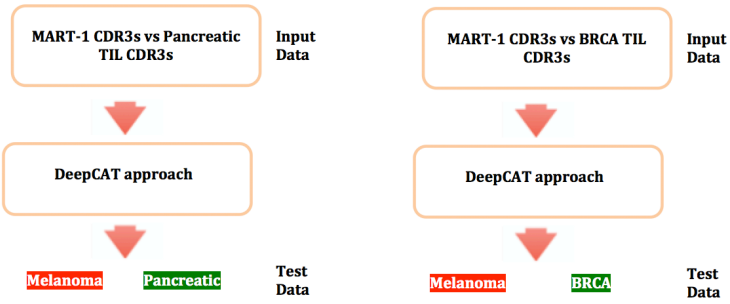

Figure SE: Diagram showing the input training data and CNN model used to predict melanoma from other cancer types.

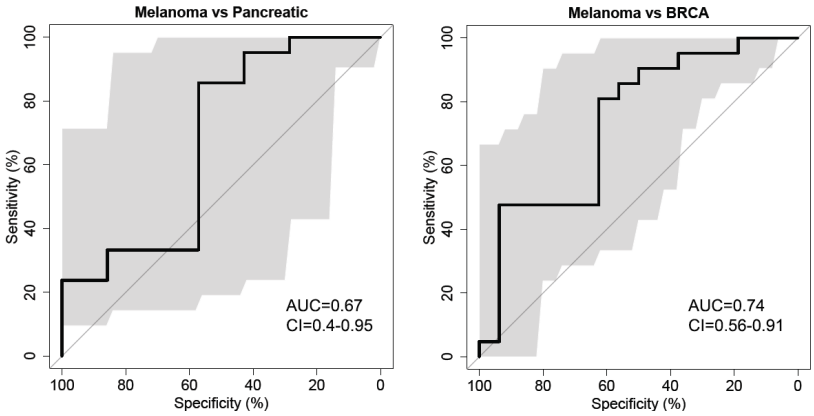

Figure SF. ROC curves for CNN models prediction cancer sites trained using cancer-type-specific TCRs.

Influence of non-cancer chronic inflammatory conditions to cancer score

Chronic inflammation is common among the population, which includes chronic viral infection, auto-immune disorders and cancer. In this work we have demonstrated significant increase of cancer scores in patients with malignant tumors, but it remains unclear how non-cancer related chronic inflammations affect cancer score. To investigate, we collected 3 cohorts, including HCMV infection (Emerson 2017), rheumatoid arthritis (RA)[5] and multiple sclerosis (MS)[6]. The advantage of these cohorts is that they have healthy donor samples uniformly profiled with the patient samples. However, except for Emerson 2017, the other two cohorts cannot be compared to other samples in our analysis, because Savola cohort used flow sorted CD8+ T cells, and Alves Sousa cohort was profiled using 5' RACE with mRNA. For all three cohorts, cancer scores were increased in patients with inflammatory conditions (**Figure SG**), but this increase (ratio of means, or r value labeled in the figure) does not reach to the magnitude as in the cancer patients. In conclusion, pre-existing chronic inflammatory conditions will slightly increase cancer scores, which may result in a reduction in diagnosis specificities when applied to the general population. This caveat, however, can be potentially lifted by exhaustive examination of patient's medical history on chronic viral infections and common autoimmune disorders. We rely on future efforts to generate more uniformly profiled TCR-seq data for other chronic conditions to explore how they affect cancer scores. With enough data, better Deep Learning models can be developed to differentiate cancer patients from the non-cancer individuals carrying these inflammations.

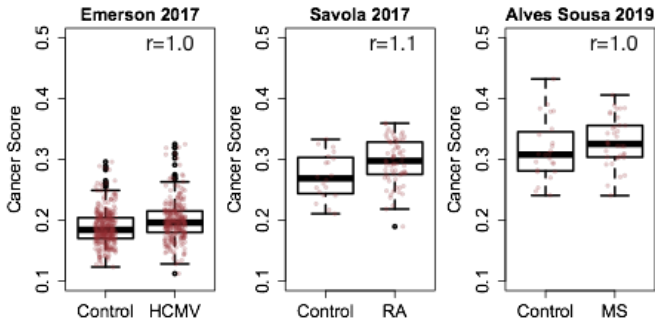

Figure SG: Non-cancer chronic inflammatory conditions might slightly raise cancer scores.

Reference

1. Freund, Y. & Schapire, R. A decision-theoretic generalization of online learning and an application to boosting. *Journal of Computer and System Science* **55**, 119-139 (1997).
2. Olson, M. JOUSBoost: Implements Under/Oversampling for Probability Estimation. *R package version 2.1.0* (2017).
3. Zhou, J. & Troyanskaya, O.G. Predicting effects of noncoding variants with deep learning-based sequence model. *Nature methods* **12**, 931-934 (2015).
4. Hou, J., Adhikari, B. & Cheng, J. DeepSF: deep convolutional neural network for mapping protein sequences to folds. *Bioinformatics* **34**, 1295-1303 (2018).
5. Savola, P.*, et al.* Somatic mutations in clonally expanded cytotoxic T lymphocytes in patients with newly diagnosed rheumatoid arthritis. *Nature communications* **8**, 15869 (2017).
6. Alves Sousa, A.P.*, et al.* Comprehensive Analysis of TCR-beta Repertoire in Patients with Neurological Immune-mediated Disorders. *Scientific reports* **9**, 344 (2019).

Supplementary Table 1

Disease Abbreviation	Number of Patients	caTCR count	Disease full name
ACC	12	36	adrenal cortical cancer
BLCA	195	1027	bladder cancer
BRCA	589	5062	breast cancer
CESC	151	1292	cervical cancer
CHOL	19	105	cholangiocarcinoma
COAD	154	731	colon cancer
DLBC	21	764	diffuse large-B cell lymphoca
ESCA	75	1355	esophageal squamous carcimoma
GBM	24	105	glioblastoma
HNSC	262	1870	head and neck cancer
KICH	23	45	kidney chromophobe
KIRC	337	3897	renal clear cell carcinoma
KIRP	115	591	renal papillary cell carcinoma
LAML	85	394	acute myeloid leukemia
LGG	57	117	lower grade glioma
LIHC	145	622	liver cancer
LUAD	280	2165	lung adenocarcinoma
LUSC	270	2297	lung squamous carcinoma
MESO	45	419	mesothelioma
OV	146	2826	ovarian cancer
PAAD	81	519	pancreatic cancer
PCPG	44	86	pheochromocytoma and paraganglioma
PRAD	245	772	prostate cancer
READ	48	210	rectal cancer
SARC	36	491	sarcoma
SKCM	187	2429	melanoma
STAD	129	6273	stomach cancer
TGCT	89	868	testicular germ-cell cancer
THCA	241	1377	thyroid cancer
THYM	48	4599	thymoma
UCEC	75	300	endometrial cancer
UCS	12	58	uterine carcinosarcoma

Supplementary Table 2

	Study	Tissue Type	Disease	Sample Size	Data Type	PubMed ID	Link	Usage in the paper	Tag (Supplementary Table 4)
Training Data									
	TCGA	TIL	Multiple Cancers	4,240	RNA-seq	N/A	https://github.com/s175573/DeepCAT/tree/master/data	Figure S3, S4	
	Emerson et al., 2017	PBMC	Healthy Donors, hCMV batch 2	120	TCR-seq (DNA)	28369038	https://clients.adaptivebiotech.com/pub/emerson-2017-natgen	Figure 2, S3, S4	
Validation Data									
	Zhang et al., 2018	Sorted antigen-specific T cells	Cancer and infectious diseases	1,454 (TCR count)	Single cell SMART-seq	30418433	https://www.nature.com/articles/nbt.4282?proof=true&draft=collection	Figure 2	
	10xGenomics	Sorted antigen-specific T cells	Cancer and infectious diseases	87,490 (TCR count)	Single cell Droplet-seq	Unpublished	https://support.10xgenomics.com/single-cell-vdj/datasets	Figure 2	
Test Data									
	Emerson et al., 2017	PBMC	Healthy Donors, hCMV batch 1	666	TCR-seq (DNA)	28369038	https://clients.adaptivebiotech.com/pub/emerson-2017-natgen	Figure 3, S5, SA, SG	Healthy Donor, HCMV
	DeWittt et al., 2015	PBMC	Yellow Fever Virus	9	TCR-seq (DNA)	25653453	https://clients.adaptivebiotech.com/pub/dewitt-2015-jvi	Figure 3, 4	YFV
	Kanakry et al., 2016	PBMC	Healthy Donor (GVHD patients)	15	TCR-seq (DNA)	27213183	https://clients.adaptivebiotech.com/pub/Kanakry-2016-JCIInsight	Figure 4	GVHD donor
	DeWitt et al., 2018	PBMC	Active Tuberculosis	33	TCR-seq (DNA)	29914888	https://clients.adaptivebiotech.com/pub/seshadri-2018-journalofimmunology	Figure 3, 4	TB
	Chu et al., 2019	PBMC	Healthy Donor (Time Course)	3	TCR-seq (DNA)	31226930	https://clients.adaptivebiotech.com/pub/healthy-adult-time-course-TCRB	Figure 3, 4	Healthy Donor Time Course
	Savola et al., 2017	Sorted CD8+ T cells from PBMC	Rheumatoid Arthritis	89	TCR-seq (DNA)	28635960	https://clients.adaptivebiotech.com/pub/mustjoki-2017-natcomms	Figure SG	
	Mansfield et al., 2018	TIL	Lung Cancer and Brain Metastasis	20	TCR-seq (DNA)	29391594	https://clients.adaptivebiotech.com/pub/mansfield-2018-scientificreports	Figure 3	Lung Brain Mets TIL, Lung Cancer TIL
	Hsu et al., 2016	PBMC, TIL	Glioma	27	TCR-seq (DNA)	26968205	https://clients.adaptivebiotech.com/pub/Prins-2016-Cancerimmunolres	Figure 3	GBM PBMC
	Beausang et al., 2017	PBMC, TIL	Early-stage Breast Cancer	16	TCR-seq (DNA)	29138313	https://clients.adaptivebiotech.com/pub/beausang-2017-pnas	Figure 3, 4, SA, SF	Early-stage BRCA PBMC
	Emerson et al., 2013	PBMC, TIL	Ovarian Cancer	5	TCR-seq (DNA)	24027095	https://clients.adaptivebiotech.com/pub/emerson-2013-jpathol	Figure 3, 4, SA	Ovarian Cancer PBMC
	Tumeh et al., 2014	TIL	Melanoma	23	TCR-seq (DNA)	25428505	https://clients.adaptivebiotech.com/pub/tumeh-2014-nature	Figure 3	Melanoma TIL
	Stromnes et al., 2017	PBMC, TIL	Pancreatic Cancer	16	TCR-seq (DNA)	29066497	https://clients.adaptivebiotech.com/pub/stromnes-2017-cancerimmunologyresearch	Figure 3, 4, SA. SF	Pancreatic PBMC, Pancreatic TIL
	Snyder et al., 2017	PBMC, TIL	Bladder Cancer	30	TCR-seq (DNA)	28552987	https://clients.adaptivebiotech.com/pub/snyder-2017-plosmedicine	Figure 3	Bladder Cancer PBMC
	Robert et al., 2014	PBMC	Melanoma	21	TCR-seq (DNA)	24583799	https://clients.adaptivebiotech.com/pub/robert-2014-CCR	Figure 3, SA, SF	Melanoma PBMC
	Formenti et al., 2018	PBMC	Lung Cancer	29	TCR-seq (DNA)	30397353	https://clients.adaptivebiotech.com/pub/formenti-2018-natmed	Figure 3	Lung Cancer PBMC
	Le et al., 2017	PBMC	Colorectal Cancer	3	TCR-seq (DNA)	28596308	https://clients.adaptivebiotech.com/pub/diaz-2017-science	Figure 3	Colon Cancer TIL
	This work	PBMC	Early-stage RCC	10	TCR-seq (DNA)		Will be released with this paper	Figure 4	inHouse RCC PBMC
	This work	PBMC	Early to Mid-stage Ovarian Cancer	10	TCR-seq (DNA)		Will be released with this paper	Figure 4	inHouse OV PBMC
	This work	PBMC	Early-stage Pancreatic Cancer and Benign Cyst	8	TCR-seq (DNA)		Will be released with this paper	Figure 4, SF	inHouse Pancreatic PBMC
	JHU cohort	PBMC	Stage I to III Lung Cancer	14	TCR-seq (DNA)	Unpublished	Under Embargo Policy	Figure 4	Early JHU_lung PBMC
	Sims et al., 2016	PBMC	Glioma	15	TCR-seq (RNA)	27261081	https://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE79338	Figure 5	iRepertoire_GBM
	iRepertoire RCC Cohort	PBMC	Metastatic RCC	17	TCR-seq (RNA)	Unpublished	Under Embargo Policy	Figure 5	iRepertoire_RCC
	iRepertoire Healthy Donor Cohort	PBMC	Healthy Donor	225	TCR-seq (RNA)	Unpublished	Under Embargo Policy	Figure 5, S9	iRepertoire_Control
	Alves Sousa et al., 2019	PBMC	Multiple Sclerosis	80	TCR-seq (RACE)	30674904	https://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE121082	Figure SG	

For test data, cohorts in green color are used as control samples.

TCR-seq (DNA) cohorts are all profiled at Adaptive Biotechnology using the immunoSEQ platform; TCR-seq (RNA) cohorts are profiled using the iRepertoire platform; TCR-seq(RACE) cohort is profiled using the 5'RACE technique.

Figure 1-5: main figures; Figure S1-S10: supplementary figures; Figure SA-SG: supplementary note figures

Supplementary Table 3: Pancreatic Cancer

Patient ID	Sex	Age	Stage	Diagnosis	Subtype	Treatment
1	M	60	IIB	Pancreas Adenocarcinoma		No Tx
4	F	66	IIB	Pancreas Adenocarcinoma		Preop Chemo
5	M	60		Pancreatic Cyst		
6	M	63	IIA	Pancreas Adenocarcinoma		Preop Chemo
7	F	63		Pancreatic Cyst		
16	M	67	IIA	Pancreas Adenocarcinoma		Preop Chemo + SBRT
17	M	60		Pancreatic Cyst	IPMN	
19	F	78	III	Pancreas Adenocarcinoma		Preop Chemo + SBRT

Supplementary Table 3: Lung Cancer

ID	age	sex (1=M)	TNM stage	Stage
MD01-010	78	1	T3N0	IIB
MD01-019	70	0	T2aN0	IB
MD01-024	55	1	T1AN0	IA
MD043-006	69	0	T2AN1	IIA
MD043-008	72	1	T1bN0	IA
MD043-011	55	0	T2aN1	IIA
NY016-007	68	1	T2aN1	IIA
NY016-015	58	1	T2bN1	IIB
NY016-016	79	1	T1bN1	IIA
NY016-021	74	0	T3N0	IIB
MD043-012	66	0	T3N1	IIIA
MD01-004	67	0	T4N1	IIIA
NY016-009	84	0	T1N2	IIIA
NY016-014	58	1	T2N2	IIIA

Supplementary Table 3: Kidney Cancer

ID	Age (at time of blood collection)	Sex	Pre-treatment? (Y/N)	RCC Pathology Stage (at time of sampling)	Histology
BP49	45	M	N	T1a	Clear cell RCC
BP69	51	F	N	T1a	Clear cell RCC
BP108	76	F	N	T1a	Clear cell RCC
BP122	30	F	N	T1a	RCC unclassified
BP130	54	M	N	T1a	chromophobe RCC
BP17	49	F	N	T1a	Clear cell RCC
BP24	68	M	N	T1a	Papillary RCC
BP78	76	F	N	T1b	Clear cell RCC
BP117	48	F	N	T1b	Clear cell RCC
BP204	60	F	N	T1a	Clear cell RCC

Supplementary Table 3: Ovarian Cancer

ID	Age (at time of blood collection)	Sex	Pre-treatment? (Y/N)	Pathology stage	Histology
414	N/A	F	N	IIIc	HGSC
413	N/A	F	N	IIIc	HGSC
515	N/A	F	N	IIb	HGSC
514	N/A	F	N	IIIc	HGSC
513	N/A	F	N	IIc	Endometrioid ovarian cancer
500	N/A	F	N	Ia	Serous BOT
508	N/A	F	N	Ia	Serous BOT
498	N/A	F	N	Ia	Serous BOT
496	N/A	F	N	Ia	Mucinous BOT
494	N/A	F	N	IIa	Clear cell ovarian cancer

Supplementary Table 4: Adaptive

Sample ID	Tag	Cancer Score
HIP00110	Healthy Donor	0.209
HIP00169	Healthy Donor	0.184
HIP00594	HCMV	0.176
HIP00602	Healthy Donor	0.167
HIP00614	Healthy Donor	0.148
HIP00640	Healthy Donor	0.174
HIP00707	HCMV	0.186
HIP00710	Healthy Donor	0.228
HIP00715	Healthy Donor	0.199
HIP00728	Healthy Donor	0.179
HIP00734	Healthy Donor	0.22
HIP00761	HCMV	0.21
HIP00769	Healthy Donor	0.143
HIP00771	Healthy Donor	0.181
HIP00773	Healthy Donor	0.164
HIP00775	HCMV	0.203
HIP00777	HCMV	0.171
HIP00779	Healthy Donor	0.198
HIP00805	Healthy Donor	0.191
HIP00813	HCMV	0.155
HIP00819	Healthy Donor	0.191
HIP00822	Healthy Donor	0.177
HIP00825	Healthy Donor	0.222
HIP00826	Healthy Donor	0.235
HIP00832	Healthy Donor	0.202
HIP00838	HCMV	0.194
HIP00851	HCMV	0.182
HIP00869	Healthy Donor	0.256
HIP00898	HCMV	0.196
HIP00904	Healthy Donor	0.21
HIP00924	HCMV	0.206
HIP00926	Healthy Donor	0.192
HIP00934	Healthy Donor	0.245
HIP00951	HCMV	0.23
HIP00971	HCMV	0.179
HIP00985	HCMV	0.16
HIP00997	Healthy Donor	0.177
HIP00999	Healthy Donor	0.192
HIP01004	Healthy Donor	0.18
HIP01022	Healthy Donor	0.166
HIP01055	Healthy Donor	0.192
HIP01091	HCMV	0.216
HIP01129	Healthy Donor	0.151
HIP01140	Healthy Donor	0.175
HIP01160	Healthy Donor	0.155
HIP01161	Healthy Donor	0.212
HIP01162	Healthy Donor	0.173
HIP01180	Healthy Donor	0.151
HIP01181	HCMV	0.168
HIP01197	Healthy Donor	0.163
HIP01206	Healthy Donor	0.139
HIP01218	Healthy Donor	0.139
HIP01219	HCMV	0.185
HIP01220	HCMV	0.182
HIP01223	HCMV	0.162
HIP01232	HCMV	0.195
HIP01253	Healthy Donor	0.186
HIP01255	HCMV	0.164
HIP01264	Healthy Donor	0.182
HIP01266	Healthy Donor	0.181
HIP01298	Healthy Donor	0.213
HIP01313	Healthy Donor	0.147
HIP01359	Healthy Donor	0.204
HIP01384	HCMV	0.245
HIP01391	Healthy Donor	0.202
HIP01392	Healthy Donor	0.179
HIP01393	Healthy Donor	0.127
HIP01465	HCMV	0.192
HIP01470	HCMV	0.166
HIP01499	Healthy Donor	0.168
HIP01501	HCMV	0.302
HIP01571	Healthy Donor	0.182
HIP01582	Healthy Donor	0.17
HIP01596	Healthy Donor	0.176
HIP01597	Healthy Donor	0.2
HIP01765	HCMV	0.211
HIP01795	Healthy Donor	0.213
HIP01797	Healthy Donor	0.171
HIP01798	Healthy Donor	0.212
HIP01805	Healthy Donor	0.167
HIP01820	Healthy Donor	0.187
HIP01850	HCMV	0.215
HIP01856	HCMV	0.19
HIP01865	HCMV	0.177
HIP01867	Healthy Donor	0.193
HIP01870	Healthy Donor	0.19
HIP01947	HCMV	0.137
HIP02024	HCMV	0.196
HIP02078	HCMV	0.171
HIP02090	Healthy Donor	0.249
HIP02103	Healthy Donor	0.161
HIP02112	Healthy Donor	0.163
HIP02126	HCMV	0.148
HIP02271	HCMV	0.214
HIP02663	HCMV	0.181
HIP02734	Healthy Donor	0.174
HIP02737	Healthy Donor	0.207
HIP02742	Healthy Donor	0.175
HIP02780	Healthy Donor	0.183
HIP02790	HCMV	0.236
HIP02805	Healthy Donor	0.173
HIP02811	Healthy Donor	0.199
HIP02820	Healthy Donor	0.161
HIP02848	Healthy Donor	0.141
HIP02855	Healthy Donor	0.217
HIP02873	HCMV	0.158
HIP02875	Healthy Donor	0.172
HIP02877	Healthy Donor	0.194
HIP02928	HCMV	0.196
HIP02931	Healthy Donor	0.2
HIP02947	HCMV	0.145
HIP02962	HCMV	0.204
HIP02997	HCMV	0.144
HIP03004	Healthy Donor	0.223
HIP03099	Healthy Donor	0.155
HIP03107	Healthy Donor	0.173
HIP03111	Healthy Donor	0.164
HIP03125	Healthy Donor	0.175
HIP03184	Healthy Donor	0.248
HIP03194	HCMV	0.205
HIP03197	Healthy Donor	0.18
HIP03216	HCMV	0.201
HIP03228	Healthy Donor	0.178
HIP03233	HCMV	0.171
HIP03236	Healthy Donor	0.229
HIP03275	HCMV	0.171
HIP03370	HCMV	0.163
HIP03378	HCMV	0.226
HIP03381	HCMV	0.191
HIP03383	Healthy Donor	0.177
HIP03385	Healthy Donor	0.182
HIP03484	Healthy Donor	0.201
HIP03494	Healthy Donor	0.174
HIP03495	HCMV	0.196
HIP03502	Healthy Donor	0.211
HIP03505	Healthy Donor	0.173
HIP03511	HCMV	0.203
HIP03591	Healthy Donor	0.207
HIP03592	Healthy Donor	0.176
HIP03597	Healthy Donor	0.214
HIP03618	HCMV	0.219

HIP03628	HCMV	0.183
HIP03630	HCMV	0.172
HIP03651	Healthy Donor	0.19
HIP03677	HCMV	0.196
HIP03678	Healthy Donor	0.214
HIP03685	Healthy Donor	0.283
HIP03693	Healthy Donor	0.181
HIP03695	HCMV	0.202
HIP03720	HCMV	0.201
HIP03732	Healthy Donor	0.219
HIP03746	Healthy Donor	0.171
HIP03807	HCMV	0.185
HIP03812	Healthy Donor	0.167
HIP03814	Healthy Donor	0.181
HIP04455	HCMV	0.254
HIP04464	HCMV	0.32
HIP04471	Healthy Donor	0.156
HIP04475	HCMV	0.186
HIP04480	Healthy Donor	0.17
HIP04498	Healthy Donor	0.215
HIP04509	HCMV	0.193
HIP04510	HCMV	0.208
HIP04511	HCMV	0.2
HIP04527	HCMV	0.225
HIP04532	Healthy Donor	0.156
HIP04545	Healthy Donor	0.179
HIP04552	Healthy Donor	0.152
HIP04555	HCMV	0.143
HIP04576	Healthy Donor	0.152
HIP04578	HCMV	0.168
HIP04597	Healthy Donor	0.215
HIP04605	HCMV	0.202
HIP04611	Healthy Donor	0.213
HIP04634	HCMV	0.164
HIP04958	Healthy Donor	0.31
HIP05311	HCMV	0.219
HIP05331	HCMV	0.205
HIP05377	Healthy Donor	0.265
HIP05388	Healthy Donor	0.211
HIP05390	Healthy Donor	0.177
HIP05398	Healthy Donor	0.154
HIP05405	HCMV	0.19
HIP05409	Healthy Donor	0.139
HIP05434	HCMV	0.203
HIP05437	HCMV	0.196
HIP05444	Healthy Donor	0.204
HIP05455	HCMV	0.188
HIP05460	HCMV	0.201
HIP05467	HCMV	0.2
HIP05524	Healthy Donor	0.145
HIP05533	Healthy Donor	0.21
HIP05535	HCMV	0.163
HIP05540	Healthy Donor	0.181
HIP05551	HCMV	0.163
HIP05552	Healthy Donor	0.182
HIP05559	HCMV	0.128
HIP05561	Healthy Donor	0.185
HIP05563	HCMV	0.218
HIP05574	Healthy Donor	0.135
HIP05578	Healthy Donor	0.158
HIP05590	HCMV	0.171
HIP05595	HCMV	0.148
HIP05665	Healthy Donor	0.177
HIP05757	Healthy Donor	0.242
HIP05763	Healthy Donor	0.386
HIP05815	HCMV	0.216
HIP05817	Healthy Donor	0.186
HIP05832	HCMV	0.197
HIP05838	Healthy Donor	0.207
HIP05841	HCMV	0.191
HIP05934	Healthy Donor	0.289
HIP05941	Healthy Donor	0.232
HIP05942	HCMV	0.209
HIP05948	Healthy Donor	0.242
HIP05960	HCMV	0.197
HIP06191	Healthy Donor	0.2
HIP07754	Healthy Donor	0.186
HIP08076	Healthy Donor	0.189
HIP08200	Healthy Donor	0.127
HIP08223	Healthy Donor	0.235
HIP08230	Healthy Donor	0.189
HIP08236	Healthy Donor	0.192
HIP08305	HCMV	0.19
HIP08337	HCMV	0.197
HIP08339	Healthy Donor	0.17
HIP08345	Healthy Donor	0.133
HIP08346	Healthy Donor	0.208
HIP08389	Healthy Donor	0.218
HIP08399	Healthy Donor	0.15
HIP08400	HCMV	0.188
HIP08439	Healthy Donor	0.197
HIP08499	HCMV	0.184
HIP08507	Healthy Donor	0.176
HIP08521	HCMV	0.19
HIP08596	HCMV	0.225
HIP08598	HCMV	0.204
HIP08653	HCMV	0.208
HIP08702	HCMV	0.155
HIP08710	Healthy Donor	0.227
HIP08711	Healthy Donor	0.188
HIP08725	HCMV	0.234
HIP08792	HCMV	0.245
HIP08805	Healthy Donor	0.172
HIP08816	Healthy Donor	0.195
HIP08821	HCMV	0.19
HIP08827	HCMV	0.202
HIP08888	Healthy Donor	0.219
HIP08890	HCMV	0.18
HIP08972	Healthy Donor	0.185
HIP08977	Healthy Donor	0.184
HIP08986	HCMV	0.206
HIP08989	Healthy Donor	0.216
HIP09001	Healthy Donor	0.193
HIP09020	HCMV	0.21
HIP09022	HCMV	0.161
HIP09026	HCMV	0.218
HIP09029	Healthy Donor	0.172
HIP09041	Healthy Donor	0.189
HIP09046	Healthy Donor	0.198
HIP09051	HCMV	0.226
HIP09062	HCMV	0.171
HIP09097	Healthy Donor	0.205
HIP09118	Healthy Donor	0.161
HIP09119	HCMV	0.169
HIP09122	HCMV	0.181
HIP09150	HCMV	0.214
HIP09159	Healthy Donor	0.175
HIP09190	HCMV	0.17
HIP09235	HCMV	0.199
HIP09253	Healthy Donor	0.155
HIP09284	Healthy Donor	0.161
HIP09344	Healthy Donor	0.182
HIP09364	HCMV	0.218
HIP09365	HCMV	0.134
HIP09366	HCMV	0.131
HIP09430	HCMV	0.201
HIP09559	Healthy Donor	0.164
HIP09624	HCMV	0.149
HIP09681	HCMV	0.291
HIP09775	HCMV	0.215
HIP09789	HCMV	0.196
HIP10358	Healthy Donor	0.177

HIP10376	Healthy Donor	0.142
HIP10377	HCMV	0.199
HIP10389	Healthy Donor	0.215
HIP10408	HCMV	0.182
HIP10424	HCMV	0.179
HIP10443	HCMV	0.213
HIP10445	Healthy Donor	0.177
HIP10447	Healthy Donor	0.152
HIP10480	HCMV	0.169
HIP10507	HCMV	0.219
HIP10514	Healthy Donor	0.205
HIP10545	Healthy Donor	0.235
HIP10564	Healthy Donor	0.205
HIP10568	HCMV	0.189
HIP10597	Healthy Donor	0.152
HIP10602	Healthy Donor	0.178
HIP10639	Healthy Donor	0.172
HIP10669	HCMV	0.187
HIP10694	Healthy Donor	0.174
HIP10716	HCMV	0.229
HIP10726	Healthy Donor	0.154
HIP10730	Healthy Donor	0.212
HIP10746	Healthy Donor	0.168
HIP10759	Healthy Donor	0.181
HIP10787	HCMV	0.192
HIP10814	HCMV	0.188
HIP10815	Healthy Donor	0.194
HIP10817	HCMV	0.209
HIP10820	Healthy Donor	0.162
HIP10821	Healthy Donor	0.177
HIP10823	Healthy Donor	0.154
HIP10846	Healthy Donor	0.188
HIP11058	Healthy Donor	0.172
HIP11513	HCMV	0.112
HIP11518	HCMV	0.2
HIP11553	Healthy Donor	0.142
HIP11613	HCMV	0.201
HIP11649	HCMV	0.224
HIP11711	HCMV	0.146
HIP11717	HCMV	0.207
HIP11758	HCMV	0.185
HIP11774	HCMV	0.203
HIP11784	HCMV	0.161
HIP11845	Healthy Donor	0.185
HIP11857	HCMV	0.227
HIP11937	HCMV	0.225
HIP11989	HCMV	0.209
HIP12034	Healthy Donor	0.195
HIP12088	Healthy Donor	0.243
HIP12091	Healthy Donor	0.213
HIP12097	HCMV	0.215
HIP12099	HCMV	0.192
HIP12123	HCMV	0.216
HIP12129	Healthy Donor	0.174
HIP12143	Healthy Donor	0.196
HIP12165	HCMV	0.178
HIP12527	Healthy Donor	0.159
HIP12533	Healthy Donor	0.192
HIP12534	HCMV	0.215
HIP12538	Healthy Donor	0.186
HIP12703	HCMV	0.218
HIP12743	HCMV	0.257
HIP12900	HCMV	0.176
HIP12980	HCMV	0.223
HIP13015	Healthy Donor	0.169
HIP13122	Healthy Donor	0.186
HIP13142	Healthy Donor	0.182
HIP13157	HCMV	0.227
HIP13168	Healthy Donor	0.184
HIP13176	HCMV	0.186
HIP13178	Healthy Donor	0.123
HIP13183	Healthy Donor	0.249
HIP13185	Healthy Donor	0.168
HIP13193	Healthy Donor	0.177
HIP13198	Healthy Donor	0.184
HIP13206	Healthy Donor	0.26
HIP13209	Healthy Donor	0.213
HIP13214	HCMV	0.185
HIP13217	HCMV	0.176
HIP13220	HCMV	0.173
HIP13227	HCMV	0.178
HIP13228	Healthy Donor	0.175
HIP13230	HCMV	0.31
HIP13233	HCMV	0.185
HIP13244	Healthy Donor	0.19
HIP13245	HCMV	0.211
HIP13251	Healthy Donor	0.209
HIP13252	Healthy Donor	0.162
HIP13256	Healthy Donor	0.15
HIP13263	Healthy Donor	0.204
HIP13265	Healthy Donor	0.191
HIP13274	Healthy Donor	0.2
HIP13276	Healthy Donor	0.18
HIP13284	Healthy Donor	0.239
HIP13291	HCMV	0.189
HIP13294	Healthy Donor	0.255
HIP13296	HCMV	0.325
HIP13303	Healthy Donor	0.201
HIP13306	HCMV	0.199
HIP13309	HCMV	0.249
HIP13311	HCMV	0.166
HIP13318	HCMV	0.237
HIP13319	Healthy Donor	0.21
HIP13324	HCMV	0.183
HIP13325	HCMV	0.198
HIP13350	Healthy Donor	0.205
HIP13352	HCMV	0.239
HIP13355	HCMV	0.212
HIP13360	HCMV	0.196
HIP13361	HCMV	0.211
HIP13363	Healthy Donor	0.193
HIP13370	Healthy Donor	0.214
HIP13376	Healthy Donor	0.191
HIP13383	Healthy Donor	0.193
HIP13396	HCMV	0.199
HIP13402	Healthy Donor	0.149
HIP13414	HCMV	0.169
HIP13427	HCMV	0.212
HIP13449	HCMV	0.257
HIP13463	Healthy Donor	0.169
HIP13465	Healthy Donor	0.261
HIP13473	Healthy Donor	0.202
HIP13478	HCMV	0.273
HIP13489	HCMV	0.205
HIP13497	Healthy Donor	0.178
HIP13505	Healthy Donor	0.183
HIP13511	Healthy Donor	0.208
HIP13513	HCMV	0.212
HIP13515	HCMV	0.27
HIP13518	HCMV	0.177
HIP13554	HCMV	0.182
HIP13567	Healthy Donor	0.238
HIP13592	Healthy Donor	0.177
HIP13610	HCMV	0.22
HIP13625	Healthy Donor	0.296
HIP13627	HCMV	0.194
HIP13636	HCMV	0.159
HIP13654	HCMV	0.184
HIP13658	Healthy Donor	0.176
HIP13661	Healthy Donor	0.168
HIP13663	Healthy Donor	0.208
HIP13667	HCMV	0.187

HIP13671	HCMV	0.197
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HIP13695	Healthy Donor	0.286
HIP13699	HCMV	0.19
HIP13703	HCMV	0.188
HIP13709	Healthy Donor	0.173
HIP13710	Healthy Donor	0.153
HIP13720	Healthy Donor	0.176
HIP13722	Healthy Donor	0.184
HIP13736	Healthy Donor	0.179
HIP13741	Healthy Donor	0.2
HIP13746	Healthy Donor	0.212
HIP13749	Healthy Donor	0.169
HIP13751	HCMV	0.244
HIP13753	HCMV	0.416
HIP13754	Healthy Donor	0.165
HIP13757	Healthy Donor	0.174
HIP13760	Healthy Donor	0.195
HIP13764	Healthy Donor	0.151
HIP13766	Healthy Donor	0.14
HIP13769	Healthy Donor	0.189
HIP13771	HCMV	0.238
HIP13773	HCMV	0.197
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HIP13780	Healthy Donor	0.174
HIP13782	HCMV	0.231
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HIP13789	HCMV	0.198
HIP13793	HCMV	0.196
HIP13794	Healthy Donor	0.209
HIP13796	Healthy Donor	0.2
HIP13800	HCMV	0.327
HIP13803	Healthy Donor	0.218
HIP13806	Healthy Donor	0.223
HIP13809	HCMV	0.199
HIP13810	Healthy Donor	0.158
HIP13812	Healthy Donor	0.21
HIP13814	HCMV	0.251
HIP13818	HCMV	0.157
HIP13822	HCMV	0.237
HIP13823	Healthy Donor	0.182
HIP13831	HCMV	0.147
HIP13833	HCMV	0.156
HIP13847	Healthy Donor	0.181
HIP13848	Healthy Donor	0.194
HIP13852	HCMV	0.217
HIP13853	Healthy Donor	0.165
HIP13854	Healthy Donor	0.186
HIP13856	HCMV	0.192
HIP13857	Healthy Donor	0.235
HIP13859	Healthy Donor	0.186
HIP13860	Healthy Donor	0.169
HIP13865	HCMV	0.205
HIP13869	HCMV	0.153
HIP13871	Healthy Donor	0.188
HIP13875	HCMV	0.231
HIP13877	Healthy Donor	0.138
HIP13880	HCMV	0.197
HIP13887	Healthy Donor	0.17
HIP13893	Healthy Donor	0.178
HIP13894	HCMV	0.161
HIP13900	HCMV	0.231
HIP13902	HCMV	0.182
HIP13903	HCMV	0.268
HIP13911	HCMV	0.257
HIP13916	Healthy Donor	0.229
HIP13919	HCMV	0.211
HIP13920	Healthy Donor	0.158
HIP13923	HCMV	0.322
HIP13926	HCMV	0.204
HIP13928	HCMV	0.215
HIP13929	Healthy Donor	0.183
HIP13932	HCMV	0.173
HIP13933	Healthy Donor	0.192
HIP13935	Healthy Donor	0.204
HIP13938	HCMV	0.207
HIP13939	HCMV	0.184
HIP13941	Healthy Donor	0.191
HIP13944	Healthy Donor	0.214
HIP13945	Healthy Donor	0.201
HIP13947	Healthy Donor	0.243
HIP13949	HCMV	0.179
HIP13951	HCMV	0.234
HIP13954	HCMV	0.189
HIP13956	HCMV	0.22
HIP13958	Healthy Donor	0.208
HIP13961	Healthy Donor	0.195
HIP13962	HCMV	0.189
HIP13964	HCMV	0.18
HIP13966	Healthy Donor	0.17
HIP13967	HCMV	0.226
HIP13972	Healthy Donor	0.147
HIP13975	HCMV	0.209
HIP13976	HCMV	0.224
HIP13978	Healthy Donor	0.171
HIP13981	Healthy Donor	0.189
HIP13983	Healthy Donor	0.199
HIP13986	HCMV	0.152
HIP13987	HCMV	0.179
HIP13988	HCMV	0.198
HIP13989	Healthy Donor	0.234
HIP13992	HCMV	0.194
HIP13994	HCMV	0.203
HIP13996	HCMV	0.213
HIP14000	Healthy Donor	0.17
HIP14004	Healthy Donor	0.209
HIP14007	Healthy Donor	0.18
HIP14009	HCMV	0.155
HIP14014	Healthy Donor	0.219
HIP14015	Healthy Donor	0.201
HIP14016	HCMV	0.174
HIP14018	Healthy Donor	0.18
HIP14020	Healthy Donor	0.139
HIP14022	HCMV	0.196
HIP14024	HCMV	0.275
HIP14028	Healthy Donor	0.174
HIP14030	Healthy Donor	0.175
HIP14034	HCMV	0.197
HIP14036	Healthy Donor	0.162
HIP14037	Healthy Donor	0.217
HIP14039	Healthy Donor	0.196
HIP14041	HCMV	0.216
HIP14043	Healthy Donor	0.152
HIP14045	HCMV	0.166
HIP14048	Healthy Donor	0.153
HIP14051	HCMV	0.192
HIP14053	HCMV	0.201
HIP14055	Healthy Donor	0.201
HIP14059	Healthy Donor	0.177
HIP14060	HCMV	0.249
HIP14064	Healthy Donor	0.202
HIP14066	Healthy Donor	0.261
HIP14071	HCMV	0.192
HIP14072	Healthy Donor	0.162
HIP14074	Healthy Donor	0.168
HIP14077	Healthy Donor	0.196
HIP14079	Healthy Donor	0.168
HIP14080	Healthy Donor	0.192
HIP14089	Healthy Donor	0.15
HIP14090	Healthy Donor	0.162
HIP14092	HCMV	0.19

HIP14095	Healthy Donor	0.196
HIP14096	HCMV	0.199
HIP14103	HCMV	0.189
HIP14106	HCMV	0.343
HIP14107	HCMV	0.213
HIP14109	Healthy Donor	0.184
HIP14110	Healthy Donor	0.326
HIP14114	Healthy Donor	0.209
HIP14118	HCMV	0.196
HIP14121	Healthy Donor	0.19
HIP14124	HCMV	0.193
HIP14127	Healthy Donor	0.204
HIP14129	Healthy Donor	0.197
HIP14130	Healthy Donor	0.18
HIP14134	Healthy Donor	0.214
HIP14136	HCMV	0.203
HIP14138	Healthy Donor	0.185
HIP14140	Healthy Donor	0.174
HIP14142	HCMV	0.192
HIP14143	Healthy Donor	0.226
HIP14148	HCMV	0.199
HIP14152	HCMV	0.211
HIP14153	Healthy Donor	0.198
HIP14156	Healthy Donor	0.203
HIP14157	HCMV	0.187
HIP14160	Healthy Donor	0.171
HIP14161	HCMV	0.174
HIP14170	Healthy Donor	0.163
HIP14172	Healthy Donor	0.18
HIP14174	Healthy Donor	0.201
HIP14175	HCMV	0.189
HIP14176	Healthy Donor	0.133
HIP14178	Healthy Donor	0.181
HIP14181	HCMV	0.2
HIP14183	HCMV	0.176
HIP14184	Healthy Donor	0.176
HIP14187	HCMV	0.221
HIP14192	Healthy Donor	0.209
HIP14194	HCMV	0.236
HIP14196	Healthy Donor	0.187
HIP14202	Healthy Donor	0.179
HIP14205	HCMV	0.194
HIP14206	Healthy Donor	0.177
HIP14209	Healthy Donor	0.2
HIP14211	Healthy Donor	0.171
HIP14213	Healthy Donor	0.177
HIP14214	Healthy Donor	0.189
HIP14217	Healthy Donor	0.169
HIP14218	Healthy Donor	0.169
HIP14221	HCMV	0.172
HIP14223	HCMV	0.238
HIP14226	Healthy Donor	0.204
HIP14227	HCMV	0.198
HIP14230	Healthy Donor	0.175
HIP14231	HCMV	0.167
HIP14234	Healthy Donor	0.152
HIP14236	HCMV	0.319
HIP14237	Healthy Donor	0.173
HIP14238	Healthy Donor	0.19
HIP14240	Healthy Donor	0.198
HIP14241	Healthy Donor	0.201
HIP14243	Healthy Donor	0.152
HIP14244	HCMV	0.183
HIP14361	HCMV	0.242
HIP14363	Healthy Donor	0.192
HIP14494	Healthy Donor	0.186
HIP14844	Healthy Donor	0.198
HIP14911	Healthy Donor	0.171
HIP15685	HCMV	0.226
HIP15854	HCMV	0.172
HIP15855	Healthy Donor	0.212
HIP15860	Healthy Donor	0.193
HIP15861	HCMV	0.308
HIP16515	HCMV	0.159
HIP16738	Healthy Donor	0.23
HIP16867	HCMV	0.165
HIP17370	HCMV	0.268
HIP17440	Healthy Donor	0.165
HIP17445	Healthy Donor	0.162
HIP17449	Healthy Donor	0.15
HIP17454	Healthy Donor	0.207
HIP17457	Healthy Donor	0.2
HIP17462	HCMV	0.263
HIP17534	HCMV	0.19
HIP17577	HCMV	0.193
HIP17585	Healthy Donor	0.156
HIP17657	Healthy Donor	0.159
HIP17698	Healthy Donor	0.209
HIP17723	HCMV	0.217
HIP17737	Healthy Donor	0.18
HIP17760	HCMV	0.218
HIP17793	Healthy Donor	0.165
HIP17837	HCMV	0.211
HIP17845	HCMV	0.175
HIP17887	Healthy Donor	0.21
HIP19048	Healthy Donor	0.184
HIP19089	Healthy Donor	0.264
HIP19716	Healthy Donor	0.161
HIP19717	HCMV	0.181
Subject 1_PBMC_Day 14	YFV	0.2
Subject 2_PBMC_Day 14	YFV	0.173
Subject 3_PBMC_Day 14	YFV	0.236
Subject 4_PBMC_Day 14	YFV	0.197
Subject 5_PBMC_Day 14	YFV	0.199
Subject 6_PBMC_Day 14	YFV	0.15
Subject 7_PBMC_Day 14	YFV	0.206
Subject 8_PBMC_Day 14	YFV	0.21
Subject 9_PBMC_Day 14	YFV	0.203
PRE_11	Melanoma PBMC	0.336
PRE_12	Melanoma PBMC	0.295
PRE_13	Melanoma PBMC	0.299
PRE_14	Melanoma PBMC	0.35
PRE_15	Melanoma PBMC	0.26
PRE_18	Melanoma PBMC	0.258
PRE_19	Melanoma PBMC	0.24
PRE_21	Melanoma PBMC	0.28
PRE_23	Melanoma PBMC	0.321
PRE_24	Melanoma PBMC	0.295
PRE_25	Melanoma PBMC	0.334
PRE_26	Melanoma PBMC	0.286
PRE_27	Melanoma PBMC	0.323
PRE_28	Melanoma PBMC	0.3
PRE_29	Melanoma PBMC	0.233
PRE_32	Melanoma PBMC	0.24
PRE_33	Melanoma PBMC	0.276
PRE_5	Melanoma PBMC	0.302
PRE_7	Melanoma PBMC	0.319
PRE_8	Melanoma PBMC	0.323
PRE_9	Melanoma PBMC	0.392
BR01B	Early-stage BRCA PBMC	0.319
BR01T	Early-stage BRCA PBMC	0.263
BR05B	Early-stage BRCA PBMC	0.22
BR05T	Early-stage BRCA PBMC	0.266
BR07B	Early-stage BRCA PBMC	0.335
BR07T	Early-stage BRCA PBMC	0.323
BR13B	Early-stage BRCA PBMC	0.247
BR13T	Early-stage BRCA PBMC	0.317
BR14B	Early-stage BRCA PBMC	0.255
BR14T	Early-stage BRCA PBMC	0.225
BR15B	Early-stage BRCA PBMC	0.256
BR15T	Early-stage BRCA PBMC	0.26
BR16B	Early-stage BRCA PBMC	0.275

BR16T	Early-stage BRCA PBMC	0.333
BR17B	Early-stage BRCA PBMC	0.314
BR17T	Early-stage BRCA PBMC	0.381
BR18B	Early-stage BRCA PBMC	0.271
BR18T	Early-stage BRCA PBMC	0.317
BR19B	Early-stage BRCA PBMC	0.389
BR19T	Early-stage BRCA PBMC	0.345
BR20B	Early-stage BRCA PBMC	0.293
BR20T	Early-stage BRCA PBMC	0.291
BR21B	Early-stage BRCA PBMC	0.275
BR21T	Early-stage BRCA PBMC	0.342
BR22B	Early-stage BRCA PBMC	0.302
BR22T	Early-stage BRCA PBMC	0.246
BR24B	Early-stage BRCA PBMC	0.26
BR24T	Early-stage BRCA PBMC	0.309
BR25B	Early-stage BRCA PBMC	0.325
BR25T	Early-stage BRCA PBMC	0.364
BR26B	Early-stage BRCA PBMC	0.305
BR26T	Early-stage BRCA PBMC	0.276
0040-14-090-9A	Bladder Cancer PBMC	0.205
0040_S14-38354	Bladder Cancer PBMC	0.097
0471-14-090-6A	Bladder Cancer PBMC	0.235
0471-14-090-6B	Bladder Cancer PBMC	0.272
0471-14-090-6C	Bladder Cancer PBMC	0.221
0471_SYS12-10161	Bladder Cancer PBMC	0.493
0522-14-090-15A	Bladder Cancer PBMC	0.242
0522-14-090-15B	Bladder Cancer PBMC	0.257
0522-14-090-15C	Bladder Cancer PBMC	0.244
0979-14-090-12A	Bladder Cancer PBMC	0.248
0979-14-090-12B	Bladder Cancer PBMC	0.259
1233-14-090-1A	Bladder Cancer PBMC	0.142
1233-14-090-1B	Bladder Cancer PBMC	0.196
1233-14-090-1C	Bladder Cancer PBMC	0.168
1233_S13-5121_5_4L	Bladder Cancer PBMC	0.399
1249-14-090-16A	Bladder Cancer PBMC	0.235
1249-14-090-16B	Bladder Cancer PBMC	0.272
1249_S14-22404	Bladder Cancer PBMC	0.577
1849-14-090-28A	Bladder Cancer PBMC	0.239
1849-14-090-28B	Bladder Cancer PBMC	0.238
1849-14-090-28C	Bladder Cancer PBMC	0.254
1849_S10-56583_6_7L	Bladder Cancer PBMC	0.386
1994-14-090-4A	Bladder Cancer PBMC	0.217
1994-14-090-4B	Bladder Cancer PBMC	0.262
1994-14-090-4C	Bladder Cancer PBMC	0.271
1994_S12-48509_4_7L	Bladder Cancer PBMC	0.371
2131-14-090-26A	Bladder Cancer PBMC	0.259
2131-14-090-26B	Bladder Cancer PBMC	0.217
2131-14-090-26C	Bladder Cancer PBMC	0.271
2131_S14-11099_2_2_GU	Bladder Cancer PBMC	0.113
2278-14-090-7A	Bladder Cancer PBMC	0.244
2278-14-090-7B	Bladder Cancer PBMC	0.308
2278-14-090-7C	Bladder Cancer PBMC	0.243
2278_S13-47848_7_9PV	Bladder Cancer PBMC	0.788
2389-14-090-21A	Bladder Cancer PBMC	0.206
2389-14-090-21B	Bladder Cancer PBMC	0.22
2389-14-090-21C	Bladder Cancer PBMC	0.255
2389_S14-26091	Bladder Cancer PBMC	0.333
2849-14-090-3A	Bladder Cancer PBMC	0.244
2849-14-090-3B	Bladder Cancer PBMC	0.273
2849-14-090-3C	Bladder Cancer PBMC	0.248
2849-14-090-3D	Bladder Cancer PBMC	0.268
2849-14-090-3E	Bladder Cancer PBMC	0.285
2849-14-090-3F	Bladder Cancer PBMC	0.294
2849-14-090-3G	Bladder Cancer PBMC	0.33
2849-14-090-3H	Bladder Cancer PBMC	0.283
2849_S12-59715-1	Bladder Cancer PBMC	0.433
2937-14-090-23A	Bladder Cancer PBMC	0.304
2937-14-090-23B	Bladder Cancer PBMC	0.264
2937_S05-29839_1_1	Bladder Cancer PBMC	0.33
3529-14-090-2A	Bladder Cancer PBMC	0.205
3529-14-090-2B	Bladder Cancer PBMC	0.229
3529-14-090-2C	Bladder Cancer PBMC	0.212
3529_S12-3955_4_10_F3	Bladder Cancer PBMC	0.58
4072-14-090-20A	Bladder Cancer PBMC	0.214
4072-14-090-20B	Bladder Cancer PBMC	0.219
4072-14-090-20C	Bladder Cancer PBMC	0.266
i072_S13-19687_1_14_MAT	Bladder Cancer PBMC	NaN
5037-14-090-29A	Bladder Cancer PBMC	0.26
5037-14-090-29B	Bladder Cancer PBMC	0.284
5037-14-090-29C	Bladder Cancer PBMC	0.319
5037_S12-16630_1_2_TSF	Bladder Cancer PBMC	0.28
5122-14-090-8A	Bladder Cancer PBMC	0.229
5122-14-090-8B	Bladder Cancer PBMC	0.24
5122-14-090-8C	Bladder Cancer PBMC	0.239
5122_S13-9876_3_8L	Bladder Cancer PBMC	0.447
5338-14-090-13A	Bladder Cancer PBMC	0.211
5338-14-090-13B	Bladder Cancer PBMC	0.19
5338-14-090-13C	Bladder Cancer PBMC	0.219
5338_S13-10376_3-4L	Bladder Cancer PBMC	0.094
6229-14-090-18A	Bladder Cancer PBMC	0.194
6229-14-090-18B	Bladder Cancer PBMC	0.203
6229-14-090-18C	Bladder Cancer PBMC	0.198
6229-14-090-18D	Bladder Cancer PBMC	0.203
6229_S15-50380	Bladder Cancer PBMC	0.269
6428-14-090-11A	Bladder Cancer PBMC	0.235
6428-14-090-11B	Bladder Cancer PBMC	0.291
6428-14-090-11C	Bladder Cancer PBMC	0.295
6428_S13-25113_5_9L	Bladder Cancer PBMC	0.467
6800-14-090-14A	Bladder Cancer PBMC	0.195
6800-14-090-14B	Bladder Cancer PBMC	0.229
6800-14-090-14C	Bladder Cancer PBMC	0.247
7577-14-090-22A	Bladder Cancer PBMC	0.236
7577-14-090-22B	Bladder Cancer PBMC	0.184
7577-14-090-22C	Bladder Cancer PBMC	0.306
7577_S14-7038_1_7L	Bladder Cancer PBMC	0.541
7592-14-090-17A	Bladder Cancer PBMC	0.2
7592-14-090-17B	Bladder Cancer PBMC	0.255
7592-14-090-17C	Bladder Cancer PBMC	0.208
7729-14-090-27A	Bladder Cancer PBMC	0.281
7729-14-090-27B	Bladder Cancer PBMC	0.268
7729-14-090-27C	Bladder Cancer PBMC	0.22
7729-14-090-27D	Bladder Cancer PBMC	0.256
7729_S13-39493_3_12_LAW	Bladder Cancer PBMC	0.196
8214-14-090-5A	Bladder Cancer PBMC	0.194
8214-14-090-5B	Bladder Cancer PBMC	0.235
8214-14-090-5C	Bladder Cancer PBMC	0.224
8214-14-090-5D	Bladder Cancer PBMC	0.247
8728-14-090-25A	Bladder Cancer PBMC	0.253
8728-14-090-25B	Bladder Cancer PBMC	0.245
8728-14-090-25C	Bladder Cancer PBMC	0.267
8728_S13-17092_5_10L	Bladder Cancer PBMC	0.318
9517-14-090-19A	Bladder Cancer PBMC	0.228
9517-14-090-19B	Bladder Cancer PBMC	0.21
9517-14-090-19C	Bladder Cancer PBMC	0.201
9517-14-090-19D	Bladder Cancer PBMC	0.237
9517-14-090-19E	Bladder Cancer PBMC	0.247
9517-14-090-19F	Bladder Cancer PBMC	0.263
9517_S14-30425_1_1_GU	Bladder Cancer PBMC	NaN
9723-14-090-24A	Bladder Cancer PBMC	0.206
9723_S14-15330	Bladder Cancer PBMC	0.047
9854-14-090-30A	Bladder Cancer PBMC	0.289
9881-14-090-10A	Bladder Cancer PBMC	0.252
9881-14-090-10B	Bladder Cancer PBMC	0.242
9881-14-090-10C	Bladder Cancer PBMC	0.228
9881-14-090-10D	Bladder Cancer PBMC	0.251
9881_S13-31947_5_10_LLL	Bladder Cancer PBMC	0.869
Patient10_Tumor	Colon Cancer TIL	0.128
Patient11_Tumor	Colon Cancer TIL	0.422
Patient12_Tumor	Colon Cancer TIL	0.407
Patient13_Tumor	Colon Cancer TIL	0.461
Patient14_Tumor	Colon Cancer TIL	0.729
Patient1_Tumor	Colon Cancer TIL	0.335

Patient2_Tumor	Colon Cancer TIL	0.24
Patient3_Tumor	Colon Cancer TIL	0.255
Patient4_Tumor	Colon Cancer TIL	0.102
Patient5_Tumor	Colon Cancer TIL	NaN
Patient6_Tumor	Colon Cancer TIL	NaN
Patient7_Tumor	Colon Cancer TIL	0.373
Patient8_Tumor	Colon Cancer TIL	0.124
Patient9_Tumor	Colon Cancer TIL	NaN
PC19-16Blood	Pancreatic Cancer PBMC	0.292
PC19-39Blood	Pancreatic Cancer PBMC	0.346
PC19-40Blood	Pancreatic Cancer PBMC	0.347
PC19-44Blood	Pancreatic Cancer PBMC	0.299
PC19-55Blood	Pancreatic Cancer PBMC	0.361
PC19-64Blood	Pancreatic Cancer PBMC	0.24
PC19-68Blood	Pancreatic Cancer PBMC	0.368
PC19-16T	Pancreatic Cancer TIL	0.335
PC19-18T	Pancreatic Cancer TIL	0.344
PC19-1T	Pancreatic Cancer TIL	0.34
PC19-39T	Pancreatic Cancer TIL	0.34
PC19-40PDA	Pancreatic Cancer TIL	0.432
PC19-44PDA	Pancreatic Cancer TIL	0.34
PC19-55PDA	Pancreatic Cancer TIL	0.311
PC19-64PDA	Pancreatic Cancer TIL	0.256
PC19-68PDA	Pancreatic Cancer TIL	0.287
tient 1_Metastatic_SectionA	Ovarian Cancer PBMC	0.382
ient 1_Metastatic_SectionA	Ovarian Cancer PBMC	0.344
ient 1_Metastatic_SectionA	Ovarian Cancer PBMC	0.349
tient 1_Metastatic_SectionA	Ovarian Cancer PBMC	0.333
tient 1_Metastatic_SectionA	Ovarian Cancer PBMC	0.318
tient 1_Metastatic_SectionA	Ovarian Cancer PBMC	0.327
ient 1_Metastatic_Section	Ovarian Cancer PBMC	0.334
ıtient 1_Metastatic_Section	Ovarian Cancer PBMC	0.336
ıtient 1_Metastatic_Section	Ovarian Cancer PBMC	0.334
Patient 1_Tumor_SectionC1	Ovarian Cancer PBMC	0.393
²atient 2_Tumor_SectionB1	Ovarian Cancer PBMC	0.268
Patient 2_Tumor_SectionB2	Ovarian Cancer PBMC	0.349
²atient 2_Tumor_SectionB2	Ovarian Cancer PBMC	0.324
²atient 2_Tumor_SectionB2	Ovarian Cancer PBMC	0.403
²atient 2_Tumor_SectionB2	Ovarian Cancer PBMC	0.369
²atient 2_Tumor_SectionB2	Ovarian Cancer PBMC	0.34
Patient 2_Tumor_SectionB8	Ovarian Cancer PBMC	0.288
²atient 2_Tumor_SectionC1	Ovarian Cancer PBMC	0.244
²atient 2_Tumor_SectionC1	Ovarian Cancer PBMC	0.308
²atient 2_Tumor_SectionC2	Ovarian Cancer PBMC	0.287
²atient 2_Tumor_SectionC2	Ovarian Cancer PBMC	0.343
²atient 2_Tumor_SectionC2	Ovarian Cancer PBMC	0.327
Patient 2_Tumor_SectionC7	Ovarian Cancer PBMC	0.471
Patient 2_Tumor_SectionC8	Ovarian Cancer PBMC	0.263
²atient 2_Tumor_SectionD1	Ovarian Cancer PBMC	0.334
²atient 2_Tumor_SectionD1	Ovarian Cancer PBMC	0.309
²atient 2_Tumor_SectionD2	Ovarian Cancer PBMC	0.255
²atient 2_Tumor_SectionD2	Ovarian Cancer PBMC	0.331
²atient 2_Tumor_SectionD2	Ovarian Cancer PBMC	0.382
Patient 2_Tumor_SectionD8	Ovarian Cancer PBMC	0.34
Patient 2_Tumor_SectionD9	Ovarian Cancer PBMC	0.317
Patient 2_Whole Blood	Ovarian Cancer PBMC	0.332
ıtient 3_Metastatic_Section	Ovarian Cancer PBMC	0.264
tient 3_Metastatic_SectionA	Ovarian Cancer PBMC	0.243
tient 3_Metastatic_SectionA	Ovarian Cancer PBMC	0.261
tient 3_Metastatic_SectionA	Ovarian Cancer PBMC	0.227
tient 3_Metastatic_SectionA	Ovarian Cancer PBMC	0.274
tient 3_Metastatic_SectionA	Ovarian Cancer PBMC	0.284
tient 3_Metastatic_SectionA	Ovarian Cancer PBMC	0.297
tient 3_Metastatic_SectionA	Ovarian Cancer PBMC	0.267
ıtient 3_Metastatic_Section	Ovarian Cancer PBMC	0.237
tient 3_Metastatic_SectionA	Ovarian Cancer PBMC	0.283
tient 3_Metastatic_SectionA	Ovarian Cancer PBMC	0.267
tient 3_Metastatic_SectionA	Ovarian Cancer PBMC	0.275
tient 3_Metastatic_SectionA	Ovarian Cancer PBMC	0.258
tient 3_Metastatic_SectionA	Ovarian Cancer PBMC	0.301
tient 3_Metastatic_SectionA	Ovarian Cancer PBMC	0.285
ıtient 3_Metastatic_Section	Ovarian Cancer PBMC	0.292
ıtient 3_Metastatic_Section	Ovarian Cancer PBMC	0.289
ıtient 3_Metastatic_Section	Ovarian Cancer PBMC	0.252
ıtient 3_Metastatic_Section	Ovarian Cancer PBMC	0.246
ıtient 3_Metastatic_Section	Ovarian Cancer PBMC	0.244
ıtient 3_Metastatic_Section	Ovarian Cancer PBMC	0.235
Patient 3_Tumor_SectionC1	Ovarian Cancer PBMC	0.356
Patient 3_Whole Blood	Ovarian Cancer PBMC	0.335
ient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.328
ient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.297
tient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.256
tient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.288
tient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.343
ient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.386
ient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.386
tient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.307
tient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.297
ient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.315
ient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.349
tient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.334
tient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.33
tient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.36
tient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.332
tient 4_Metastatic_SectionA	Ovarian Cancer PBMC	0.314
ıtient 4_Metastatic_Section	Ovarian Cancer PBMC	0.348
ıtient 4_Metastatic_Section	Ovarian Cancer PBMC	0.355
Patient 4_Tumor_Section B8	Ovarian Cancer PBMC	0.357
²atient 4_Tumor_SectionB1	Ovarian Cancer PBMC	0.325
²atient 4_Tumor_SectionB1	Ovarian Cancer PBMC	0.313
²atient 4_Tumor_SectionB2	Ovarian Cancer PBMC	0.373
²atient 4_Tumor_SectionB2	Ovarian Cancer PBMC	0.376
²atient 4_Tumor_SectionB2	Ovarian Cancer PBMC	0.386
²atient 4_Tumor_SectionB2	Ovarian Cancer PBMC	0.319
Patient 4_Tumor_SectionB7	Ovarian Cancer PBMC	0.363
Patient 4_Whole Blood	Ovarian Cancer PBMC	0.342
ıtient 5_Metastatic_Section	Ovarian Cancer PBMC	0.33
tient 5_Metastatic_Section	Ovarian Cancer PBMC	0.336
tient 5_Metastatic_SectionA	Ovarian Cancer PBMC	0.321
tient 5_Metastatic_SectionA	Ovarian Cancer PBMC	0.308
tient 5_Metastatic_SectionA	Ovarian Cancer PBMC	0.353
²atient 5_Tumor_SectionB1	Ovarian Cancer PBMC	0.277
²atient 5_Tumor_SectionB1	Ovarian Cancer PBMC	0.244
²atient 5_Tumor_SectionB2	Ovarian Cancer PBMC	NaN
²atient 5_Tumor_SectionB2	Ovarian Cancer PBMC	0.371
²atient 5_Tumor_SectionB2	Ovarian Cancer PBMC	0.159
²atient 5_Tumor_SectionB2	Ovarian Cancer PBMC	NaN
Patient 5_Tumor_SectionB8	Ovarian Cancer PBMC	0.483
Patient 5_Tumor_SectionB9	Ovarian Cancer PBMC	0.48
Patient 5_Whole Blood	Ovarian Cancer PBMC	0.377
10_Brain Met	Lung Brain Mets TIL	0.382
11_Brain Met	Lung Brain Mets TIL	0.499
12_Brain Met	Lung Brain Mets TIL	0.377
13_Brain Met	Lung Brain Mets TIL	0.378
14_Brain Met	Lung Brain Mets TIL	0.407
15_Brain Met	Lung Brain Mets TIL	0.347
16_Brain Met	Lung Brain Mets TIL	0.334
17_Brain Met	Lung Brain Mets TIL	0.157
18_Brain Met	Lung Brain Mets TIL	0.341
19_Brain Met	Lung Brain Mets TIL	0.368
1_Brain Met	Lung Brain Mets TIL	0.354
20_Brain Met	Lung Brain Mets TIL	0.362
2_Brain Met	Lung Brain Mets TIL	0.36
3_Brain Met	Lung Brain Mets TIL	0.433
4_Brain Met	Lung Brain Mets TIL	0.382
5_Brain Met	Lung Brain Mets TIL	0.381
6_Brain Met	Lung Brain Mets TIL	0.335
7_Brain Met	Lung Brain Mets TIL	0.268
8_Brain Met	Lung Brain Mets TIL	0.35
9_Brain Met	Lung Brain Mets TIL	0.478
Pt10_PD_PBMC_Day0	Lung Cancer PBMC	0.183
Pt10_PD_PBMC_Day22	Lung Cancer PBMC	0.22

Pt11_NE_PBMC_Day0	Lung Cancer PBMC	0.208
Pt11_NE_PBMC_Day22	Lung Cancer PBMC	0.168
Pt13_NE_PBMC_Day0	Lung Cancer PBMC	0.217
Pt13_NE_PBMC_Day22	Lung Cancer PBMC	0.2
Pt15_NE_PBMC_Day0	Lung Cancer PBMC	0.208
Pt15_NE_PBMC_Day22	Lung Cancer PBMC	0.198
Pt16_PD_PBMC_Day0	Lung Cancer PBMC	0.192
Pt16_PD_PBMC_Day22	Lung Cancer PBMC	0.232
Pt17_PR_PBMC_Day0	Lung Cancer PBMC	0.195
Pt17_PR_PBMC_Day22	Lung Cancer PBMC	0.212
Pt18_NE_PBMC_Day0	Lung Cancer PBMC	0.183
Pt18_NE_PBMC_Day22	Lung Cancer PBMC	0.198
Pt1_PR_PBMC_Day0	Lung Cancer PBMC	0.214
Pt1_PR_PBMC_Day22	Lung Cancer PBMC	0.217
Pt21_NE_PBMC_Day0	Lung Cancer PBMC	0.269
Pt21_NE_PBMC_Day22	Lung Cancer PBMC	0.233
Pt22_SD_PBMC_Day0	Lung Cancer PBMC	0.203
Pt22_SD_PBMC_Day22	Lung Cancer PBMC	0.225
Pt23_PR_PBMC_Day0	Lung Cancer PBMC	0.233
Pt23_PR_PBMC_Day22	Lung Cancer PBMC	0.218
Pt27_PD_PBMC_Day0	Lung Cancer PBMC	0.235
Pt27_PD_PBMC_Day22	Lung Cancer PBMC	0.243
Pt28_PD_PBMC_Day0	Lung Cancer PBMC	0.193
Pt28_PD_PBMC_Day22	Lung Cancer PBMC	0.212
Pt29_NE_PBMC_Day0	Lung Cancer PBMC	0.218
Pt29_NE_PBMC_Day22	Lung Cancer PBMC	0.241
Pt30_SD_PBMC_Day0	Lung Cancer PBMC	0.253
Pt30_SD_PBMC_Day22	Lung Cancer PBMC	0.272
Pt32_SD_PBMC_Day0	Lung Cancer PBMC	0.171
Pt32_SD_PBMC_Day172	Lung Cancer PBMC	0.191
Pt32_SD_PBMC_Day22	Lung Cancer PBMC	0.228
Pt32_SD_PBMC_Day64	Lung Cancer PBMC	0.223
Pt32_SD_PBMC_Day88	Lung Cancer PBMC	0.218
Pt35_NE_PBMC_Day0	Lung Cancer PBMC	0.227
Pt35_NE_PBMC_Day22	Lung Cancer PBMC	0.27
Pt36_PD_PBMC_Day0	Lung Cancer PBMC	0.198
Pt36_PD_PBMC_Day22	Lung Cancer PBMC	0.212
Pt36_PD_PBMC_Day64	Lung Cancer PBMC	0.203
Pt36_PD_PBMC_Day88	Lung Cancer PBMC	0.217
Pt37_PR_PBMC_Day0	Lung Cancer PBMC	0.238
Pt37_PR_PBMC_Day22	Lung Cancer PBMC	0.225
Pt38_PD_PBMC_Day0	Lung Cancer PBMC	0.208
Pt38_PD_PBMC_Day22	Lung Cancer PBMC	0.178
Pt38_PD_PBMC_Day88	Lung Cancer PBMC	0.235
Pt3_CR_PBMC_Day0	Lung Cancer PBMC	0.207
Pt3_CR_PBMC_Day22	Lung Cancer PBMC	0.217
Pt40_PD_PBMC_Day0	Lung Cancer PBMC	0.266
Pt40_PD_PBMC_Day22	Lung Cancer PBMC	0.256
Pt41_NE_PBMC_Day0	Lung Cancer PBMC	0.24
Pt41_NE_PBMC_Day22	Lung Cancer PBMC	0.269
Pt43_PD_PBMC_Day0	Lung Cancer PBMC	0.17
Pt43_PD_PBMC_Day22	Lung Cancer PBMC	0.187
Pt44_PR_PBMC_Day0	Lung Cancer PBMC	0.19
Pt44_PR_PBMC_Day22	Lung Cancer PBMC	0.229
Pt4_CR_PBMC_Day0	Lung Cancer PBMC	0.216
Pt4_CR_PBMC_Day203	Lung Cancer PBMC	0.209
Pt4_CR_PBMC_Day22	Lung Cancer PBMC	0.215
Pt4_CR_PBMC_Day43	Lung Cancer PBMC	0.248
Pt4_CR_PBMC_Day64	Lung Cancer PBMC	0.222
Pt5_SD_PBMC_Day0	Lung Cancer PBMC	0.26
Pt5_SD_PBMC_Day22	Lung Cancer PBMC	0.238
Pt5_SD_PBMC_Day43	Lung Cancer PBMC	0.242
Pt5_SD_PBMC_Day64	Lung Cancer PBMC	0.249
Pt6_NE_PBMC_Day0	Lung Cancer PBMC	0.174
Pt6_NE_PBMC_Day22	Lung Cancer PBMC	0.154
Pt9_SD_PBMC_Day0	Lung Cancer PBMC	0.237
Pt9_SD_PBMC_Day22	Lung Cancer PBMC	0.198
Subject01-110316_PBMC	Healthy Donor Time Course	0.19
Subject01-110415_PBMC	Healthy Donor Time Course	0.2
Subject01-110512_PBMC	Healthy Donor Time Course	0.172
Subject01-110609_PBMC	Healthy Donor Time Course	0.187
Subject01-110819_PBMC	Healthy Donor Time Course	0.209
Subject01-110915_PBMC	Healthy Donor Time Course	0.187
Subject01-111014_PBMC	Healthy Donor Time Course	0.213
Subject01-120320_PBMC	Healthy Donor Time Course	0.203
Subject02-110317_PBMC	Healthy Donor Time Course	0.165
Subject02-110415_PBMC	Healthy Donor Time Course	0.178
Subject02-110513_PBMC	Healthy Donor Time Course	0.184
Subject02-110609_PBMC	Healthy Donor Time Course	0.182
Subject02-110811_PBMC	Healthy Donor Time Course	0.203
Subject02-110908_PBMC	Healthy Donor Time Course	0.174
Subject02-111006_PBMC	Healthy Donor Time Course	0.182
Subject02-120327_PBMC	Healthy Donor Time Course	0.178
Subject03-110316_PBMC	Healthy Donor Time Course	0.185
Subject03-110415_PBMC	Healthy Donor Time Course	0.188
Subject03-110513_PBMC	Healthy Donor Time Course	0.186
Subject03-110609_PBMC	Healthy Donor Time Course	0.184
Subject03-110812_PBMC	Healthy Donor Time Course	0.186
Subject03-110909_PBMC	Healthy Donor Time Course	0.18
Subject03-111007_PBMC	Healthy Donor Time Course	0.186
Subject03-120403_PBMC	Healthy Donor Time Course	0.191
0305_PA	GBM PBMC	0.235
0305_PB	GBM PBMC	0.191
0881_PA	GBM PBMC	0.212
10956_PA	GBM PBMC	0.305
10956_PB	GBM PBMC	0.304
13209_PA	GBM PBMC	0.185
13209_PB	GBM PBMC	0.168
15532_PA	GBM PBMC	0.204
1607_PA	GBM PBMC	0.234
1607_PB	GBM PBMC	0.218
1708_PA	GBM PBMC	0.196
1708_PB	GBM PBMC	0.28
1708_TA	GBM PBMC	0.332
1708_TB	GBM PBMC	0.305
17232_PA	GBM PBMC	0.225
17232_PB	GBM PBMC	0.194
17232_TA	GBM PBMC	0.296
19539_PA	GBM PBMC	0.212
19539_PB	GBM PBMC	0.217
21828_PA	GBM PBMC	0.212
21828_PB	GBM PBMC	0.168
27934_PA	GBM PBMC	0.201
27934_PB	GBM PBMC	0.178
32204_PA	GBM PBMC	0.21
32204_PB	GBM PBMC	0.19
32204_TB	GBM PBMC	0.293
33296_PA	GBM PBMC	0.264
33296_PB	GBM PBMC	0.248
34730_PA	GBM PBMC	0.211
34730_PB	GBM PBMC	0.199
6815_PA	GBM PBMC	0.171
6815_PB	GBM PBMC	0.188
PD1_Patient12_Pre	Melanoma TIL	0.307
PD1_Patient13_Pre	Melanoma TIL	0.304
PD1_Patient14_Pre	Melanoma TIL	0.231
PD1_Patient15_Pre	Melanoma TIL	0.305
PD1_Patient16_Pre	Melanoma TIL	0.289
PD1_Patient17_Pre	Melanoma TIL	0.302
PD1_Patient18_Pre	Melanoma TIL	0.272
PD1_Patient19_Pre	Melanoma TIL	0.256
PD1_Patient1_Pre	Melanoma TIL	0.306
PD1_Patient20_Pre	Melanoma TIL	0.364
PD1_Patient21_Pre	Melanoma TIL	0.243
PD1_Patient22_Pre	Melanoma TIL	0.365
PD1_Patient23_Pre	Melanoma TIL	0.312
PD1_Patient24_Pre	Melanoma TIL	0.305
PD1_Patient25_Pre	Melanoma TIL	NaN
PD1_Patient2_Pre	Melanoma TIL	0.316
PD1_Patient3_Pre	Melanoma TIL	0.315
PD1_Patient4_Pre	Melanoma TIL	0.305
PD1_Patient5_Pre	Melanoma TIL	0.316

PD1_Patient6_Pre	Melanoma TIL	0.308
PD1_Patient7_Pre	Melanoma TIL	0.306
PD1_Patient8_Pre	Melanoma TIL	0.292
PD1_Patient9_Pre	Melanoma TIL	0.293
10_Lung	Lung Cancer TIL	0.378
11_Lung	Lung Cancer TIL	0.402
12_Lung	Lung Cancer TIL	0.382
13_Lung	Lung Cancer TIL	0.399
14_Lung	Lung Cancer TIL	0.35
15_Lung	Lung Cancer TIL	0.374
16_Lung	Lung Cancer TIL	0.382
17_Lung	Lung Cancer TIL	0.36
18_Lung	Lung Cancer TIL	0.331
19_Lung	Lung Cancer TIL	0.352
1_Lung	Lung Cancer TIL	0.39
20_Lung	Lung Cancer TIL	0.329
2_Lung	Lung Cancer TIL	0.385
3_Lung	Lung Cancer TIL	0.331
4_Lung	Lung Cancer TIL	0.431
5_Lung	Lung Cancer TIL	0.325
6_Lung	Lung Cancer TIL	0.393
7_Lung	Lung Cancer TIL	0.343
8_Lung	Lung Cancer TIL	0.342
9_Lung	Lung Cancer TIL	0.397
BP108	inHouse RCC PBMC	0.40509197
BP117	inHouse RCC PBMC	0.27878836
BP122	inHouse RCC PBMC	0.2580931
BP130	inHouse RCC PBMC	0.36956075
BP17	inHouse RCC PBMC	0.24520558
BP204	inHouse RCC PBMC	0.30715504
BP24	inHouse RCC PBMC	0.34777924
BP49	inHouse RCC PBMC	0.310086
BP69	inHouse RCC PBMC	0.24996658
BP78	inHouse RCC PBMC	0.277014
GO413	inHouse OV PBMC	0.27955514
GO414	inHouse OV PBMC	0.28994504
GO494	inHouse OV PBMC	0.31097832
GO496	inHouse OV PBMC	0.27521673
GO498	inHouse OV PBMC	0.24290703
GO500	inHouse OV PBMC	0.297676
GO508	inHouse OV PBMC	0.2874703
GO513	inHouse OV PBMC	0.33235228
GO514	inHouse OV PBMC	0.36925167
GO515	inHouse OV PBMC	0.2511676
MD01-010	Early JHU_Lung PBMC	0.27579403
MD01-019	Early JHU_Lung PBMC	0.22907762
MD01-024	Early JHU_Lung PBMC	0.30258527
MD043-003	Early JHU_Lung PBMC	0.29187623
MD043-006	Early JHU_Lung PBMC	0.23864019
MD043-008	Early JHU_Lung PBMC	0.2587863
MD043-011	Early JHU_Lung PBMC	0.26732302
NY016-007	Early JHU_Lung PBMC	0.2835174
NY016-015	Early JHU_Lung PBMC	0.28045487
NY016-016	Early JHU_Lung PBMC	0.30117986
NY016-021	Early JHU_Lung PBMC	0.28635123
MD01-004	Late JHU_Lung PBMC	0.2369099
MD043-012	Late JHU_Lung PBMC	0.2984715
NY016-009	Late JHU_Lung PBMC	0.2933475
NY016-014	Late JHU_Lung PBMC	0.3076549
pancreas-16	inHouse Pancreatic PBMC	0.23920017
pancreas-17	inHouse Pancreatic PBMC	0.23186156
pancreas-19	inHouse Pancreatic PBMC	0.25323275
pancreas-1	inHouse Pancreatic PBMC	0.29596633
pancreas-4	inHouse Pancreatic PBMC	0.30504405
pancreas-5	inHouse Pancreatic PBMC	0.19168739
pancreas-6	inHouse Pancreatic PBMC	0.26231995
pancreas-7	inHouse Pancreatic PBMC	0.25949353
01-0272_TCRB	TB	0.20128094
01-0345_TCRB	TB	0.25564656
01-0381_TCRB	TB	0.20587152
01-0457_TCRB	TB	0.20244448
01-0667_TCRB	TB	0.23731196
01-0872_TCRB	TB	0.20805217
01-0959_TCRB	TB	0.23534165
02-0249_TCRB	TB	0.1854494
02-0292_TCRB	TB	0.21422137
02-0319_TCRB	TB	0.23255761
02-0320_TCRB	TB	0.22314215
03-0324_TCRB	TB	0.2581756
03-0539_TCRB	TB	0.2300714
03-0558_TCRB	TB	0.2252191
03-0703_TCRB	TB	0.2215595
03-0709_TCRB	TB	0.22567861
09-0092_TCRB	TB	0.25338668
09-0157_TCRB	TB	0.23492841
09-0306_TCRB	TB	0.23465608
11-0083_TCRB	TB	0.2543969
TB-1100_TCRB	TB	0.20420113
TB-1103_TCRB	TB	0.22977567
TB-1104_TCRB	TB	0.18254362
TB-1107_TCRB	TB	0.25080487
TB-1112_TCRB	TB	0.20699956
TB-1117_TCRB	TB	0.23005931
TB-1119_TCRB	TB	0.17597535
TB-1124_TCRB	TB	0.2647558
TB-1126_TCRB	TB	0.25631

Supplementary Table 4: iRepertoire

Sample ID	Tag	Cancer Score
101929	iRepertoire_Control	0.40372843
101945	iRepertoire_Control	0.3987111
101961	iRepertoire_Control	0.3188681
101959	iRepertoire_Control	0.34209603
101981	iRepertoire_Control	0.4016726
101848	iRepertoire_Control	0.34279156
101849	iRepertoire_Control	0.36239034
101965	iRepertoire_Control	0.31862152
101804	iRepertoire_Control	0.30225056
101841	iRepertoire_Control	0.35663125
101954	iRepertoire_Control	0.37547222
101868	iRepertoire_Control	0.33343685
101766	iRepertoire_Control	0.4558695
101794	iRepertoire_Control	0.385123
101758	iRepertoire_Control	0.35908517
101771	iRepertoire_Control	0.4112622
101931	iRepertoire_Control	0.39205328
101873	iRepertoire_Control	0.4378978
101821	iRepertoire_Control	0.34487474
101342	iRepertoire_Control	0.35641122
101316	iRepertoire_Control	0.34279278
101330	iRepertoire_Control	0.41093904
101340	iRepertoire_Control	0.4733857
101334	iRepertoire_Control	0.35076678
101348	iRepertoire_Control	0.3563575
101268	iRepertoire_Control	0.3771413
101354	iRepertoire_Control	0.4031349
101345	iRepertoire_Control	0.3936409
101459	iRepertoire_Control	0.37000257
101378	iRepertoire_Control	0.4488126
101329	iRepertoire_Control	0.33006364
101410	iRepertoire_Control	0.30084923
101357	iRepertoire_Control	0.3332064
101267	iRepertoire_Control	0.42126137
101274	iRepertoire_Control	0.3779874
101473	iRepertoire_Control	0.40479013
101282	iRepertoire_Control	0.40186095
103000	iRepertoire_Control	0.34843317
102810	iRepertoire_Control	0.41698304
102972	iRepertoire_Control	0.3066281
102786	iRepertoire_Control	0.282643
102926	iRepertoire_Control	0.3571672
102827	iRepertoire_Control	0.37249294
102937	iRepertoire_Control	0.4379346
102892	iRepertoire_Control	0.42776126
102992	iRepertoire_Control	0.39513096
102991	iRepertoire_Control	0.31650048
102805	iRepertoire_Control	0.43420973
102799	iRepertoire_Control	0.30088302
102977	iRepertoire_Control	0.34471348
102839	iRepertoire_Control	0.42026097
102932	iRepertoire_Control	0.2420324
102924	iRepertoire_Control	0.38682136
102923	iRepertoire_Control	0.3860535
102942	iRepertoire_Control	0.35329583
102794	iRepertoire_Control	0.4187023
102866	iRepertoire_Control	0.35442075
102797	iRepertoire_Control	0.3236202
104145	iRepertoire_Control	0.371344
104130	iRepertoire_Control	0.39547592
104109	iRepertoire_Control	0.34466487
103997	iRepertoire_Control	0.29370642
104166	iRepertoire_Control	0.4397488
104090	iRepertoire_Control	0.42625365
104189	iRepertoire_Control	0.34116563
104024	iRepertoire_Control	0.2711971
104077	iRepertoire_Control	0.37707412
104224	iRepertoire_Control	0.35338414
104154	iRepertoire_Control	0.4181558
104248	iRepertoire_Control	0.43340573
104019	iRepertoire_Control	0.3311118
104023	iRepertoire_Control	0.3771361
104015	iRepertoire_Control	0.40986842
104251	iRepertoire_Control	0.3327817
104170	iRepertoire_Control	0.42436203
104120	iRepertoire_Control	0.41824237
104105	iRepertoire_Control	0.37670085
104065	iRepertoire_Control	0.43420693
104013	iRepertoire_Control	0.33278593
103624	iRepertoire_Control	0.31189615
103641	iRepertoire_Control	0.32095608
103820	iRepertoire_Control	0.33033377
103676	iRepertoire_Control	0.3312191
103705	iRepertoire_Control	0.3301792
103658	iRepertoire_Control	0.29727513
103713	iRepertoire_Control	0.3464812
103696	iRepertoire_Control	0.36857587
103692	iRepertoire_Control	0.28621474
103826	iRepertoire_Control	0.3202506
107020	iRepertoire_Control	0.32660902
107032	iRepertoire_Control	0.3173156
107172	iRepertoire_Control	0.39270243
106939	iRepertoire_Control	0.301483
107102	iRepertoire_Control	0.33825532
107132	iRepertoire_Control	0.30998865
107047	iRepertoire_Control	0.35296342
107053	iRepertoire_Control	0.4366008
106963	iRepertoire_Control	0.4134663
107174	iRepertoire_Control	0.37380278
106973	iRepertoire_Control	0.37505305
106965	iRepertoire_Control	0.33477858
106983	iRepertoire_Control	0.32810667
107153	iRepertoire_Control	0.30533728
107006	iRepertoire_Control	0.3200528
107082	iRepertoire_Control	0.3832781
106953	iRepertoire_Control	0.3189021
107015	iRepertoire_Control	0.42509454
107183	iRepertoire_Control	0.3797196
106979	iRepertoire_Control	0.37824726
106964	iRepertoire_Control	0.38803113
108425	iRepertoire_Control	0.41194072
108365	iRepertoire_Control	0.33739832
108453	iRepertoire_Control	0.39836696
108508	iRepertoire_Control	0.42678055
108379	iRepertoire_Control	0.34501624
108377	iRepertoire_Control	0.34963495
108420	iRepertoire_Control	0.3579851
108556	iRepertoire_Control	0.39409575
108424	iRepertoire_Control	0.28564283
108575	iRepertoire_Control	0.31951514
108446	iRepertoire_Control	0.4176627
108563	iRepertoire_Control	0.37021747
108493	iRepertoire_Control	0.39145535
108322	iRepertoire_Control	0.37366694
108374	iRepertoire_Control	0.36796838
108455	iRepertoire_Control	0.35565102
108569	iRepertoire_Control	0.35210082
108554	iRepertoire_Control	0.33485657
108550	iRepertoire_Control	0.36294845
108334	iRepertoire_Control	0.3419749
107805	iRepertoire_Control	0.30536145
107969	iRepertoire_Control	0.42471895
107846	iRepertoire_Control	0.26241368
107841	iRepertoire_Control	0.43666235
108023	iRepertoire_Control	0.33713683
107996	iRepertoire_Control	0.3587661
108019	iRepertoire_Control	0.3393638
107983	iRepertoire_Control	0.3546955
108036	iRepertoire_Control	0.35503525
107966	iRepertoire_Control	0.2914933
107972	iRepertoire_Control	0.35690254
107975	iRepertoire_Control	0.28544766
108029	iRepertoire_Control	0.4010726
107873	iRepertoire_Control	0.38872865
107771	iRepertoire_Control	0.41461545
107875	iRepertoire_Control	0.35689333
107984	iRepertoire_Control	0.41228473
107857	iRepertoire_Control	0.37042934
109219	iRepertoire_Control	0.3925764
109237	iRepertoire_Control	0.30364
109262	iRepertoire_Control	0.35630026
109235	iRepertoire_Control	0.4410939

109113	iRepertoire_Control	0.28969604
109118	iRepertoire_Control	0.3530747
109329	iRepertoire_Control	0.36430222
109141	iRepertoire_Control	0.41347906
109307	iRepertoire_Control	0.32550213
109215	iRepertoire_Control	0.36264464
109260	iRepertoire_Control	0.3745721
109166	iRepertoire_Control	0.40491444
109124	iRepertoire_Control	0.34576437
109213	iRepertoire_Control	0.41895965
109274	iRepertoire_Control	0.37917057
109127	iRepertoire_Control	0.30592352
109135	iRepertoire_Control	0.33723363
109358	iRepertoire_Control	0.33646595
109315	iRepertoire_Control	0.41506365
109327	iRepertoire_Control	0.3288846
109883	iRepertoire_Control	0.3745937
109943	iRepertoire_Control	0.3185677
109968	iRepertoire_Control	0.400147
110074	iRepertoire_Control	0.39894933
109937	iRepertoire_Control	0.41075
109907	iRepertoire_Control	0.42057475
109919	iRepertoire_Control	0.36592686
110020	iRepertoire_Control	0.3939647
109887	iRepertoire_Control	0.4168986
110036	iRepertoire_Control	0.32480252
109972	iRepertoire_Control	0.3217595
109905	iRepertoire_Control	0.3878782
110085	iRepertoire_Control	0.4062701
109949	iRepertoire_Control	0.34275433
109975	iRepertoire_Control	0.35291082
109957	iRepertoire_Control	0.32760277
109999	iRepertoire_Control	0.38217366
110100	iRepertoire_Control	0.4782333
109886	iRepertoire_Control	0.3738878
110047	iRepertoire_Control	0.3915984
110194	iRepertoire_Control	0.38439968
110181	iRepertoire_Control	0.37431562
110240	iRepertoire_Control	0.43148315
110176	iRepertoire_Control	0.39419273
110207	iRepertoire_Control	0.39240718
110234	iRepertoire_Control	0.3867715
110230	iRepertoire_Control	0.37134555
110192	iRepertoire_Control	0.33165273
110263	iRepertoire_Control	0.42898574
110389	iRepertoire_Control	0.23916386
110330	iRepertoire_Control	0.3518657
110381	iRepertoire_Control	0.3335418
110344	iRepertoire_Control	0.3593943
110414	iRepertoire_Control	0.366735
110373	iRepertoire_Control	0.34358498
110212	iRepertoire_Control	0.290741
110417	iRepertoire_Control	0.3775135
110360	iRepertoire_Control	0.4130489
110384	iRepertoire_Control	0.4183195
110329	iRepertoire_Control	0.37582615
110249	iRepertoire_Control	0.35413393
110348	iRepertoire_Control	0.40276963
111157	iRepertoire_Control	0.38733745
111256	iRepertoire_Control	0.31386974
111136	iRepertoire_Control	0.33820802
111100	iRepertoire_Control	0.4136362
111233	iRepertoire_Control	0.2704639
111148	iRepertoire_Control	0.41832355
111234	iRepertoire_Control	0.39337444
111105	iRepertoire_Control	0.34132504
111178	iRepertoire_Control	0.343459
111239	iRepertoire_Control	0.3653949
111190	iRepertoire_Control	0.43245393
111168	iRepertoire_Control	0.4398516
111254	iRepertoire_Control	0.36775425
111146	iRepertoire_Control	0.43040246
112183	iRepertoire_Control	0.40580577
Renal_01-01-1_TRB_pep	iRepertoire_RCC	0.3983343
Renal_01-02-1_TRB_pep	iRepertoire_RCC	0.34994283
Renal_01-03-1_TRB_pep	iRepertoire_RCC	0.54792523
Renal_01-04-1_TRB_pep	iRepertoire_RCC	0.5051877
Renal_01-05-1_TRB_pep	iRepertoire_RCC	0.39823505
Renal_01-19-1_TRB_pep	iRepertoire_RCC	0.43979815
Renal_01-20-1_TRB_pep	iRepertoire_RCC	0.42024732
Renal_01-23-1_TRB_pep	iRepertoire_RCC	0.33161584
Renal_01-24-1_TRB_pep	iRepertoire_RCC	0.4182641
Renal_01-30-1_TRB_pep	iRepertoire_RCC	0.43739036
Renal_03-21-1_TRB_pep	iRepertoire_RCC	0.5260305
Renal_03-22-1_TRB_pep	iRepertoire_RCC	0.3935503
Renal_03-28-1_TRB_pep	iRepertoire_RCC	0.49472174
Renal_06-25-1_TRB_pep	iRepertoire_RCC	0.55462706
Renal_06-27-1_TRB_pep	iRepertoire_RCC	0.42003888
Renal_06-29-1_TRB_pep	iRepertoire_RCC	0.503078
Renal_06-31-1_TRB_pep	iRepertoire_RCC	0.44140047
GSM2092524_TCR23B.BC2	iRepertoire_GBM	0.44074336
GSM2092529_TCR29B.BC2	iRepertoire_GBM	0.42121214
GSM2092534_TCR78B.BC2	iRepertoire_GBM	0.42995846
GSM2092539_TCR68B.BC8	iRepertoire_GBM	0.45452774
GSM2092544_TCR94B.BC6	iRepertoire_GBM	0.38578153
GSM2092549_TCR69B.BC6	iRepertoire_GBM	0.4305666
GSM2092554_TCR93B.BC6	iRepertoire_GBM	0.47707012
GSM2092559_TCR59B.BC8	iRepertoire_GBM	0.468451
GSM2092564_TCR95B.BC6	iRepertoire_GBM	0.38006452
GSM2092569_TCR106B.BC2	iRepertoire_GBM	0.41843432
GSM2092574_TCR62B.BC8	iRepertoire_GBM	0.40017167