Supplementary information

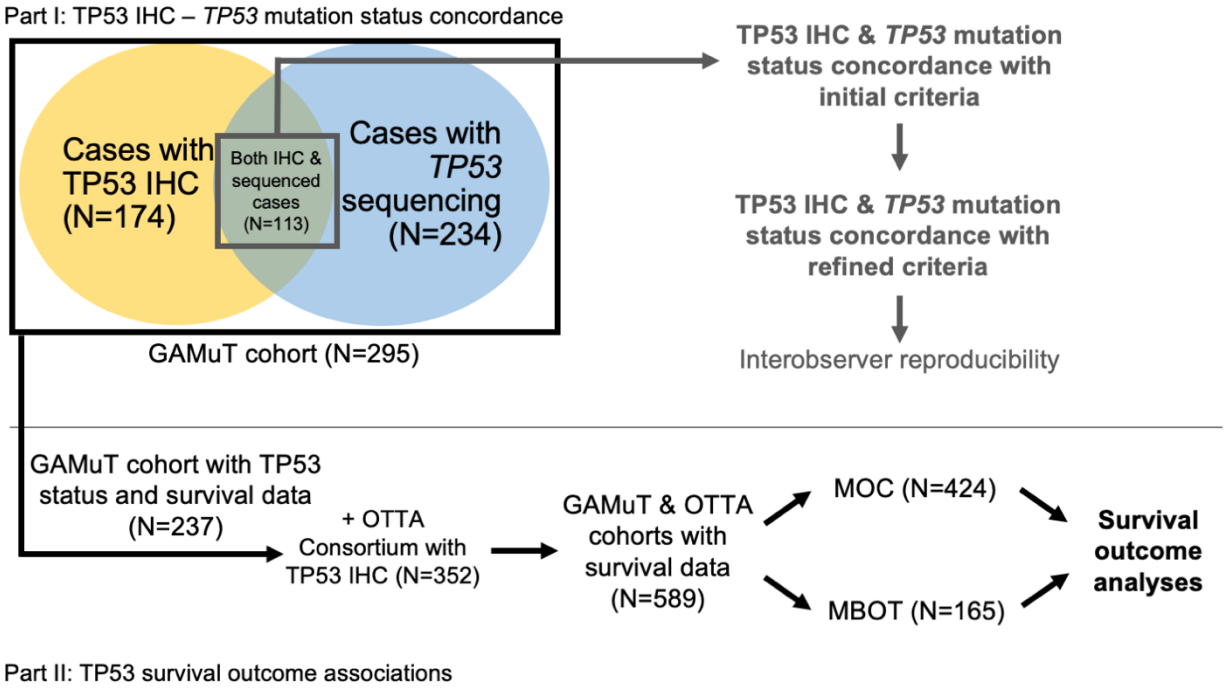

Figure S1. Study design. Part I: ovarian mucinous borderline tumors (MBOT) and mucinous carcinomas (MOC) from the genomic analysis of mucinous tumors (GAMuT) cohort with TP53 immunohistochemistry (IHC) and *TP53* sequencing data were used to determine concordance between IHC and mutation status by sequencing. An independent cohort with TP53 IHC was utilized to evaluate interobserver reproducibility on IHC. Part II: Cases of MBOT and MOC from the GAMuT cohort and Ovarian Tumor Tissue Analysis (OTTA) consortium with TP53 IHC and/or *TP53* mutation status by sequencing were evaluated for survival outcomes stratified by *TP53* normal or abnormal status.

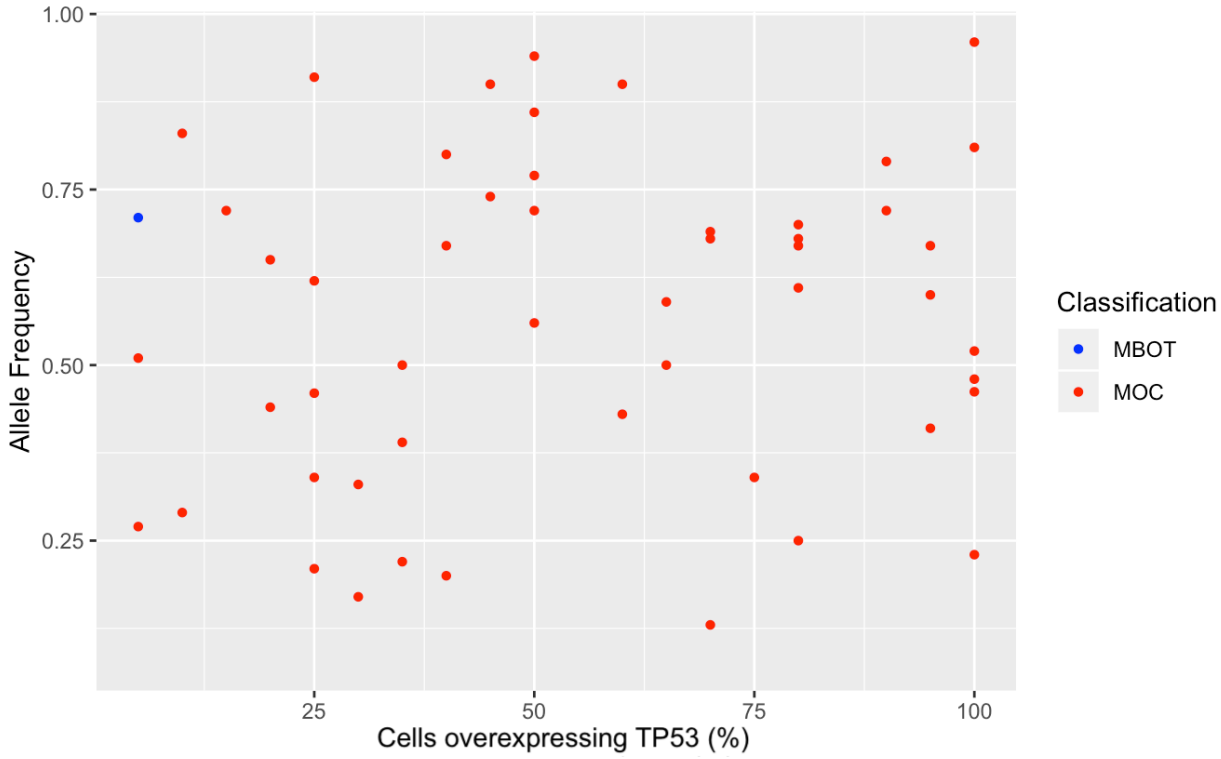

Figure S2. Allelic frequency and percentage of tumor cells demonstrating TP53 immunohistochemistry in ovarian tumors. Mucinous borderline tumors (MBOT; blue). mucinous carcinomas (MOC; red) (r=0.137; Spearman correlation; p=0.318).

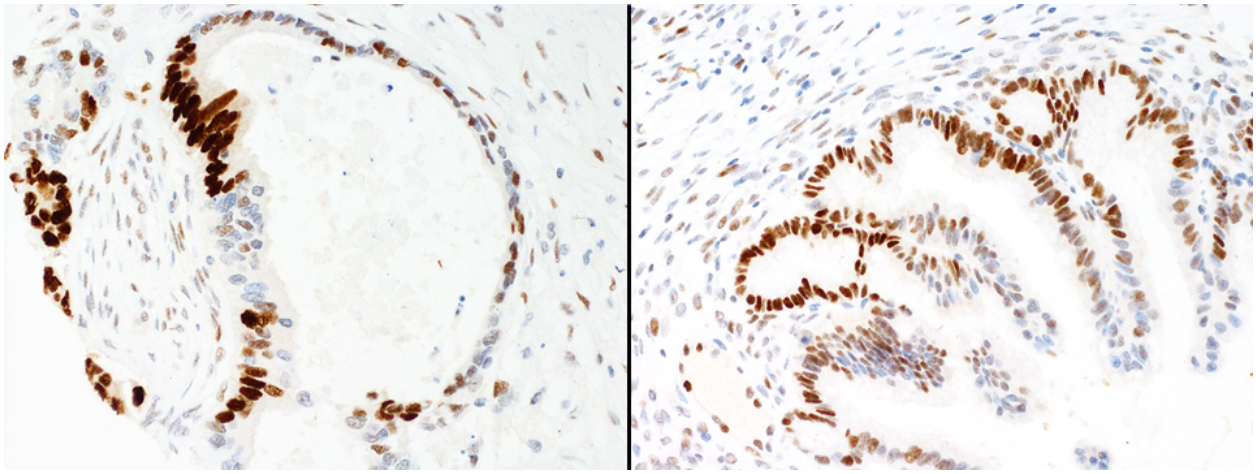

Figure S3. Examples of cases where disagreements occurred during interobserver reproducibility studies. These cases had final consensus scores of 5% abnormal overexpression (left) and normal (right).

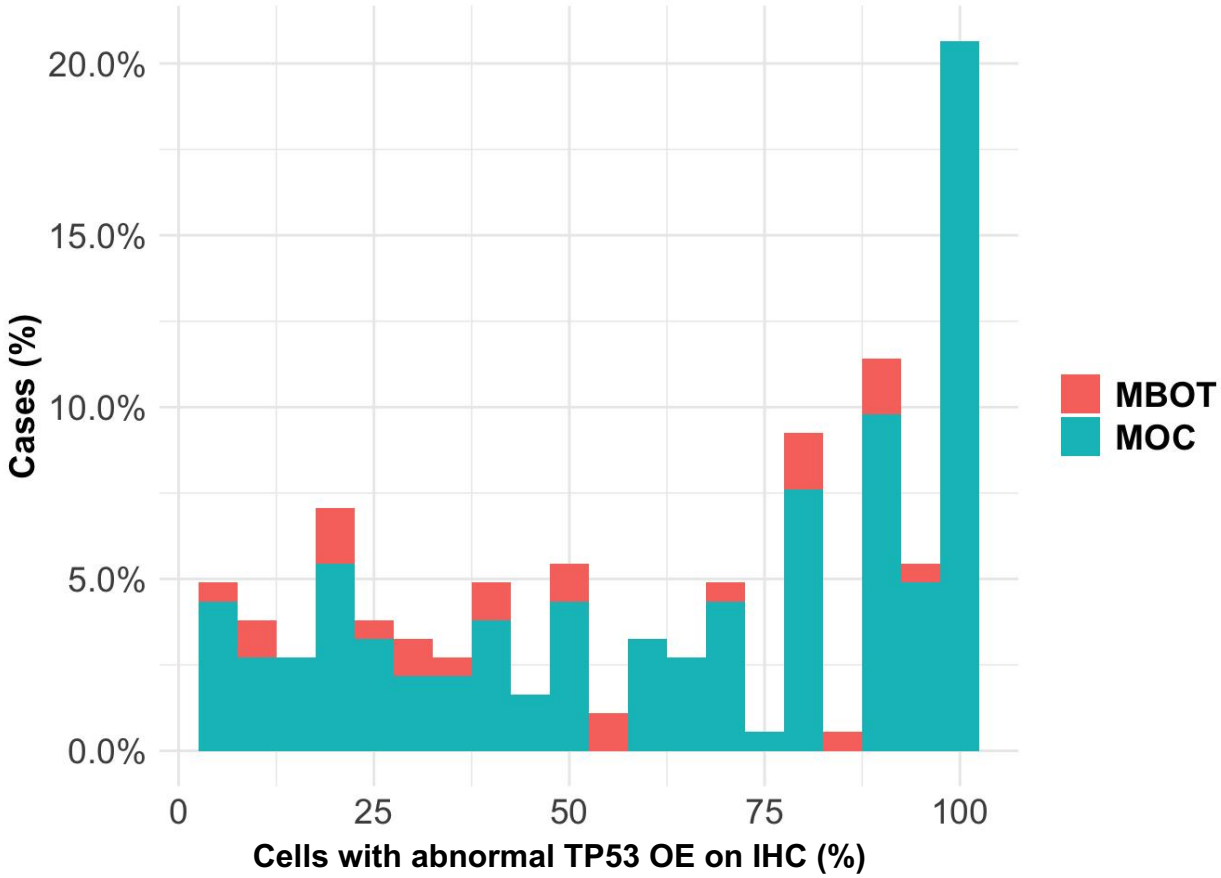

Figure S4. Distribution of percentage of tumor cells demonstrating abnormal TP53 overexpression (OE) in ovarian mucinous borderline tumors (MBOT, N=25) and mucinous carcinomas (MOC, N=159), as a percentage of the overexpressing cases.

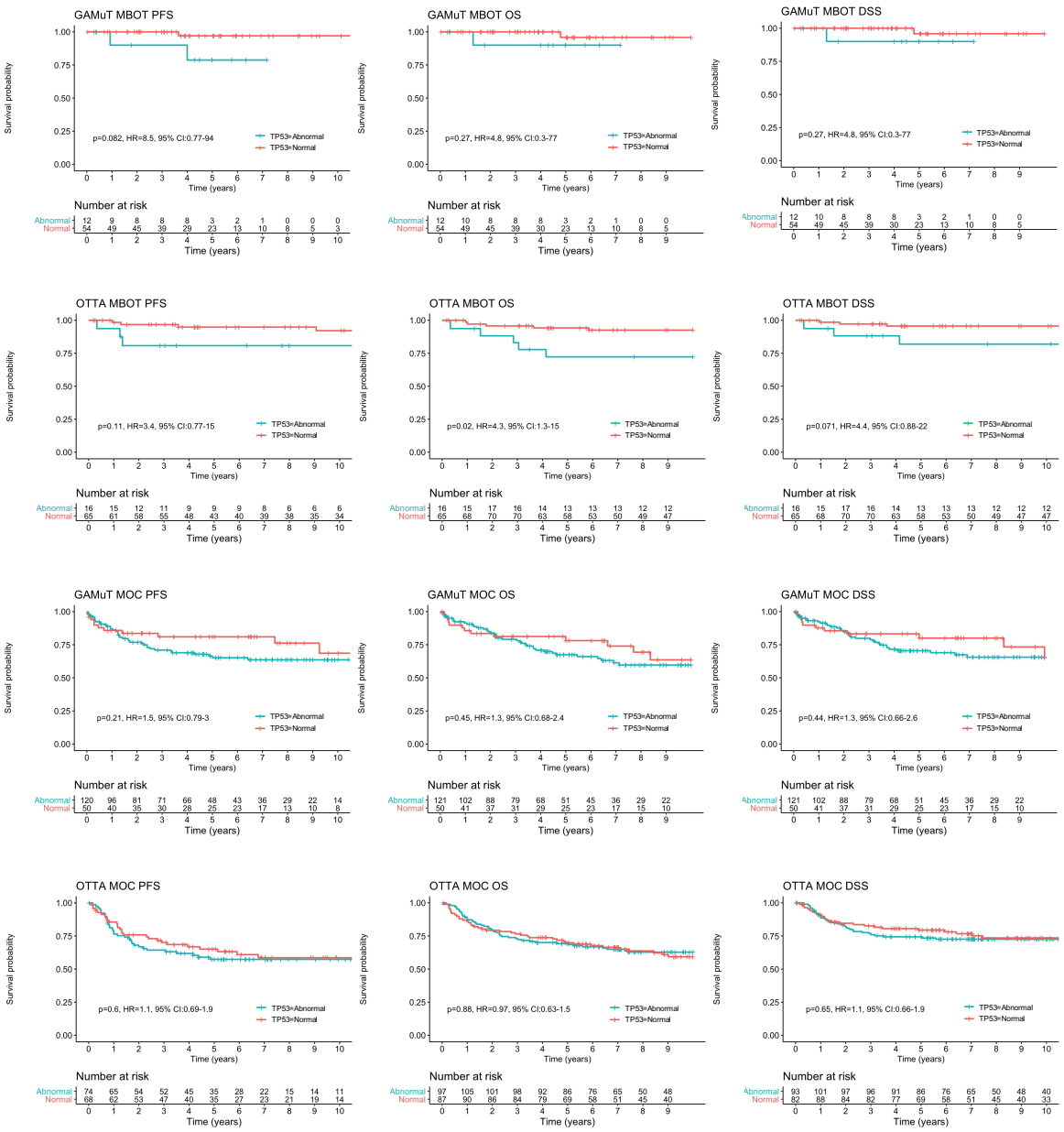

Figure S5. Kaplan-Meier survival plots of ovarian mucinous borderline tumors (MBOT) and mucinous carcinomas (MOC) stratified by TP53 status using mutation and immunohistochemistry data. Progression free survival (PFS). Overall survival (OS). Disease-specific survival (DSS). P-values are output from coxph in R.

Supplementary Table 1. Ethics approval for studies from the Ovarian Tumor Tissue Analysis Consortium.

Study	Study name	Location	Years	Ascertainment	Reference	Ethics committee	Informed consent	# of MOC in analysis	# of MBOT in analysis
AOV	Alberta Ovarian Tumor Types Study	Canada	1978-2010	Population-based Alberta Cancer Registry; annual updates performed for vital statistics	1	Health Research Ethics Board of Alberta	No / pathology material	62	57
BAV	Bavarian Ovarian Cancer Study	Germany	2002-2006	Gynecologic Oncology Center at the Comprehensive Cancer Center Erlangen-Nuremberg	2	Ethics Committee of the Medical Faculty of the Friedrich-Alexander University Erlangen-Nuremberg	Yes	11	1
DOV	Diseases of the Ovary and their Evaluation	US	2002-2009	13 counties from western Washington SEER registry	3,4	Fred Hutchinson Cancer Research Center Institutional Review Board	Yes	21	0
HAW	Hawaii Ovarian Cancer Study	US	1993-2008	Hawaii Tumor Registry and medical records	5,6	University of Hawaii, Committee on Human Studies	Yes	9	0
MAY	Mayo Clinic Ovarian Cancer Study	US	2000-2013	Mayo Clinic Division of Gynecologic Oncology (Rochester, MN)	7	Institutional Review Board of Mayo Clinic	Yes	11	0
NOT	Nottingham Study	UK	1991-2011	Hospital records and Trent cancer registry	8	Institutional Review Board of Mayo Clinic	No / pathology material	32	0
SEA	Study of Epidemiology and Risk Factors in Cancer Heredity	UK	1998-present	Eastern Region Cancer Intelligence Unit, West Midlands Cancer Intelligence Unit, and multiple cancer networks	9	Cambridgeshire 4 Research Ethics Committee	Yes	25	6
STA	Genetic Epidemiology of Ovarian Cancer Study	US	1997-2001	Greater Bay Area Cancer Registry	10	Stanford University IRB	Yes	9	12
SWE	Sweden Western Region Ovarian Cancer Study	Sweden	2001-2016	Sahlgrenska University Hospital, medical records and the clinical cancer register in the western Sweden health care region and Swedish death register		Regional ethics review board in Gothenburg (Swedish Ethical Review Authority)	Yes	9	13
TVA	Ovarian Cancer in Alberta	Canada	2005-2011	Alberta Cancer Registry and affiliated hospitals	11	Health Research Ethics Board of Alberta	Yes	6	0
VAN	Vancouver Ovarian Cancer Study	Canada	1984-2000	Ovarian Cancer Registry serving British Columbia and the Cheryl Brown Outcomes Unit	12,13	University of British Columbia - British Columbia Cancer Agency Research Ethics Board	Some cases Yes and some cases No / pathology material	51	2
WMH	Westmead Hospital, Gynaecological Oncology Biobank (GynBiobank)	Australia	1992-present	The Crown Princess Mary Cancer Centre and affiliated hospitals	14	Western Sydney Local Health District, Human Research Ethics Committee	Yes	7	8
								253	99
								352	

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Supplementary Table 2. Frequencies of patterns of TP53 immunohistochemistry observed in ovarian mucinous borderline tumors (MBOT) and mucinous carcinomas (MOC) from the Genomic Analysis of Mucinous Tumors (GAMuT) cohort and Ovarian Tumor Tissue Analysis (OTTA) consortium. Numbers of cases and percentages within each tumor type and all mucinous tumors combined are represented.

Tumor Type	Normal (%)	Abnormal (%)			Total (%)
		OE	CA	CY	
MBOT	123 (80.4)	24 (15.7)	6 (3.9)	0 (0)	153 (100)
MOC	140 (39.8)	156 (44.3)	50 (14.2)	6 (1.7)	352 (100)
Total	263 (52.1)	180 (35.6)	56 (11.1)	6 (1.2)	505 (100)

OE = overexpression, CA = complete absence, CY = cytoplasmic