

EXHIBIT 24

EXHIBIT 24: INFRINGEMENT OF U.S. PATENT NO. 11,634,491 BY KEYTRUDA

Claim 1 [pre]	Merck Induces Infringement of JHU's Methods for Treating With Pembrolizumab
A method of treating cancer in a human patient, the method comprising:	Merck's FDA-approved label for Keytruda (pembrolizumab) ("Keytruda Label") instructs physicians to use Keytruda to treat cancer in a human patient. For example, the Indications and Usage Section of the Keytruda Label lists Indication 1.7 for the treatment of patients with unresectable or metastatic MSI-H or mismatch repair deficient (dMMR) solid tumors. A physician would understand that endometrial cancer, small bowel cancer, gastric cancer, ampullary cancer, cholangiocarcinoma, pancreatic cancer, prostate cancer, breast cancer, esophageal cancer, liver cancer, ovarian cancer, uterine cancer, cervical cancer, bladder cancer, testicular cancer and oral cancer can present as an unresectable or metastatic solid tumor. 1.7 Microsatellite Instability-High or Mismatch Repair Deficient Cancer KEYTRUDA is indicated for the treatment of adult and pediatric patients with unresectable or metastatic microsatellite instability-high (MSI-H) or mismatch repair deficient (dMMR) solid tumors, as determined by an FDA-approved test, that have progressed following prior treatment and who have no satisfactory alternative treatment options [see <i>Dosage and Administration</i> (2.1)]. Label at 5. The Indications and Usage Section of the Keytruda Label also lists Indication 1.15 for the treatment of cancer in a population of patients wherein the cancers are advanced endometrial carcinoma that are MSI-H or dMMR. 1.15 Endometrial Carcinoma KEYTRUDA, in combination with lenvatinib, is indicated for the treatment of patients with advanced endometrial carcinoma that is mismatch repair proficient (pMMR) as determined by an FDA-approved test or not MSI-H, who have disease progression following prior systemic therapy in any setting and are not candidates for curative surgery or radiation [see <i>Dosage and Administration</i> (2.1)]. KEYTRUDA, as a single agent, is indicated for the treatment of patients with advanced endometrial carcinoma that is MSI-H or dMMR, as determined by an FDA-approved test, who have disease progression following prior systemic therapy in any setting and are not candidates for curative surgery or radiation [see <i>Dosage and Administration</i> (2.1)].

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testing or having tested a biological sample obtained from a patient having endometrial cancer, small bowel cancer, gastric cancer, ampullary cancer, cholangiocarcinoma, pancreatic cancer, prostate cancer, breast cancer, esophageal cancer, liver cancer, ovarian cancer, uterine cancer, cervical cancer, bladder cancer, testicular cancer or oral cancer, thereby determining that the patient's cancer is microsatellite instability high or DNA mismatch repair deficient; and	The Keytruda Label instructs physicians to test or have tested a biological sample obtained from a patient having endometrial cancer, small bowel cancer, gastric cancer, ampullary cancer, cholangiocarcinoma, pancreatic cancer, prostate cancer, breast cancer, esophageal cancer, liver cancer, ovarian cancer, uterine cancer, cervical cancer, bladder cancer, testicular cancer or oral cancer to determine whether the cancer is microsatellite instability high or DNA mismatch repair deficient. For example, the Keytruda Label indicates that Keytruda is approved for the treatment of patients with solid tumors that are MSI-H or dMMR as determined by an FDA-approved test: 1.7 Microsatellite Instability-High or Mismatch Repair Deficient Cancer KEYTRUDA is indicated for the treatment of adult and pediatric patients with unresectable or metastatic microsatellite instability-high (MSI-H) or mismatch repair deficient (dMMR) solid tumors, as determined by an FDA-approved test, that have progressed following prior treatment and who have no satisfactory alternative treatment options <i>[see Dosage and Administration (2.1)]</i>. Label at 5. The Indications and Usage Section of the Keytruda Label also includes Indication 1.15 for the treatment of cancer in a population of patients wherein the cancers are advanced endometrial carcinoma that are MSI-H or dMMR as determined by an FDA-approved test: 1.15 Endometrial Carcinoma KEYTRUDA, in combination with lenvatinib, is indicated for the treatment of patients with advanced endometrial carcinoma that is mismatch repair proficient (pMMR) as determined by an FDA-approved test or not MSI-H, who have disease progression following prior systemic therapy in any setting and are not candidates for curative surgery or radiation <i>[see Dosage and Administration (2.1)]</i>. KEYTRUDA, as a single agent, is indicated for the treatment of patients with advanced endometrial carcinoma that is MSI-H or dMMR, as determined by an FDA-approved test, who have disease progression following prior systemic therapy in any setting and are not candidates for curative surgery or radiation <i>[see Dosage and Administration (2.1)]</i>. Label at 6. The Dosage and Administration section of the Keytruda Label instructs physicians to test or have

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	tested the patient's tumor specimen for MSI-H/dMMR status to select patients for single treatment with Keytruda according to Indication 1.7. 2 DOSAGE AND ADMINISTRATION 2.1 Patient Selection <u>Patient Selection for Single-Agent Treatment</u> Select patients for treatment with KEYTRUDA as a single agent based on the presence of positive PD-L1 expression in: - stage III NSCLC who are not candidates for surgical resection or definitive chemoradiation [see <i>Clinical Studies (14.2)</i>]. - metastatic NSCLC [see <i>Clinical Studies (14.2)</i>]. - first-line treatment of metastatic or unresectable, recurrent HNSCC [see <i>Clinical Studies (14.3)</i>]. - previously treated recurrent locally advanced or metastatic esophageal cancer [see <i>Clinical Studies (14.10)</i>]. - recurrent or metastatic cervical cancer with disease progression on or after chemotherapy [see <i>Clinical Studies (14.11)</i>]. For the MSI-H/dMMR indications, select patients for treatment with KEYTRUDA as a single agent based on MSI-H/dMMR status in tumor specimens [see <i>Clinical Studies (14.7, 14.8)</i>]. Label at 7 (highlighting added). The Dosage and Administration section of the Keytruda Label refers physicians to a website to find information necessary to test or have tested a biological sample obtained from a patient to determine whether the cancer is microsatellite instability high or DNA mismatch repair deficient: <u>Additional Patient Selection Information</u> Information on FDA-approved tests for patient selection is available at: http://www.fda.gov/CompanionDiagnostics . Label at 8. For example, FDA provides a List of Cleared or Approved Companion Diagnostic Devices (In Vitro and Imaging Tools) which lists the diagnostic tools approved to determine whether a biological sample from a patient is MSI-H or dMMR.

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	Diagnostic Name (Manufacturer)	Indication - Sample Type	Drug Trade Name (Generic) NDA / BLA	Biomarker(s)	Biomarker(s) (Details)	PMA / 510(k) / 513(f)(2) / HDE (Approval / Clearance / Grant Date)
	FoundationOne CDx (Foundation Medicine, Inc.)	Solid Tumors - Tissue	Keytruda (pembrolizumab) BLA 125514	TMB	TMB ≥ 10 mutations per megabase	P170019/S016 (06/16/2020)
	FoundationOne CDx (Foundation Medicine, Inc.)	Solid Tumors - Tissue	Keytruda (pembrolizumab) BLA 125514	MSI-High	Microsatellite instability-High (MSI-H)	P170019/S029 (02/18/2022)
	PD-L1 IHC 22C3 pharmDx (Dako North America, Inc.)	Non-Small Cell Lung Cancer (NSCLC) - Tissue	Keytruda (pembrolizumab) BLA 125514	PD-L1	PD-L1 protein expression	P150013 (10/02/2015)
	PD-L1 IHC 22C3 pharmDx (Dako North America, Inc.)	Cervical Cancer - Tissue	Keytruda (pembrolizumab) BLA 125514	PD-L1	PD-L1 protein expression	P150013/S009 (06/12/2018)
	PD-L1 IHC 22C3 pharmDx (Dako North America, Inc.)	Head and Neck Squamous Cell Carcinoma (HNSCC) - Tissue	Keytruda (pembrolizumab) BLA 125514	PD-L1	PD-L1 protein expression	P150013/S014 (06/10/2019)
	PD-L1 IHC 22C3 pharmDx (Dako North America, Inc.)	Esophageal Squamous Cell Carcinoma (ESCC) - Tissue	Keytruda (pembrolizumab) BLA 125514	PD-L1	PD-L1 protein expression	P150013/S016 (07/30/2019)
	PD-L1 IHC 22C3 pharmDx (Dako North America, Inc.)	Triple-Negative Breast Cancer (TNBC) - Tissue	Keytruda (pembrolizumab) BLA 125514	PD-L1	PD-L1 protein expression	P150013/S020 (11/13/2020)
	Ventana MMR RxDx Panel (Ventana Medical Systems, Inc.)	Solid Tumors	Keytruda (pembrolizumab) BLA 125514	deficient mismatch repair (dMMR) proteins	MLH1, PMS2, MSH2 and MSH6	P210001/S001 (03/21/2022)
https://www.fda.gov/medical-devices/in-vitro-diagnostics/list-cleared-or-approved-companion-diagnostic-devices-in-vitro-and-imaging-tools (last accessed May 16, 2023).						

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in response to determining that the patient's cancer is microsatellite instability high or DNA mismatch repair deficient, treating the patient determined to have microsatellite instability high or DNA mismatch repair deficient cancer with a therapeutically effective amount of pembrolizumab.	The Keytruda Label instructs physicians on how to treat a patient determined to have a cancer that is microsatellite instability high or DNA mismatch repair deficient with a therapeutically effective amount of pembrolizumab in response to determining that the cancer is microsatellite instability high or DNA mismatch repair deficient. The Keytruda Label discloses that Keytruda is a pembrolizumab injection. KEYTRUDA® (pembrolizumab) injection, for intravenous use Initial U.S. Approval: 2014 Label at 1. For, example, the Dosage and Administration section of the Keytruda Label instructs physicians to test or have tested the patient's tumor specimen for MSI-H/dMMR status to select patients for single treatment with Keytruda according to Indication 1.7. <i>See</i> 1[a] above. The Recommended Dosage section of the Keytruda Label provides the recommended dosages of Keytruda as well as the duration/timing of treatment by the indication, wherein the indication is directed to cancer confirmed to be MSI-high/MMR deficient.

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2.2 Recommended Dosage

Table 1: Recommended Dosage

Indication	Recommended Dosage of KEYTRUDA	Duration/Timing of Treatment
Monotherapy		
Adult patients with unresectable or metastatic melanoma	200 mg every 3 weeks* or 400 mg every 6 weeks*	Until disease progression or unacceptable toxicity
Adjuvant treatment of adult patients with melanoma or RCC	200 mg every 3 weeks* or 400 mg every 6 weeks*	Until disease recurrence, unacceptable toxicity, or up to 12 months
Adult patients with NSCLC, HNSCC, cHL, PMBCL, locally advanced or metastatic Urothelial Carcinoma, MSI-H or dMMR Cancer, MSI-H or dMMR CRC, MSI-H or dMMR Endometrial Carcinoma, Esophageal Cancer, Cervical Cancer, HCC, MCC, TMB-HJ Cancer, or cSCC	200 mg every 3 weeks* or 400 mg every 6 weeks*	Until disease progression, unacceptable toxicity, or up to 24 months

- * 30-minute intravenous infusion
- † Refer to the Prescribing Information for the agents administered in combination with KEYTRUDA for recommended dosing information, as appropriate.
- ‡ When axitinib is used in combination with KEYTRUDA, dose escalation of axitinib above the initial 5 mg dose may be considered at intervals of six weeks or longer.
- § Patients who experience disease progression or unacceptable toxicity related to KEYTRUDA with neoadjuvant treatment in combination with chemotherapy should not receive adjuvant single agent KEYTRUDA.

Label at 8-9 (highlighting added).

The Preparation and Administration section of the Keytruda Label provides instructions for preparing and administering Keytruda to patients:

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	2.4 Preparation and Administration <u>Preparation for Intravenous Infusion</u> • Visually inspect the solution for particulate matter and discoloration. The solution is clear to slightly opalescent, colorless to slightly yellow. Discard the vial if visible particles are observed. • Dilute KEYTRUDA injection (solution) prior to intravenous administration. • Withdraw the required volume from the vial(s) of KEYTRUDA and transfer into an intravenous (IV) bag containing 0.9% Sodium Chloride Injection, USP or 5% Dextrose Injection, USP. Mix diluted solution by gentle inversion. Do not shake. The final concentration of the diluted solution should be between 1 mg/mL to 10 mg/mL. • Discard any unused portion left in the vial. <u>Storage of Diluted Solution</u> The product does not contain a preservative. Store the diluted solution from the KEYTRUDA 100 mg/4 mL vial either: • At room temperature for no more than 6 hours from the time of dilution. This includes room temperature storage of the diluted solution, and the duration of infusion. • Under refrigeration at 2°C to 8°C (36°F to 46°F) for no more than 96 hours from the time of dilution. If refrigerated, allow the diluted solution to come to room temperature prior to administration. Do not shake. Discard after 6 hours at room temperature or after 96 hours under refrigeration. Do not freeze. <u>Administration</u> • Administer diluted solution intravenously over 30 minutes through an intravenous line containing a sterile, non-pyrogenic, low-protein binding 0.2 micron to 5 micron in-line or add-on filter. • Do not co-administer other drugs through the same infusion line. Label at 11. The Keytruda Label includes clinical trial results showing that the recommended dosages of Keytruda are a therapeutically effective amount among patients with MSI-H or dMMR solid tumors relevant to Indication 1.7.

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	14.7 Microsatellite Instability-High or Mismatch Repair Deficient Cancer The efficacy of KEYTRUDA was investigated in patients with MSI-H or mismatch repair deficient (dMMR), solid tumors enrolled in one of five uncontrolled, open-label, multi-cohort, multi-center, single-arm trials. Patients with active autoimmune disease or a medical condition that required immunosuppression were ineligible across the five trials. Patients received either KEYTRUDA 200 mg every 3 weeks or KEYTRUDA 10 mg/kg every 2 weeks. Treatment continued until unacceptable toxicity or disease progression that was either symptomatic, rapidly progressive, required urgent intervention, or occurred with a decline in performance status. A maximum of 24 months of treatment with KEYTRUDA was administered. For the purpose of assessment of anti-tumor activity across these 5 trials, the major efficacy outcome measures were ORR as assessed by BICR according to RECIST v1.1, modified to follow a maximum of 10 target lesions and a maximum of 5 target lesions per organ, and DoR.

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Table 66: Efficacy Results for Patients with MSI-H/dMMR Cancer

Endpoint	KEYTRUDA n=149
Objective Response Rate	
ORR (95% CI)	39.6% (31.7, 47.9)
Complete response rate	7.4%
Partial response rate	32.2%
Duration of Response	
Median in months (range)	NR (1.6+, 22.7+)
% with duration ≥6 months	78%

NR = not reached

Table 67: Response by Tumor Type

	N	Objective Response Rate n (%)	95% CI	Duration of Response range (months)
CRC	90	32 (36%)	(26%, 46%)	(1.6+, 22.7+)
Non-CRC	59	27 (46%)	(33%, 59%)	(1.9+, 22.1+)
Endometrial cancer	14	5 (36%)	(13%, 65%)	(4.2+, 17.3+)
Biliary cancer	11	3 (27%)	(6%, 61%)	(11.6+, 19.6+)
Gastric or GE junction cancer	9	5 (56%)	(21%, 86%)	(5.8+, 22.1+)
Pancreatic cancer	6	5 (83%)	(36%, 100%)	(2.6+, 9.2+)
Small intestinal cancer	8	3 (38%)	(9%, 76%)	(1.9+, 9.1+)
Breast cancer	2	PR, PR		(7.6, 15.9)
Prostate cancer	2	PR, SD		9.8+
Bladder cancer	1	NE		
Esophageal cancer	1	PR		18.2+
Sarcoma	1	PD		
Thyroid cancer	1	NE		
Retropertoneal adenocarcinoma	1	PR		7.5+
Small cell lung cancer	1	CR		8.9+
Renal cell cancer	1	PD		

CR = complete response
PR = partial response
SD = stable disease
PD = progressive disease
NE = not evaluable

Label at 89-90 (highlighting added).

The Keytruda Label includes clinical trial results showing that the recommended dosages of Keytruda are a therapeutically effective amount of pembrolizumab among patients with MSI-H or dMMR endometrial tumors relevant to Indication 1.15.

14.15 Endometrial Carcinoma

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	<u>As a Single Agent for the Treatment of Advanced MSI-H or dMMR Endometrial Carcinoma</u> The efficacy of KEYTRUDA was investigated in KEYNOTE-158 (NCT02628067), a multicenter, non-randomized, open-label, multi-cohort trial. The trial enrolled 90 patients with unresectable or metastatic MSI-H or dMMR endometrial carcinoma in Cohorts D and K who received at least one dose of KEYTRUDA. MSI or MMR tumor status was determined using polymerase chain reaction (PCR) or immunohistochemistry (IHC), respectively. Patients with autoimmune disease or a medical condition that required immunosuppression were ineligible. Patients received KEYTRUDA 200 mg intravenously every 3 weeks until unacceptable toxicity or documented disease progression. Patients treated with KEYTRUDA without disease progression could be treated for up to 24 months. Assessment of tumor status was performed every 9 weeks for the first 12 months, and every 12 weeks thereafter. The major efficacy outcome measures were ORR and DoR as assessed by BICR according to RECIST v1.1, modified to follow a maximum of 10 target lesions and a maximum of 5 target lesions per organ. Among the 90 patients evaluated, the baseline characteristics were: median age of 64 years (range: 42 to 86); 83% White, 8% Asian, and 3% Black; 12% Hispanic or Latino; 39% ECOG PS of 0 and 61% ECOG PS of 1; 96% had M1 disease and 4% had M0 disease at study entry; and 51% had one and 48% had two or more prior lines of therapy. Nine patients received only adjuvant therapy and one patient received only neoadjuvant and adjuvant therapy before participating in the study. Efficacy results are summarized in Table 80. Table 80: Efficacy Results in Patients with Advanced MSI-H or dMMR Endometrial Carcinoma in KEYNOTE-158 <table data-bbox="773 1209 1263 1394"> <tr> <th>Endpoint</th><th>KEYTRUDA n=90*</th></tr> <tr> <td>Objective Response Rate</td><td></td></tr> <tr> <td>ORR (95% CI)</td><td>46% (35, 56)</td></tr> <tr> <td>Complete response rate</td><td>12%</td></tr> <tr> <td>Partial response rate</td><td>33%</td></tr> <tr> <td>Duration of Response</td><td>n=41</td></tr> <tr> <td>Median in months (range)</td><td>NR (2.9, 55.7+)</td></tr> <tr> <td>% with duration ≥12 months</td><td>68%</td></tr> <tr> <td>% with duration ≥24 months</td><td>44%</td></tr> </table> * Median follow-up time of 16.0 months (range 0.5 to 62.1 months) + Denotes ongoing response NR = not reached Label at 111, 114-115 (highlighting added).	Endpoint	KEYTRUDA n=90*	Objective Response Rate		ORR (95% CI)	46% (35, 56)	Complete response rate	12%	Partial response rate	33%	Duration of Response	n=41	Median in months (range)	NR (2.9, 55.7+)	% with duration ≥12 months	68%	% with duration ≥24 months	44%
Endpoint	KEYTRUDA n=90*																		
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