Recent advances in cancer immunotherapies such as checkpoint inhibitors, cancer vaccines, oncolytic viruses, and CAR-T cell therapies have refocused the oncology drug development landscape from traditional chemotherapeutics to immunoncology therapeutics. Preclinical efficacy, safety and toxicology studies for regulatory submissions must include the monitoring of immune responses in addition to traditional toxicology endpoints since adverse events from exaggerated pharmacology may occur.

At IITRI, the cornerstone of our immuno-oncology capabilities is a strong scientific foundation in immunology and cancer biology. We offer preclinical services for cancer immunotherapy development from preclinical translational models and full characterization of immune responses to IND-enabling GLP toxicology and safety studies.

**IMMUNOPROFILING**
Screening new therapies and developing translational animal models is an essential component of a preclinical program for new antitumor immunotherapies. IITRI now offers immunoprofiling services to support efficacy screening of new therapies in xenograft and syngeneic mouse tumor model proof of concept studies.

IITRI’s immunoprofiling services include:

- Immunophenotyping with multi-color FACS
- Cytokine panels
- ELISpot assays
- *In vitro* and *in vivo* T cell exhaustion models

**IMMUNO-ONCOLOGY TOXICOLOGY**
IITRI offers the capability to conduct GLP toxicology studies in mouse tumor models to mimic the physiologic environment of the patient. We also can accommodate BSL-2 viral vectors for oncolytic viral vector efficacy through toxicology studies, and offer scientific support of PhD-level immunologist, virologist and microbiologist study directors.

- Toxicology and safety studies
- Histopathology services
- Small molecule and biologic bioanalytical
- Immunogenicity laboratory support
- Rodent, non-rodent and NHP studies

**MOUSE TUMOR MODELS**
As the leading preclinical contractor to the National Cancer Institute (NCI) for over 10 years, IITRI has conducted preclinical toxicology studies supporting the successful filing of over 20 INDs for the NCI. We work hand-in-hand with our sponsors to design experiments and select the appropriate xenograft or syngeneic model to evaluate new investigational agents. Below is a list of available mouse tumor models:

<table>
<thead>
<tr>
<th>CANCER TYPE</th>
<th>CELL LINES</th>
<th>MOUSE STRAIN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>XENOGRRAFT MODELS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colorectal</td>
<td>COLO-205, HT29, HCT116, Caco-2, RKO</td>
<td>Nude</td>
</tr>
<tr>
<td>Breast</td>
<td>MCF-7, T47D, MDA-MB-231</td>
<td>Nude, SCID</td>
</tr>
<tr>
<td>Prostate</td>
<td>PC-3, DU-145</td>
<td>Nude</td>
</tr>
<tr>
<td>Ovarian</td>
<td>OVCAR-3, OVCAR-5</td>
<td>Nude, SCID</td>
</tr>
<tr>
<td>Renal</td>
<td>RXF-393, Caki-1, A498</td>
<td>Nude</td>
</tr>
<tr>
<td>Melanoma</td>
<td>MDA-MB-435</td>
<td>Nude</td>
</tr>
<tr>
<td>Pancreatic</td>
<td>PANC-1</td>
<td>Nude</td>
</tr>
<tr>
<td><strong>SYNGENEIC MODELS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lung</td>
<td>Lewis Lung Cancer (LLC)</td>
<td>C57BL/6</td>
</tr>
<tr>
<td>Colorectal</td>
<td>CT26</td>
<td>BALB/c</td>
</tr>
<tr>
<td>Breast</td>
<td>4T1</td>
<td>BALB/c</td>
</tr>
<tr>
<td>Melanoma</td>
<td>B16-F10</td>
<td>C57BL/6</td>
</tr>
</tbody>
</table>
CANCER IMMUNOTHERAPEUTIC DRUG DEVELOPMENT

DRUG DISCOVERY

Efficacy studies
- Cancer cell lines
- Xenograft mouse models
- Transgenic / syngeneic mouse models

Mechanism of action studies
- Gene expression studies
- Cancer cell line-based studies

IMMUNE RESPONSE CHARACTERIZATION

Immunoprofiling
- Immunophenotyping: multi-color FACS
- T-cell characterization
- Cytokine panels

Immunogenicity
- ADA ELISA
- NAb assays
- Rodents, non-rodents, NHPs

GLP SAFETY & TOXICOLOGY

Repeat-dose GLP toxicology studies
- All relevant routes including inhalation
- Rodent, non-rodent, NHP
- ABSL 2

Biodistribution (qPCR)
Safety pharmacology
Reproductive toxicology

CLINICAL TRIAL SUPPORT

Bioanalytical support
- Method cross-validation
- Tissue and fluid matrices

Tissue cross-reactivity
Cytokine panels
Assessment of biomarkers