

## IMMUNO-ONCOLOGY CLINICAL DEVELOPMENT

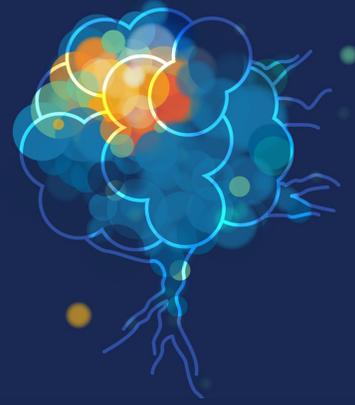
Immuno-oncology (I-O) is not a new concept. In 1891, Surgeon William Coley began injecting cancer patients with bacteria to try and stimulate an immune response. Decades ago, doctors tried the Bacillus Calmetter-Guerin (BCG) vaccine with some evidence of effect to stimulate the immune system. In 2011, cell biologist Ralph M. Steinman, who discovered the immune system's sentinel dendritic cells was awarded the Nobel prize for his work.

I-O is an old field, but one moving at a lightning pace with new approaches to harness the immune system to treat diseases. According to an October 2018 report from The Cancer Research Institute (CRI) titled: "Trends in the global Immuno-Oncology landscape" and published in Nature Reviews Drug Discovery, the number of active agents in immuno-oncology ranging across multiple immunotherapy approaches increased 67% in a single year.

### PROMISING APPROACHES

- Checkpoint Inhibitors
- Adoptive Cell Transfer including CAR-T Cells
- Monoclonal Antibodies/Therapeutic Antibodies
- Treatment Vaccines
- Cytokines
- Oncolytic Viruses
- Combination Therapies

***Medpace is deeply involved in I-O clinical development and has the experience to address unique challenges and complexities of this dynamic area of research.***



### EXPERTS

- Accomplished in-house I-O medical, operational, regulatory, and safety experts
- Access to key opinion leaders (KOLs) and thought leaders around the world
- Specialized clinical research teams supported by Medpace's continual training program
- Imaging and central lab teams - led by seasoned research experts

### EXPERIENCE

- Knowledgeable in I-O study designs including umbrella studies, basket studies, modality, organ based, and complex statistical designs such as m-TPI, m-TPI-2, and Bayesian
- Skilled in combination therapy research
- Adept in complex studies with Advanced Therapy Medicinal Products (ATMPs)
- Knowledgeable in global regulatory requirements which accelerates start-up
- Start-up lab with extensive experience working with I-O biomarkers
- Knowledgeable Imaging core lab with experience in RECIST, irRC, irRECIST, and iRECIST

### EXECUTION

- Strong relationships with key sites to expedite site start-up, enhance recruitment, and maximize trial efficiency
- Work with PIs in protocol development for new approaches to treatment and approvals
- Successful data-driven, expert-refined patient recruitment strategies (IntelliPACE®)
- Thorough feasibility processes assess interest in trials and volume of specific populations
- Integrated labs including Central Labs and Imaging Core Labs



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## CHALLENGES IN DEVELOPMENT

Planning I-O clinical trials requires expertise and experience in a field that is rapidly changing. In this fast-paced field, awareness of the complex challenges and considerations in conducting successful trials for new agents is critical. Sponsors face many complex challenges including operational considerations, biomarkers, safety testing, and imaging needs.

## OPERATIONAL CONSIDERATIONS

Clinical trials of immunotherapeutic agents have different considerations for successful execution than standard anti-cancer agents. As novel targets and methods of delivery are identified, investigators need to be aware of the effects on the immune system, including both immunosuppression and autoimmunity, especially as combination therapies are studied. Cellular therapies are known to have unique challenges with scheduling, manufacturing and toxicities. Immunotherapeutic trials have distinctive issues to be addressed regarding patient selection, pharmacokinetics, trial monitoring, toxicity grading, and response assessment.

## BIOMARKERS AND TESTING

I-O biomarkers seek to characterize the relationship between the immune system, the tumor and its microenvironment, and the host. Unique interactions of these factors, as well as I-O biomarker presence and prevalence, contributes to the balance of activation versus suppression of the antitumor immune response.

Medpace Central Labs has extensive experience working with I-O biomarkers that address the interplay between the immune system and the tumor in four key areas including:

- Tumor Antigens
- Inflamed Tumor Markers
- Immune Suppression Markers
- Host Environment Factors

## IMAGING CORE LAB: ASSESSING RESPONSES

In most oncology clinical trials, tumor response occurs between 8 and 12 weeks. With I-O agents however, tumor response may be delayed and pseudo-progression has been described. This may provide a false assessment of progressive disease. Newer radiographic staging systems have been developed for solid tumors and lymphomas. Medpace Imaging Core Labs is experienced in many modalities and measurement criterion for critical imaging end-points in I-O trials including:

- Response evaluation criteria in solid tumors (RECIST), irRC, irRECIST, and iRECIST
- Nuclear medicine imaging including PERCIST and Lugano
- Database optimization for imaging endpoints in I-O trials including EDC and eCRF

## FULL-SERVICE CLINICAL DEVELOPMENT

Medpace is a scientifically-driven, global, full-service clinical contract research organization (CRO) providing Phase I-IV clinical development services to the biotechnology, pharmaceutical and medical device industries. Medpace's mission is to accelerate the global development of safe and effective medical therapeutics through its high-science and disciplined operating approach that leverages local regulatory and deep therapeutic expertise across all major areas including oncology, cardiology, metabolic disease, endocrinology, central nervous system and anti-viral and anti-infective.

