# Cancer Risk Approach Plan

## Risk Characterization/Formulation
- **Cancer-103**: Determine effects of radiation quality on cancer initiation, promotion, progression.
- **Cancer-104**: Determine effects of dose-rate on cancer initiation, promotion, progression.
- **Cancer-202**: Evaluate contribution of genetic background/diversity on cancer outcomes.
- **Cancer-203**: Evaluate tissue-specific risks of space radiation exposure on cancer outcomes.
- **Cancer-204**: Evaluate sex-specific risks of space radiation exposure on cancer outcomes.
- **Cancer-303**: Identify early surrogate biomarkers that correlate with cancer, premalignancy, or the hallmarks of cancer.
- **Cancer-304**: Identify and/or develop strategies for accelerated countermeasure development.

## CM Identification/Validation
- **Cancer-402**: Identify and/or develop monitoring tools to support spaceflight research, long-term health surveillance, and countermeasure implementation.
- **Cancer-502**: Systematically identify safe and effective countermeasures for radiation carcinogenesis.
- **Cancer-503**: Validate identified countermeasures in advanced biological model systems.
- **Cancer-602**: Operate identified interventional countermeasures.
- **Cancer-603**: Operate identified monitoring/preventative countermeasures.

## CM Operationalization
- **Cancer-604**: Evaluate sex-specific risks of space radiation exposure on cancer outcomes.

## External Deliverables
- **Data-driven strategies to characterize space radiation effects**
- **Evidence-based models of individual susceptibility**
- **Complete characterization**
- **Biomarkers and infrastructure**

## HRR Gap: research logic description
- Data-driven strategies to characterize space radiation effects

## Note: Decision Points (●), Element Milestone (○) and Gap Closures (●) are Program reviews with defined entry/exit criteria.

Legend:  
- Analog  
- Flight environment  
- Cross Element Integration  
- Anticipated PRR Color Change

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7/30/2021