# A Living Network Meta-Analysis of First Line Treatment of Metastatic Kidney Cancer

**Irbaz Bin Riaz, MD, MS[1], Huan He, PhD[2], Yiqing Zhao, PhD[2], Rabbia Siddiqi, MBBS[3], Vitaly Herasevich, MD, PhD[4], Per Olav Vandvik, MD, PhD[5], Victor Montori, MD[6], Allan Bryce, MD[7], M. Hassan Murad, MD, MPH[8], Hongfang Liu, PhD[2]**

**[1] Department of Oncology, Mayo Clinic, Rochester, MN; [2] Department of Health Sciences Research, Mayo Clinic, Rochester, MN; [3] Dow Medical University, Sindh, Pakistan; [4] Department of Anesthesiology and Perioperative Medicine, Mayo Clinic, Rochester, MN; [5] Institute for Health and Society, University of Oslo, Norway; [6] Department of Endocrinology, Mayo Clinic, Rochester, MN; [7] Department of Oncology, Mayo Clinic Arizona, Phoenix, AZ; [8] Department of Internal Medicine, Mayo Clinic, Rochester, MN**

**Background**: In rapidly moving fields of medicine, Systematic reviews (SR) and meta-analyses (MA), such as our network MA on first line treatment in kidney cancer, require frequent labor intense updates. Patients may receive suboptimal treatment or even be harmed if there is a delay in synthesizing evidence and updated guidelines. Keeping evidence synthesis current is difficult, especially in the field of oncology, due to the sheer volume of clinical data. We propose living network meta-analyses, which combine human and machine effort, as a mechanism for providing synthesized evidence as soon as new or updated studies becomes available.

**Methods**: Proposed model for living network meta-analysis system consists of two major modules: the data collector and the data analyzer. In the data collector module, there are 4 components to help users extract detailed information from studies, including: 1) Study search, which can import relevant study from PubMed and ClinicalTrials.gov; 2) PDF file management, which helps user to upload and organize PDF files of each study in a clinical trial based structure; 3) Attribute extractor, which provides interactive web interface for information extraction from PDF files and search results of studies, based on natural language processing techniques and web interaction techniques; and 4) dynamic data table, which supports dataset management and exploration. In the data analyzer module, we combined several Python and R packages to provide flexible web interface and network meta-analysis to explore the dataset collected by previous module. To fully utilize the analysis results of different R packages, we implemented adapters to uniform the analysis result. Moreover, we designed web-based interactive charts and tables for demonstrating the network meta-analysis results (e.g., network plot, forest plot, and league table).

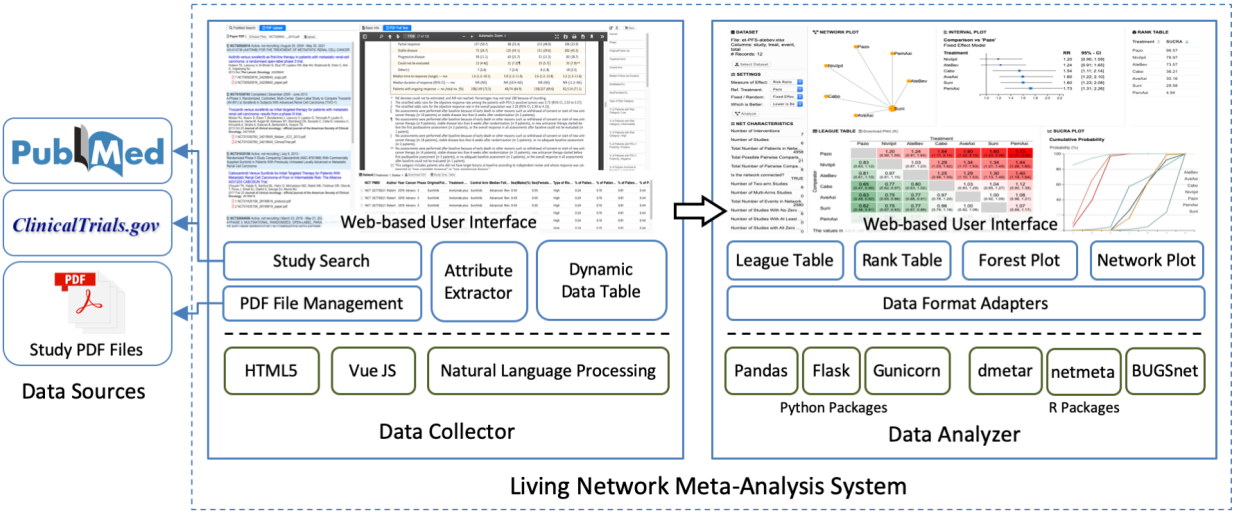


**Figure 1**: The architecture of our proposed living network meta-analysis system

**Proof of concept**: We have created a living network meta-analysis of first line treatment of metastatic kidney cancer. Interactive study characteristics table, estimates of efficacy (Overall Survival, Progression Free Survival) and toxicity (Grade 3 or higher AEs) are updated as soon as new information becomes available.