Ulcerative Colitis (UC), mostly prevalent in western countries, is rapidly spreading its roots in the Indian subcontinent. Amidst the ongoing research revolving around the treatments of UC, there was felt a need to explore the diagnostic field of research with quiet many loopholes and lacunae yet to be resolved. The exact antigens playing a role in occurrence of UC and precise diagnostic tests for its early detection are areas which still evade the scientific community all over the world. This project describes the development and validation of a diagnostic algorithm for systematic diagnosis of UC in India aimed at reducing the large amount of expenses incurred by the patients for performing various diagnostic tests and to save upon the precious time wasted during the diagnosis phase due to which treatment is delayed. This project also aims to develop novel, time efficient and cost effective Indirect Immunofluorescence (IIF) based assays to assess the presence of anti-neutrophil cytoplasmic antibodies (ANCA) and diagnose UC in the Indian population. An IIF based assay, an ELISA based assay and a novel modified IIF based assay using intact nuclei from human neutrophils were developed to detect atypical p-ANCA biomarker in UC patients and validated against standard ANCA IIF assay available commercially in the market. The novel modified UC ANCA IIF assay showed enhanced performance characteristics as compared to the commercially available assay. It also had the benefits of simplified interpretation cost efficiency and reduced turnaround time. One of the most significant highlights of this assay is its cost, which is one tenth the cost of commercially available ANCA IIF tests. This assay may prove to be very efficient in diagnosis of UC amongst the Indian population and will also help in differentiating UC from other similar autoimmune diseases. The diagnostic algorithm is poised to help doctors in recommending the minimal number of tests to the patients suspected of suffering from UC and thus aid in correctly diagnosing UC in the shortest amount of time and incurring the least possible expenses. Thus we hope that this project will dramatically change the diagnostic scenario with reference to UC diagnosis in India and other developing countries.