Correspondence

Use of a cognitive computing system for treatment of cervical cancer

Soyi Lim , Kwang-Beom Lee

Department of Obstetrics and Gynecology, Gachon University Gil Medical Center, Gachon University College of Medicine, Incheon, Korea

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Correspondence to

Kwang-Beom Lee

Department of Obstetrics and Gynecology,
Gachon University Gil Medical Center, Gachon
University College of Medicine, ADD 21,
Namdong-daero 774 beon-gil, Namdong-gu,
Incheon 21565, Korea.
E-mail: leekwbm@gilhospital.com

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ORCID iDs

Soyi Lim
<https://orcid.org/0000-0001-8886-3107>
Kwang-Beom Lee
<https://orcid.org/0000-0001-8311-940X>

Conflict of Interest

No potential conflict of interest relevant to this
article was reported.

We are at the cutting edge of changes in the medical field, especially in oncology. Indeed, we have witnessed remarkable advances in the treatment of cancer and significant improvements in outcomes and mortality rates for most cancer over the last four decades. Recent advances in information technology (IT), including natural language processing, cognitive computing, and machine learning, promise to finally make the so-called 'e-consultant' in medicine a reality. IBM Watson for Oncology (WFO) is a Memorial Sloan Kettering Cancer Center-trained cognitive computing system that uses natural language processing to provide oncologists with ranked, evidence-based treatment options for cancer [1-3]. WFO treatment options are presented in 3 categories: 'Recommended,' 'For Consideration,' and 'Not Recommended.' When a clinician inputs a clinical question into the system, Watson generates a list of hypotheses in response to the question. Watson scales vital knowledge and helps oncologists [4]. Although this tool was originally programmed to focus on breast and lung cancers, it has since been expanded to include colon, prostate, bladder, ovarian, cervical, pancreatic, kidney, liver, and uterine cancers, as well as melanoma, and lymphoma [5].

We retrospectively evaluated 496 enrolled patients with International Federation of Gynecology and Obstetrics (FIGO) stage I to II cervical cancer who underwent primary surgical treatment between 2006 and 2016. Of them, 9 patients were excluded because they had rare histology, inadequate imaging study, over age-range that covered by WFO or history of neoadjuvant chemotherapy, any one of which is not applicable to WFO. Cases were processed in blinded fashion using WFO, and the output was compared to real practices at our institute using the IBM formula (**Supplementary data**). We considered it concordant when the General Medical Council (GMC) practice was included in the 'Recommended' or 'For Consideration' categories provided by WFO. Of them, a total of 117 patients who only received adjuvant chemotherapy were not included in the concordance rate calculation because the GMC practice is unknown treatment option in the WFO. Treatment recommendations were concordant in 299 (80.8%) of the 370 patients: 'Recommended' for 277, and 'For Consideration' for 22.

Although treatment options suggested by WFO were mostly concordant with the GMC practices, there are still unsolved problems. First, some clinical settings, including treatment options for recurrent tumors and those with rare histology are not yet supported by WFO. Adjuvant chemotherapy performed in our institution was included as an unknown treatment option in the WFO system, reflecting substantial differences in practice patterns between the United States, where WFO was trained, and GMC in Korea. Moreover, if a patient did not perform an imaging study in which Watson needed, the case could no longer be analyzed.

Author Contributions

Conceptualization: L.S., L.K.B.; Data curation: L.S., L.K.B.; Formal analysis: L.S., L.K.B.; Investigation: L.S., L.K.B.; Methodology: L.S., L.K.B.; Project administration: L.S., L.K.B.; Resources: L.S., L.K.B.; Software: L.S.; Supervision: L.K.B.; Validation: L.S., L.K.B.; Visualization: L.S., L.K.B.; Writing - original draft: L.S.; Writing - review & editing: L.K.B.

Second, Watson showed different decisions in particular clinical situations. For example, we recommended concurrent chemoradiotherapy for an 80-year old woman with FIGO stage IB1 cervical cancer who could not endure radical surgery. However, WFO recommended radical hysterectomy and sentinel lymph node biopsy for the patient. Third, site-specific settings should be reflected in the WFO system, such as site-preferred treatment options that are not included in the WFO recommendations and state of the art procedures not available at the institution. Therefore, geography-specific customization of WFO is needed. With such improvements, WFO may be helpful to physicians and patients. It has been asked whether WFO or human clinicians are superior; however, we believe that the differences are not a question of superiority. Indeed, artificial intelligence can deliver a great deal of information and provide carefully selected treatment options; however, the clinician actually administers and is responsible for the treatment. In other words, WFO is like a car navigation system that helps us reach our destination quickly and safely. Watson can dramatically change the method of cancer treatment by analyzing complex questions with agility, accuracy, and confidence. Future benefits could include the ability to match patients to clinical trial opportunities and possibly gather data that may lead to the development of new clinical trials. Furthermore, IT advances in genetic analysis would be a promising genomic revolution. This tool will increase the number of patients receiving the most evidence based treatment and minimize the current variability in treatment decisions that exist today.

SUPPLEMENTARY MATERIAL

Supplementary data

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