

## Chapter 7

# A Pharmaco–cybernetics Approach to Designing an Oncology Drug Interaction Database for Clinical Practice

### ABSTRACT

*This chapter describes how OncoRx-MI, a pharmaco-informatics platform for detecting chemotherapy interactions, was designed through a pharmaco-cybernetics approach targeting the 5 activities of the digital health innovation process. This is the first database of its kind that is able to provide interaction information for anticancer drugs and chemotherapy regimen cocktails. In order to identify the gap and determine the usefulness of this database in clinical oncology practice, the quality of online anticancer drug interactions was assessed, and the perceptions of oncology practitioners were sought. The results showed that the accuracy of drug interaction content and the clinical usefulness of the database was highly regarded by these practitioners. In addition, evidence of its relevance and credibility was demonstrated through user feedback on the database.*

DOI: 10.4018/978-1-7998-3832-6.ch007

## INTRODUCTION

In current practice, clinicians use a variety of resources for information on anticancer drug (ACD) interactions. These include primary literature, textbooks, compendia, conventional drug information texts, online databases, and websites. With the vast amounts of drug information sources that are available, they require accurate and effective methods for identifying relevant drug-drug interactions (DDIs), so that they can make better-informed decisions when confronted with such DDIs in their daily practice. The use of DDI databases is advantageous, since clinicians do not have to sieve through the large amounts of information from various sources to determine any suspected DDIs (P.D. Hansten, 2003). Furthermore, the use of such databases can also raise an alert to any potentially harmful drug combinations, and provide useful information about the detected DDI (Grönroos et al., 1997). A number of commercial drug information databases, such as Lexi-Interact<sup>®</sup>, Micromedex<sup>®</sup> and UpToDate<sup>®</sup>, are available electronically. Some databases provide detailed DDI information, including the effects, onset, severity and mechanisms of interaction (Kheshti, Aalipour, & Namazi, 2016). In contrast, there are also websites that only alert users to potential DDIs without giving other supporting details (Eysenbach, 2000). Databases that provide information about complementary and alternative medicines (CAMs) have limited information on ACD-CAM interactions, especially for traditional Chinese medicine (TCM) herbs. Additionally, major conflicts on DDI information exist among various commercial resources and compendia, especially with combination listings, consistency of interaction severities, and strengths of scientific evidences (Wong, Ko, & Chan, 2008). There is currently no oncology-specific drug database that is dedicated to ACD interactions based on both single-agent ACDs and multiple-agent chemotherapy cocktail searches. Most of the available drug databases require the input of individual drugs in a patient's prescription in order to search for DDIs. The closest oncology-specific interaction database was developed by Radboudumc and University of Liverpool, but the database was only able to detect the DDIs of individual ACDs and not chemoregimen cocktails (Radboudumc, n.d.).

As such, a pharmaco-informatics platform – called OncoRx – was built to address this clinical gap. OncoRx is an oncology-specific drug database that detects ACD interactions with *ONCO*logy drug prescriptions (*Rx*), so that DDI searches with ACDs and chemoregimen cocktails can be carried out. OncoRx was designed from a pharmacocybernetics perspective targeting

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