Chapter 15
An Early Robot Architecture for Cancer Healing

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ABSTRACT
Treating cancer tumors is a main goal of cancer research. The author of this paper identifies a new manner to treat cancer tumors more effectively using a recommended architecture of a nanorobot called CANBOT. It contains a number of nano-components: an actuator, temperature sensor, chemical sensor, and microcontroller. CANBOT starts its role by moving toward the tumor cells using the actuator. It senses the tumor cell by capturing its image and sensing its chemicals by the chemical sensor. When CANBOT distinguishes the tumor, it verifies the survival of the tumor cells by its temperature sensor. CANBOT increases the temperature of the tumor cell through the warmer. Sensing of the cancer chemicals starts over to detect the remaining existence of cancer cells. The suggested nanorobot injects the cell with the drug from a tiny tank throughout a nano pump with a small pine needle. A nano-microcontroller controls the mechanism of CANBOT formative the role of each one and the appropriate sequences. The position of the proposed nanorobot is simulated with reference to the position of the tumor using an analytical model. The conclusion is drawn that destroying the tumor requires instilling the robot into the cancer tumor directly for effective treatment.

1. INTRODUCTION
Obliterating cancer tumors are the main goals of cancer treatment researches. To achieve these goals molecular analysis is needed to use the right drug for the right patient. However, we cannot treat all patients with a tumor type the same way due to the unmatched therapies with the cancer. The medical samples of 175 patients with one aberration, illustrate the response treatment rate was 27% with matched targeted therapy. The response rate was five percent in 116 patients when treated with non-matched therapy (“Targeted therapy promising for cancer patients,” 2011).

Patients who received matched targeted aid had average survival of 13.4 months, while average survival for patients awarded with unmatched targeted therapy was nine months. Median failure-free survival in patients who acquired matched targeted therapy was 5.2 months, allegorized to
2.2 months for patients who received unmatched targeted therapy; this clarifies the asymmetric applies of a specific drug on different patients (“Targeted therapy promising for cancer patients,” 2011; Cavalcanti, Shirinzadeh, Fukuda, & Ikeda, 2007; Leary, Liu, & Apuzzo, 2006; Boning, 2009; Boning, Ono, Nohara, & Dubowsky, 2008; Cavalcanti, Shirinzadeh, Freitas, & Kretly, 2007; Sierra, Weir, & Jones, 2005; Cavalcanti & Freitas, 2005; Mathieu, Martel, Yahia, Soulez, & Beaudoin, 2005; Behkam & Sitti, 2006; Xi, Schmidt, & Montemagno, 2005; Lee, Mahapatro, Caron, Requicha, Stauffer, Thompson, & Zhou, 2006; Fukuda, Kawamoto, Arai, & Matsuura, 1995; Freitas, 2005; Patel, Patel, Patel, Patel, & Patel, 2006; Ikeda, Arai, Fukuda, Kim, Negoro, Irie, & Takahashi, 2005; Xu, Vijaykrishnan, Xie, & Irwin, 2004; Park, Lee, & Lee, 2005; Couvreur & Vauthier, 2006; Gao, Wolfgang, Neschen, Morino, Horvath, Shulman, & Fu, 2004). The main objective of this paper is to match targeted therapies to cancer patients resourcefully and untimely using nanorobots. And the differentiated goal is to be able to abnegate tumor tissue in such a way as to abbreviate the bet of causing or allocating a recurrence of the growth in the body. The approach is conscious to be able to treat tumors that cannot be gained access via conventional surgery, such as abysmal brain tumors.

Nanorobotics is the appearing technology area beginning apparatuses or robots whose components are at or access to the scale of a nanometer. More characteristically, nanorobotics refers to the nanotechnology engineering discipline of designing and creating nanorobots, with appliances ranging in amplitude from 0.1-10 micrometers and combined of nanoscale or molecular constituents. Nanomachines are amply in the research-and-development phase, although any primitive molecular machines have been analyzed. An archetypal is a sensor having a switch about 1.5 nanometers across, capable of counting specific molecules in a chemical archetypal. The first useful applications of nanomachines might be in medical technology, identify and destroy cancer cells (Cavalcanti, Shirinzadeh, Fukuda, & Ikeda, 2007; Leary, Liu, & Apuzzo, 2006; Boning, 2009; Boning, Ono, Nohara, & Dubowsky, 2008; Cavalcanti, Shirinzadeh, Freitas, & Kretly, 2007; Sierra, Weir, & Jones, 2005; Cavalcanti & Freitas, 2005; Mathieu, Martel, Yahia, Soulez, & Beaudoin, 2005; Behkam & Sitti, 2006; Xi, Schmidt, & Montemagno, 2005; Lee, Mahapatro, Caron, Requicha, Stauffer, Thompson, & Zhou, 2006; Fukuda, Kawamoto, Arai, & Matsuura, 1995; Freitas, 2005; Patel, Patel, Patel, Patel, & Patel, 2006; Ikeda, Arai, Fukuda, Kim, Negoro, Irie, & Takahashi, 2005; Xu, Vijaykrishnan, Xie, & Irwin, 2004; Park, Lee, & Lee, 2005; Couvreur & Vauthier, 2006; Gao, Wolfgang, Neschen, Morino, Horvath, Shulman, & Fu, 2004). Nanorobots interact with the cancer cells and based on molecular levels. The main component of the aimed nanorobot architecture is allotted in Section 2. The accomplished architecture design and the behavior of the proposed nanorobot is pioneered in Section 3. In Section 4 a verification of the proposed algorithms is presented. Section 5 demonstrates the system simulation and the results accrediting to the amplitudinous positions of the proposed nanorobot and the tumor.

2. LITERATURE REVIEW

Previous researches presented the active components needed in our proposed nanorobot architecture. The proposed architecture consists of number of nano-components: a chemical sensor, a temperature sensor, an actuator and a microcontroller. These main components collaborate to achieve the goals of early detection and treatment of cancer tumor. The next subsections give a brief depiction about the structure and the functionality of these components.