ISSN : 0974 - 7532 Volume 7 Issue 4

Trade Science Inc.

Research & Reviews in

BioSciences

Review

RRBS, 7(4), 2013 [153-155]

Combination chemical agents with biological means in cancer therapy

Da-Yong Lu*[1], Ting-Ren Lu[2], Hong-Ying Wu[2]
Shanghai University, Shanghai200444, (PR CHINA)
College of Science, Shanghai University, Shanghai200444, (PR CHINA)
E-mail : ludayong@sh163.net; ludayong@shu.edu.cn

ABSTRACT

Cancer is a refractory and resistance disease and the therapeutics for cancer, especially for cancer metastasis is still imperfect. Many cancer patients die of cancer metastases. One of the reasons for unsatisfactory of cancer therapy is the toxicity of antineoplastic drugs to human bodies. So the dosages of antineoplastic drugs in human therapy can not be too high and small proportions of cancer cells survive after chemotherapy. These tumor cells will regrow to large tumor and multidrug resistance (MDR) often occurs in these cancer cells. It is these cancer cells to kill patients. The best example nowadays and in future is to combine cytotoxic anticancer chemicals with biotherapies. In this article, we address this problem by analysis of the advantages and disadvantages of different therapeutic means and provide new insights into this problem.

BACKGROUNDS

Cancer is one of the high-mortality diseases, which causes the annual deaths listing among the top 5 mortality in almost all countries. Unlike cardiovascular diseases, the treatment beneficiary for cancers especially for epithelial carcinoma has been improving slightly over the past several decades[1-3]. Cancer is a high mortality disease and the therapeutics for cancer, especially for cancer metastasis is still imperfect. Many cancer patients die of cancer metastases[4]. One of the reasons for unsatisfactory of cancer therapy is the toxicity of antineoplastic drugs to human bodies. Since the cytotoxic antineoplastic drugs are very toxic and they will kill normal human cells at the same times of killing cancer cells. So the dosages of antineoplastic drugs in human therapy can not be too high, or the patients can not tolerate them. In the end, small proportions of cancer cells survive after chemotherapy. These tumor cells will regrow to large tumor and multidrug resistance (MDR) often occurs in these cancer cells. It is these cancer cells to kill patients. The best example nowadays and in future is to combine cytotoxic anticancer chemicals with biotherapies. In this article, we address this problem by analysis of the advantages and disadvantages of different therapeutic means and provide with new strategy.

NEW STRATEGIES

We need to brainstorm new strategy to overcome this problem. Apart from manufacturing more effective and specific anticancer or antimetastatic drugs[5-6]. The best strategy of anticancer therapy is to better utilize and update present therapeutic norm. One of these attempts is to combinatory use of cytotoxic chemicals and biotherapies[7]. If cytotoxic chemical drugs can kill 70% to 95% of tumor cells, some highly specific biotherapies will kill the rest of tumor cells. This is our ultimate goal. This strategy is a paradigm of future cancer chemotherapy. We all know anticancer drugs rarely kill all tumor cells. If several cancer cells remain, they will quickly regrow to large-volume of cancer. So pa-

Review

tients' immuno-surveilence systems or the effects of high specific biotherapies[8-9] will decide the long-term effectiveness of patients. The developments of biotherapies currently insufficient will be the great task of future therapeutic studies. The best example and achievement nowadays is to combine cytotoxic anticancer chemicals with mono-clonal or polyclonal antibodies[10-16]. On the other hand, other biological means, such as vaccines can also combine with cytotoxic chemotherapy.

DIFFERENT ANTICANCER BIOTHERAPIES

THE ADVANTAGES OF THIS STRATEGY

The biotherapies for cancer are often mild and high cost and are difficult to kill large tumor volume, yet they are high specific and only kill small amount of tumor cells with completeness and no toxicity. The cytotoxic chemotherapy as we guess should always be given before the biotherapy. It is the cytotoxic chemical drugs to reduce tumor to a minimum volume, then high specific biotherapy to kill the rest of tumor cells no matter these tumor cells are MDR or not. This is a perfect strategy and hopeful we can achieve better outcome according to this paradigm and principle.

Biotherapy	Targets
Monoclonal or polyclonal antibodies	Tumor biomarkers
Vaccines	Tumor antigens
Gene therapy	Escalated tumor genes or antigens
Cytokine therapy	Human tumor environment
Immune-therapy	Tumor antigen
iRNA	Tumor genes

CHALLENGE FOR THIS STRATEGY

This is a perfect strategy and combination. But some problems and challenge still remain. First, currently biotherapy is not perfect. The cytotoxicity of most current biotherapy is weak. It is seldom to completely destroy all cancer cells if the tumor volume is more than 0.5 cm. They are still several steps to go. In the future, we need to innovate and produce more effective biotherapy for cancer therapy, especially to formed metastatic foci because this is the main cause of cancer patients' deaths.

Second, we do not know which biological pathways go aberrant in specific tumors in clinics. We must first know the characteristics of tumor to treat[17-20]. Then we can design the suitable biotherapy regimes.

The third reason is the high cost of biotherapy, especially antibody and microRNA. So patients' financial status is an important factor to decide whether we can use biotherapy to not.

There is long way to go and we must make more effort in this matter. The more we pay our attentions on this matter, the more satisfactory results we can get in..

REFERENCES

[1] H.Varmus; The new era in cancer research. Science, **312(5777)**, 1162-1165 **(2006)**.

[2] M.B.Spoon; The war on cancer. Lancet, **347(9012)**, 1377-1381 **(1996)**.

[3] A.Jemal, R.Siegel, E.Ward, T.Murray, J.Q.Xu, C.Smigal, M.J.Thun; Cancer Statistics. CA.Cancer J.Clin., **56(2)**,106-130 **(2006)**.

[4] P.Mehlen, A.Puisieux; Metastasis: a question of life or death. Nat.Rev.Cancer, **6**, 449-458 **(2006)**.

[5] D.Y.Lu, T.R.Lu, S.Cao; Cancer metastases and clinical therapies. Cell Developmental Biology, **1(4)**, e110 **(2012)**.

[6] M.Iiizumi, W.Liu, S.K.Pai, E.Furuta, K.Watabe; Drug development against metastasis-related genes and pathways: a rationale for cancer therapy. BBA, **1786**, 87-104 **(2008)**.

[7] D.Y.Lu, T.R.Lu, X.L.Chen, J.Ding; Individualized cancer chemotherapy. Hypotheses in Clinical Medicine. M.M.Shoja, P.S.Agutter, R.S.Tubbs, M.Ghanei, K.Ghabili, A.Harris, M.Loukas. (Eds); chapter 13, Nova Science Publisher. US **(2012)**.

[8] R.J.Lechleider, E.Kaminskas, X.P.Jiang, et al.; Ixabepilone in combination with capecitabine and as monotherapy for treatment of advanced breast cancer refractory to previous chemotherapies. Clin Cancer Res., **14(4)**, 4378-4384 **(2008)**.

[9] D.L.Gillespie, K.Whang, B.T.Ragel, J.R.Flynn, D.A.Kelly, R.L.Jensen; Silencing of hypoxia inducible factor-1á by RNA interference attenuates human glioma cell growth in vivo. Clin.Cancer Res., **13(8)**, 2441-2448 **(2007)**.

[10] C.E.Geyer, J.Forster, D.Lindqyuist, et al.; Lapatinib plus capecitabine for HER2-positive advanced breast cancer. N.Engl.J.Med., **355(26)**, 2733-2743 **(2006)**.

[11] J.B.Vermorken, R.Mesia, F.Rivera, et al.; Platinum-based chemothgerapy plus cetuximab in head and neck cancer. N.Engl.J.Med., **359(11)**, 1116-1127 **(2008)**.

[12] A.Younes, N.L.Barttett, J.P.Leonard, D.A.Kennedy, C.M.Lynch, E.L.Sievers et al.; Brentuximab vedotin (SGM-35) for relapsed CD30-positive lymphomas. N.Engl.J.Med., **363(19)**, 1812-1821 **(2010)**.

[13] The Lancet Oncology. New hope for advanced gastric cancer. Lancet Oncology., **11**, 211 **(2010)**.

[14] K.Miller, M.Wang, J.Gralow, et al.; Paclitaxel plus bevacizumab versus paclitaxel alone for metastatic breast cancer. N.Engl.J.Med., **357(26)**, 2666-2676 **(2007)**.

[15] J.Tol, M.Koopman, A.Cats, et al.; Chemotherapy, bevacizumab, and cetuximab in metastatic colorectal cancer. N.Engl.J.Med., **360(6)**, 564-572 **(2009)**.

[16] E.D.Ball, H.E.Broom; Monoclonal antibodies in the treatment of hematologic malignancy. Best Practice & Res.Clinical Haematology, **23**, 403-416 **(2010)**.

[17] D.Y.Lu, X.L.Chen, J.Ding; Individualized cancer chemotherapy integrating drug sensitivity tests, pathological profile analysis and computational coordination—an effective strategy to improve clinical treatment. Medical Hypotheses., **66**, 45-51 **(2006)**.

[18] A.Ocana, A.Pandiella; Personalized therapies in the cancer "omics" era. Mol.Cancer, **9**, 202 **(2010)**.

[19] B.Stransky, P.Galante; Application of bioinformatics in cancer research. An IMICS Perspective on Cancer Research, 211-233 **(2010)**.

[20] D.Y.Lu, T.R.Lu, X.L.Chen; Individualized cancer chemotherapy by detecting cancer biomarkers. Metabolomics, **2**, e121 **(2012)**.