

Patent Selections:

The recent patents annotated in this section have been selected from various patent databases, and are relevant to the articles published in this journal issue. The patents are categorized in fast emerging patent biomarker applications e.g. discovery and validation in drug discovery, clinical development and molecular diagnostics, bioinformatics, preclinical biomarker discovery, personalized medicine, translational biomarkers and therapeutic interventions.

HEAD AND NECK CANCER

1. Agarwal, V., Balakrishnan, A., Periyasamy, G. Synergistic pharmaceutical combination for the treatment of squamous cell carcinoma of head and neck. **US20140112918 (2014).**
2. Hu, S., Wong, D.T.W. Salivary protein biomarkers for human oral cancer. **US20140206008 (2014).**
3. Duerksen-Hughes, P.J., Filippova, M., Filippov, V. Biomarkers for the detection of head and neck tumors. **US20140194317 (2014).**
4. Akervall, J.A., Thibodeau, B.J., Wilson, G.D. Head and neck cancer biomarkers. **US20140213472 (2014).**
5. Ralhan, R., Walfish, P.G. Biomarkers for head-and-neck cancers and precancers. **US20140080138 (2014).**
6. Stylli, H.K.C. Methods of detecting head and neck cancer. **WO2014164365 (2014).**
7. Franzmann, E.J., Lokeshwar, V.B. Biomarkers for detection and diagnosis of head and neck squamous cell carcinoma. **US20140024042 (2014).**
8. Califano, J.A. Detection of head and neck cancer using hypermethylated gene detection. **US20140323321 (2014).**
9. Lichtarge, O., Myers, J.N. Evolutionary-gradient scoring of TP53 mutations (EGSP53) defines risk in resectable head and neck cancer. **WO2014007865 (2014).**
10. Brakenhoff, R.H., Van Der, P.M., De Kemp, S.R., Gommans, W.M., Prevost, G.P.A., Schaapveld, R.Q.J., Cerisoli, F. MIRNA for treating head and neck cancer. **EP2794881 (2014).**
11. Califano, J.A. Detection of head and neck cancer using hypermethylated gene detection. **US2014323321 (2014).**
12. Akervall, J.A., Thibodeau, B.J., Wilson, G.D. Head and neck cancer biomarkers. **US2014213472 (2014).**
13. Hirawat, S., Massacesi, C., Di, T.E. Combination of a PI3 kinase inhibitor with paclitaxel for use in the treatment or prevention of a cancer of the head and neck. **WO2014181252 (2014).**
14. Grandis, J.R., Lui, V.WY. Functional genomics screening platform for head and neck cancer. **WO2014018660 (2014).**
15. Cong, L., Egloff, A.M., Garraway, L.A., Grandis, J.R., Lander, E.S., Stransky, N., Tward, A.D., Zhang, F.

Compositions and methods of treating head and neck cancer. **EP2736538 (2014).**

ORAL CANCER

1. Hu, S., Wong, D.T.W. Salivary protein biomarkers for human oral cancer. **US20140206008 (2014).**
2. Cheng, A., Lu, Y. Method of using both MIR-196A and MIR-196B as biomarkers for detecting oral cancer. **US20140030715 (2014).**

PROGNOSIS & BIOMARKER

1. Wu, C.Y. Biomarker(s) for early detection / diagnosis/ prognosis of gastric cancer. **US2014287939 (2014).**
2. Yu Jun., Sung, J.J.Y. Epigenetic biomarker ADAMTS9 for diagnosis and prognosis of gastric cancer. **US2014274908 (2014).**
3. Croce, C.M., Volinia, S. Breast cancer biomarker signatures for invasiveness and prognosis. **AU2013209477 (2014).**
4. St-Pierre, Y. Galectin-7 as a biomarker for diagnosis, prognosis and monitoring of ovarian and rectal cancer. **WO2014094108 (2014).**
5. Mansour, H., Incitti, R., Bajic, V Composite biomarker for non-invasive screening, diagnosis and prognosis of colorectal cancer. **AU2012324545 (2014).**
6. Zhao, H., Zhang, H. Application of miRNA (mini ribonucleic acid) serving as biomarker for hepatocellular carcinoma prognosis. Application of miRNA (mini ribonucleic acid) serving as biomarker for hepatocellular carcinoma prognosis. **CN103616518 (2014).**
7. Luo, Y., Zhuo, Wei., Fu, Y. Chang Guodong. Use of nucleolin as a biomarker for lymphangiogenesis in a cancer prognosis and therapy. **US2014037655 (2014).**
8. Drouet, E., Habib, M., Agbalika, F. Use of at least one biomarker for the *in vitro* prognosis or diagnosis of lymphoproliferative episodes associated with the Epstein-Barr virus (EBV). **US2014342349 (2014).**
9. Goel, A., Hur, K., Toiyama, Y., Boland, C.R. Tissue & blood-based MIRNA biomarkers for the diagnosis, prognosis and metastasis-predictive potential in colorectal cancer. **US2014322354 (2014).**

10. Esmon, C.T., Xu, J., Zhang, X. Extracellular histones as biomarkers for prognosis and molecular targets for therapy. **US2014308289 (2014).**
11. Mansour, H., Incitti, R., Bajic, V. Composite biomarkers for non-invasive screening, diagnosis and prognosis of colorectal cancer. **US2014255418 (2014).**
12. Mickiewicz, B., Vogel, H.J., Wong, H.R., Winston, B.W. Metabolite biomarkers for diagnosis and prognosis of pediatric septic shock. **US2014205591 (2014).**
13. Kas, K., Vanpoucke, G. New biomarkers for diagnosis, prediction and/or prognosis of sepsis and uses thereof. **EP2796878 (2014).**
14. Bajaj, J., Sanyal, A., Gillevet, P.M. Gut microflora as biomarkers for the prognosis of cirrhosis and brain dysfunction. **US2014179726 (2014).**
15. Rao, M.K., Imam, J.S., Zoghi, B., Chang, Y.F., Subbarayalu, P. MIRNAS as novel therapeutic adjuvants and biomarkers for the prognosis and treatment of drug resistant breast cancers. **WO2014078686 (2014).**
16. Robert, C., Boussemart, L., Girault, I., Vagner, S. Prognosis and predictive biomarkers and biological applications thereof. **WO2014184211 (2014).**
17. La, T.N. B. Biomarkers for prognosis. **WO2014167311 (2014).**
18. Johansen, J.S., Schultz, N.A., Wojdemann, M. miRNA biomarkers for prognosis of patients with pancreatic cancer. **US2014106985 (2014).**
19. Mercola, D., McClelland, M., Jia, A., Chen, X. Biomarkers for prostate cancer prognosis. **WO2014052930 (2014).**
20. Lai, H.C., Huang, R.L. Gene biomarkers for prediction of susceptibility of ovarian neoplasms and/or prognosis or malignancy of ovarian cancers. **AU2012301937 (2014).**
21. Rai, B., Kaur, J. Specific salivary biomarkers for risk detection, early diagnosis, prognosis and monitoring of Alzheimer's and Parkinson's diseases. **US2014072982 (2014).**
22. Mercola, D., McClelland, M. Stroma biomarkers for prostate cancer prognosis. **WO2014022594 (2014).**
23. Mosser, J., Etcheverry, A., Aubry, M., Delattre, J.Y. Biomarkers and methods for the prognosis of glioblastoma. **US2014011702 (2014).**
24. García-Berrocó, T., Montaner, V.J. Biomarkers for the prognosis of ischemic stroke. **WO2014064202 (2014).**
25. Meseguer, N.A., Cuadros, A.T. New biomarkers for the diagnosis and/or prognosis of clear cell renal cell carcinoma. **WO2014041064 (2014).**

26. Ladel, C.H., Berton, A.A.S., Valsesia, A. Farmer, P.J. Prognosis biomarkers in cartilage disorders. **WO2014023704 (2014).**
27. Ansari, S., Gebel, S., Gonzalez, S.I., Hoeng, J., Martin, F., Peitsch, M., Xiang, Y. Biomarkers for prognosis of lung cancer. **WO2014072086 (2014).**
28. Lambers-Heerspink, H.J., De Zeeuw, D., Datema, R., Woloszczuk, W. Biomarkers for improved diagnosis and prognosis of chronic kidney disease. **WO2014142649 (2014).**

HUMAN PAPILLOMA VIRUS

1. Bashkin, J.K., Koeller, K.J., Edwards, T., Grace, F.C. . Compounds for treating papilloma virus infection. **WO2014065848 (2014).**
2. Yelensky, R., Boshoff, C.H., Fenton, T.R., Lechner, M.A., Stephens, P.J., Hawryluk, M.J., Frampton, G.M. Human papilloma virus as predictor of cancer prognosis. **WO2014022830 (2014).**
3. Gorodeski, G., Fu, W. P2X7: Inhibition of epithelial cancers and papillomas. **US20140037576 (2014).**
4. Weiner, D., Yan, J. Improved vaccines for human papilloma virus and methods for using the same. **WO2014165291 (2014).**

POLYMERASE CHAIN REACTION

1. Dornan, D., Duchateau-Nguyen, G.N., Tri Q., Palermo, G., Weisser, M., Yeh, R.F. Chronic lymphocytic leukemia (CLL) biomarkers. **US20140017230 (2014).**
2. Schütz, E., Beck, J., Urnovitz, H. Personalized biomarkers for cancer. **WO2014093825 (2014).**
3. Williams, S.A., Riel-mehan, M., Ostroff, R.M. Pancreatic cancer biomarkers and uses thereof. **US20140073522 (2014).**
4. Therianos, S., Ruegg, C., Monnier-Benoit, S., Ciarloni, L., Hosseini, S. Biomarker combinations for colorectal tumors. **WO2014068124 (2014).**

TUMORS MARKER

1. Boutros, M., Augustin, I. Univ Ruprecht Karls Heidelberg. Deutsches Krebsforsch. GPR177 as target and marker in tumors. **US2014227276 (2014).**
2. Beaudenon-Huibregtse, S., Wylie, D., Adai, A.T. MIRNAS as diagnostic biomarkers to distinguish benign from malignant thyroid tumors. **EP2771487 (2014).**
3. Duerksen-Hughes, P.J., Filippova, M., Filippov, V. Biomarkers for the detection of head and neck tumors. **US2014194317 (2014).**

BIOMARKERS OF ORGAN INJURY

1. Everett, A.D., Casella, J.F., Van Eyk, J. Biomarkers of brain injury. *US20140045713 (2014)*.
2. Gerszten, R., Fifer, M., Carr, S.A. Novel biomarkers for cardiovascular injury. *US20140045714 (2014)*.
3. Meyer, E., Maddens, B. Biomarkers for acute kidney injury. *US20140017702 (2014)*.
4. Cook, J.L., Cook, C.R., Stoker, A.M., Kuroki, K., Garner, B.C., Evans, R., Roller, B.L., Jayabalan, P.S. Biomarkers of osteoarthritis. *US20140155499 (2014)*.
5. Yeatts, K., Akhavan, R. Circulating biomarkers for cancer. *US20140228233 (2014)*.
6. Pawlowski, T., Svetlov, S.I., Hayes, R.L. Devices and methods for biomarker detection process and assay of liver injury. *US20140275294 (2014)*.
7. Kobeissy, F., Guingab, J., Wang, K.K., Hayes, R.L. Methods, kits and devices for detecting BII-spectrin, and breakdown products thereof, as biomarkers for the diagnosis of neural injury. *US20140024053 (2014)*.
8. Cotter, R.J., Jelinek, C., Van Eyk, J.E. Biomarkers of cardiac ischemia. *US20140147874 (2014)*.
9. Fleming, M.A., Hare, B.J., Chelsky, D., Allard, R., Paramithiotis, E. Biomarkers for HCV infected patients. *US20140308242 (2014)*.

PROTEOMICS

1. Das, S., Bakaletz, L.O. Proteomics based diagnostic detection method for chronic sinusitis. *US2014314876 (2014)*.
2. Kang, D.J., Park, S.R., Kim, Sook-Kyung. Enzyme treatment apparatus for proteins using a hollow fiber membrane, and on-line proteomics method using same. *US2014302545 (2014)*.
3. Escher, C., Ossola, R., Rinner, O., Reiter, L. Methods and systems for experimental set-up and data analysis in targeted proteomics applications. *US2014236497 (2014)*.
4. Fu, Q., Cen, W., Zhu, P. Polypeptide mixture isoelectric focusing separation method for proteomics analysis. *CN103926301 (2014)*.
5. Dratz, E., Grieco, P. Novel optical labeling molecules for proteomics and other biological analysis. *US2014186875 (2014)*.
6. Ting, A.Y., Martell, J.D., Rhee, Hyun-Woo., Zou, P. *In vivo* proteomics. *US2014186870 (2014)*.
7. Chen, Chung-Hsuan., Lin, Jung-Lee., Chu, Ming-Lee. Step-scan ion trap mass spectrometry for high speed proteomics. *CN103814425 (2014)*.

8. Wuhr, M.H., Gygi, S.P., Haas, W., Mcalister, G.C., Peshkin, L., Rad, R., Kirschner, M.W. Accurate and interference-free multiplexed quantitative proteomics using mass spectrometry. *WO2014066284 (2014)*.
9. Ren, Q., Bai, X., Ma, X., Xu, S., Yang, X. Method for studying effect of potash fertilizer on proteomics of potatoes suffering from insect attack. *CN103733895 (2014)*.
10. Clive, G.B., Kas, K., Eyckerman, S.A.J. Use of aptamers in proteomics. *PT2209893 (2014)*.
11. Devarajan, P. Method for the early detection of renal disease using proteomics. *US2014080166 (2014)*.

miRNA

1. Wang, Y., Zhang, M., Yang, D., Wang, Q., Li, J. Application of blood plasma miRNA (micro ribonucleic acid) biomarker. *CN103849677 (2014)*.
2. Zhao, H., Zhang, H. Application of miRNA (mini ribonucleic acid) serving as biomarker for hepatocellular carcinoma prognosis. *CN103616518 (2014)*.
3. Tazi, J., Scherrer, D., Garcel, A., Campos, N., Najman, R., Mahuteau-Betzer, F. miRNA-124 as a biomarker. *WO2014111892 (2014)*.
4. Chen, H., Si, H., Li, X., Yang, Z., Ding, Q., Ding, X., Sheng, Q. Serum miRNA biomarker of type 2 diabetes mellitus and application thereof. *CN103555724 (2014)*.
5. Kerin, M.J., Miller, N., Mcdermott, A. A miRNA oncologic biomarker of breast cancer. *WO2014006160 (2014)*.

GENOMICS

1. Davies, J.P., Reddy, V.S., Ainley, W.M., Thompson, M.A. Sugarcane bacilliform viral (SCBV) enhancer and its use in plant functional genomics. *US2014289899 (2014)*.
2. Benson, H., Fricchione, G., Dusek, J.A., Libermann, T.A., Bhasin, M.K. Quantitative genomics of the relaxation response. *US2014228242 (2014)*.
3. Grandis, J.R., Lui, V.W.Y. Functional genomics screening platform for head and neck cancer. *WO2014018660 (2014)*.
4. Zhang, F., Sanjana, N.E., Shalem, O. Functional genomics using CRISPR-CAS systems, compositions, methods, knock out libraries and applications thereof. *WO2014093701 (2014)*.
5. Mills, G.B., Lu, Y., Liang, H., Cheung, W.T. Efficient functional genomics platform. *WO2014004724 (2014)*.

VIRULENCE FACTORS OF *HELICOBACTER PYLORI*

1. Benghezal, M., Debowski, A.W., Sehnal, M., Dieye, Y., Park, Sehoon., Marshall, B. Gene expression and eradi-

cation system in *Helicobacter pylori*. **US20140072595 (2014)**.

2. Miyazaki, K., Ohshima, K., Katsuen, S. Inhibitory fiber against virulence factors production and method for producing same. **US20140155589 (2014)**.

PREECLAMPSIA

1. Garovic, V.D. Markers for preeclampsia. **US2014322721 (2014)**.
2. Olsson, M., Akerstrom, B., Hansson, S. HBF and A1M as early stage markers for preeclampsia. **NZ602733 (2014)**.
3. Hickok, D.E., Boniface, J.J., Critchfield, G.C., Fleischer, T.C. Biomarkers and methods for predicting preeclampsia. **US2014296108 (2014)**.

RENAL CELL CARCINOMA

1. Griffin, James D., Wu, Lizi., Chen, Jie. Method of treating mucoepidermoid carcinoma. **US20140243396 (2014)**.
2. Schwenk, J., Nilsson, P., Uhlén, M. Biomarker of renal impairment. **US20140221507 (2014)**.
3. Fries, J., Von, B.M. Methods of diagnosing and differentiating oncocytoma and malignant renal carcinoma as well as products and uses relating thereto. **WO2014154686 (2014)**.
4. Li, X., Zhou, J., Binder, S.W., Ra, S. Multiplex pcr-based testing of cutaneous squamous cell carcinoma and pseudoepitheliomatous hyperplasia and methods for distinguishing the same. **US20140242598 (2014)**.
5. Sarwal, M.M., Sigdel, T. Methods and compositions for assessing renal status using urine cell free DNA. **WO2014145232 (2014)**.
6. Mayer, G., Rudnicki, M., Perco, P. Method of diagnosing renal disorders. **US20140303023 (2014)**.
7. Arend, J.S.R., Van Den, B.E.J., Raaben, W. The use of alkaline phosphatase for preserving renal function. **US20140219984 (2014)**.
8. Meseguer, N., Cuadros, A. New biomarkers for the diagnosis and/or prognosis of clear cell renal cell carcinoma. **WO2014041064 (2014)**.
9. Blonder, J., Wei, Bih-rong., Johann, D.J., Veenstra, T.D. Renal cell carcinoma biomarkers. **US20140295456 (2014)**.

KIDNEY CANCER

1. Meyer, E., Maddens, B. Biomarkers for acute kidney injury. **US20140017702 (2014)**.

2. Funahashi, Y., Kadowaki, T., Matsui, J., Simon, J.S., Xu, L. Biomarkers for predicting and assessing responsiveness of thyroid and kidney cancer subjects to lenvatinib compounds. **US20140187577 (2014)**.
3. Keller, A., Beier, M., Meese, E., Leidinger, P., Wendschlag, A. Complex sets of mirnas as non-invasive biomarkers for kidney cancer. **US20140193822 (2014)**.
4. Hildebrandt, F. Methods and biomarkers for detection of kidney disorders. **WO2014005076 (2014)**.
5. Elias, J.A., Parikh, C.R., Cantley, L.G. Chitinase-3-like protein 1 as a biomarker of recovery from kidney injury. **US20140200184 (2014)**.
6. Ma, R.C.W., So, W.Y., Chan, J.C.N. Novel biomarkers for diabetic kidney diseases and use thereof. **WO2014067447 (2014)**.

MONOCLONAL ANTIBODIES

1. Wang, Z., Murphy, J., Marquardt, T., Moosmayer, D. Monoclonal antibodies against tissue factor pathway inhibitor (TFPI). **US2014294832 (2014)**.
2. Harvey, B.R., Pinkston, K.L., Azhdarina, A., Sevick-Muraca, E.M. Monoclonal antibodies targeting EPCAM for detection of prostate cancer lymph node metastases. **WO2014159531 (2014)**.
3. Owens, S.M., Henry, R., Brown, A. Anti(+) methamphetamine monoclonal antibodies. **WO2014160133 (2014)**.
4. Zhang, N., An, Z. HER3 specific monoclonal antibodies for diagnostic and therapeutic use. **WO2014159915 (2014)**.
5. Rotem-Yehudar, R., Rodionov, G. Monoclonal antibodies for tumor treatment. **US2014302032 (2014)**.
6. Azorsa, D.O. Hybridoma clones and monoclonal antibodies to fibroblast growth factor 4. **WO2014165287 (2014)**.
7. He, F., Kwang, J.H.S. Monoclonal antibodies targeting neutralizing epitopes on H5 influenza virus of clade 2.3. **US2014314777 (2014)**.
8. Pytela, R., Zhu, W., Ke, Y., Qian, Q., Au, H.C. Fusion partner for production of monoclonal rabbit antibodies. **US2014349393 (2014)**.
9. Kalergis, P.A.M., Bueno, R.S.M., Mora, A.J.E. Gomez, J.R.S. Monoclonal antibodies specific for the M2-1 antigen of respiratory syncytial virus (RSV). **US2014348858 (2014)**.
10. Korman, A.J., Srinivasan, M., Wang, C., Selby, M.J., Chen, B., Cardarelli, J.M., Huang, H. Monoclonal antibodies to programmed death 1 (PD-1). **US2014348743 (2014)**.

11. Cooper, L. J., Jena, B., Singh, H., Rushworth, D. Chimeric antigen receptor-targeting monoclonal antibodies. **WO2014190273 (2014).**
12. Marasco, W.A., Sui, J., Zhu, Q., Chang, D.K. Affinity matured anti-CCR4 humanized monoclonal antibodies and methods of use. **AU2013256010 (2014).**
13. Azorsa, D. Hybridoma clones, monoclonal antibodies, and methods of use. **WO2014185908 (2014).**
14. Hansen, G. Monoclonal antibodies directed to CD52. **US2014341912 (2014).**
15. Kim, K.J., Park, H., Wang, L., Vasquez, M. Humanized monoclonal antibodies to hepatocyte growth factor. **US2014335076 (2014).**
16. Hekmat, D., Helk, B., Schulz, H.K., Smejkal, B. Crystallization methods for purification of monoclonal antibodies. **AU2013258006 (2014).**
17. Herrera, J.M.C., Vries, J.E.D., Schwaerzler, C. Human monoclonal antibodies against human IL-4. **PT1817343 (2014).**