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# Multiple imputation and clinico-serological models to predict human papilloma virus (HPV) status in oropharyngeal carcinoma: An alternative when tissue is unavailable

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**Aim:** In epidemiological studies, determination of human papilloma virus (HPV) in oropharyngeal squamous cell carcinoma (OPSCC) may depend on the availability of clinical testing, and/or tumor tissue access. We aimed to identify alternative methods for estimating HPV status to improve the quality of such datasets.

**Method:** We developed multi-modal prediction models for HPV status and prognosis by combining both clinico-epidemiologic variables and either serological multiplex assays of HPV or multiple imputation of HPV status. Sensitivity, specificity and accuracy between these methods and either p16 immunostaining or survival were assessed.

**Results:** When comparing to a reference of tumor tissue p16 immunostaining in 783 OPC patients, the model incorporating a composite of 20 HPV serological antibodies and clinical factors (c-index: 0.96) performed better than using this composite HPV serology (c-index: 0.92) or imputation (c-index: 0.86) alone. However, the model containing a single HPV 16E6 antibody combined with clinical variables performed extremely well (c-index: 0.95). When defining HPV status by composite HPV, HPV 16E6 serology, multiple imputation, or through p16 immunostaining, each of these definitions demonstrated improved overall and progression-free survival in HPV-positive OPC patients, when compared to HPV-negative patients (adjusted hazard ratios between 0.25 and 0.63).

**Conclusion:** Our study strongly suggests that when blood samples are available, a model that utilizes a single HPV 16E6 antibody combined with several clinical features has excellent performance characteristics to estimate HPV status. When no blood or tumor tissue is available, multiple imputations remain a viable, but suboptimal option.

## Recent Publications

1. Ren J, Wang J, Zhao Y, et al. (2018) Could aspiration pepsin be used as a marker of gastric reflux? *Chest* 153(4):107
2. Ren J J, Yu Z, Yang F L, Lv D, Hung S, Zhang J, et al. (2015) Effects of *Bifidobacterium breve* feeding strategy and delivery modes on experimental allergic rhinitis mice. *PLoS ONE* 10(10): e0140018.
3. Jian-jun Ren, Yu Zhao, Jing Wang, et al. (2017) Pepsin A as a marker of laryngopharyngeal reflux detected in chronic rhinosinusitis patients. *Otolaryngology-Head and Neck Surgery* 156(5):893-900.
4. Ren J J, Zhao Y, Ren X, et al. (2017) Is reflux symptom index reliable in chronic rhinosinusitis patients to assess their reflux status? *Kaohsiung J Med Sci.* 33(6):318-319.

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5. **Jian-Jun Ren, Yu Zhao, Ming-Juan Liu, Guo Liu and Fei Chen (2015) Langerhans cell sarcoma arising from the root of tongue: a rare case, Int J Clin Exp Pathol. 8(11):15312-15315.**

### **Biography**

Jianjun Ren is currently doing the researches of HPV related to head and neck cancer patients' outcomes; the correlation between laryngopharyngeal reflux and rhinosinusitis; Artificial intelligence in the field of ENT medicine, etc, by using molecular biology, biochemistry, epidemiology, pharmacogenomics and computer science, etc.

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