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**Title:** Interpretations of three sputum smear examinations at the first diagnosis in our hospital's tuberculosis patients

Dr. Kanako 27090 Kobayashi koba@matsue.hosp.go.jp<sup>1</sup>, Dr. Shuichi 27091 Yano yano@matsue.hosp.go.jp<sup>1</sup> and Dr. Toshikazu 27092 Ikeda ikeda@matsue.hosp.go.jp<sup>1</sup>. <sup>1</sup> Pulmonary Medicine, National Hospital Organization Matsue Medical Center, Matsue, Shimane, Japan, 690-8556 .

**Body:** Purpose: Toman et al. (1979) suggested that three serial sputum smear examinations were recommended as a standard method for tuberculosis (TB) diagnosis. However, this was based on direct smear methods with Ziehl-Nielsen staining. Thus, we investigated if three sputum examinations were necessary for our hospital using homogenization/digestion, concentration, and fluorochrome staining. Methods: We evaluated TB patients admitted to our hospital between April 1, 2005 and December 31, 2009. A retrospective study was used to assess each test's positivity. Specimens were evaluated using Gaffky's number and sputum properties by Miller and Jones classification. Sputum was transported promptly, and N-acetyl-L-cysteine (NALC)-2% NaOH was added. After sputum underwent homogenization/digestion and decontamination, a specimen was immediately spun down in a refrigerated centrifuge. Fluorochrome staining of smears was used. Results: Of 268 patients who met the screening criteria, 204 were positive on their first sputum smear (76.1%). Nineteen patients whose first sputum smear was negative became positive with the second test (7.1%). Eight patients whose first and second tests were negative became positive with the third test (3.0%). After excluding strongly positive smear patients, 134 among 198 patients were positive on their first sputum smear (67.7%). With an M1 or M2 sputum property, 114 among 168 patients were positive on their first sputum smear (67.9%). In contrast, with P1-P3, 81 among 89 patients were positive on the first sputum smear (91.0%). Conclusion: TB patients with weakly positive smears or with a not purulent sputum property should undergo three sputum smear tests.