The use of ATP bioluminescence as a measure of cell proliferation and cytotoxicity.

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Adenosine triphosphate (ATP) bioluminescence was used to determine whether there was a linear relationship between cultured cell number and measured luminescence using the luciferin-luciferase reaction. In all the cells tested including peripheral blood mononuclear cells (MNC), MOLT-4, HL-60, TF-1, NFS-60 and L-929 cell lines there was a significant correlation as determined by Spearman's rank correlation coefficient ($p > 0.00001$). These observations were then used to determine whether ATP bioluminescence could be used as a suitable substitute for tritiated thymidine uptake as a measure of cell proliferation. The cell lines MOLT-4, HL-60, TF-1 and NFS-60 showed a strong correlation between thymidine uptake and ATP bioluminescence ($p > 0.00001$ for all cell types). Additionally the ATP method could detect the cytokine dependent proliferation on TF-1 and NFS-60 cells by granulocyte-macrophage colony-stimulating factor (GM-CSF) and granulocyte colony-stimulating factor (G-CSF) respectively. The tumour necrosis factor alpha (TNF)-induced cytotoxic effect on L-929 cells could also be accurately detected using this method. **It would therefore appear to be possible to use ATP bioluminescence in the detection of cytokine activity in a number of different bioassays.**

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