The use of amplified variable number of tandem repeats (VNTR) in the detection of chimerism following bone marrow transplantation: a comparison with restriction fragment length polymorphism (RFLP) by Southern blotting


Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Using amplified variable number of tandem repeats (VNTR) by the polymerase chain reaction (PCR) or restriction fragment length polymorphisms (RFLPs) by Southern blotting, in the diagnosis of chimerism following allogeneic bone marrow transplantation (alloBMT).

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
Patients with hematopoietic disorders including leukemia, lymphomas, and aplastic anaemia.

Setting
Hospital. The economic study was performed in Ohio, USA.

Dates to which data relate
The effectiveness data in the retrospective study were collected between 1988 and 1994. The effectiveness data in the prospective study were gathered between 1 November 1995, and 31 January 1996. The dates of the resources and prices used in the study were not specified.

Source of effectiveness data
The evidence for the final outcomes was derived from a single study.

Link between effectiveness and cost data
The costing was performed on the same patient sample as that used in the effectiveness study. It is not clear whether the costing was performed prospectively or retrospectively.

Study sample
Power calculations were not used to determine the sample size. The total number of patients in the study was 51. In the retrospective portion of the study the alternative techniques were applied to 46 archival DNA samples from 26 patients. The number of post-alloBMT specimens in the prospective portion was 34 from 25 patients. One patient was excluded from the retrospective portion.
Study design
The study was a case series. The interpretation of each technique’s pattern was carried out in a blinded fashion with regard to the results of the alternative technique.

Analysis of effectiveness
The analysis of the clinical study was based on treatment completers only. The main outcome measure was the sensitivity of the alternative techniques in the detection of low-level mixed hematopoietic chimerism.

Effectiveness results
RELP failed to detect low-level mixed chimerism (1% - 10%) of recipient DNA in 7 cases (7.8% of cases). The corresponding figure for VNTR was 8 cases (8.9% of cases).

Clinical conclusions
The study revealed that VNTR and RELP had similar sensitivities in the detection of low-level mixed hematopoietic chimerism.

Measure of benefits used in the economic analysis
The main benefit measure was the sensitivity of the alternative techniques in the detection of low-level mixed hematopoietic chimerism.

Direct costs
Resource quantities were not reported separately. Cost components were reported separately. The direct costs of VNTR and RELP techniques were divided into the costs of reagents and consumables, and a technical component. The dates of the price data were not specified.

Indirect Costs
Indirect costs were not reported.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was carried out.

Estimated benefits used in the economic analysis
RELP failed to detect low-level mixed chimerism (1% - 10%) of recipient DNA in 7 cases (7.8%). The corresponding figure for VNTR was 8 cases (8.9%).

Cost results
The total cost of performing VNTR analysis was $86.71. The corresponding value for RELP analysis was $147.56.

Synthesis of costs and benefits
A synthesis was not carried out by the authors since VNTR analysis was a weakly dominant strategy (with similar
sensitivity but less cost).

**Authors' conclusions**
VNTR is a viable alternative to RELP in the detection of chimerism after bone marrow transplantation and offers substantial cost savings, faster turnaround time, easier preparation of the DNA, smaller DNA requirements, and the elimination of radioisotopes and cumbersome restriction enzymes.

**CRD COMMENTARY - Selection of comparators**
A justification was given by the authors for the choice of the comparator. The justification was that RELP by Southern blotting has been shown to be a sensitive method in the evaluation of the chimeric state. You should consider whether this is a widely used health technology in your own setting.

**Validity of estimate of measure of benefit**
The lack of randomisation may adversely affect the power of the study to measure the benefits of the alternative techniques.

**Validity of estimate of costs**
The resource quantities were not reported separately from the costs. Adequate details of the methods of cost estimation were not given.

**Other issues**
The authors' conclusion was not justified, given that the study did not introduce any explicit measures to evaluate some of the variables mentioned in the conclusion, such as the degree of ease of preparation of the DNA, and the size of DNA requirements. Additionally, given the lack of randomisation, sensitivity and statistical analysis, the results need to be treated with some caution. The issue of generalisability to other settings/countries was not addressed.

**Source of funding**
None stated.

**Bibliographic details**

**PubMedID**
9052379

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Blotting, Southern /economics; Bone Marrow Transplantation; Costs and Cost Analysis; DNA; Follow-Up Studies; Humans; Minisatellite Repeats /genetics; Polymerase Chain Reaction /economics; Polymorphism, Restriction Fragment Length; Prospective Studies; Retrospective Studies; Transplantation Chimera /genetics

**AccessionNumber**
21997000382