



Ross School of Business at the University of Michigan

Independent Study Project Report

TERM : Fall 1999

COURSE : BA 750

PROFESSOR : David Butz

STUDENT : Arturo O. Araya

TITLE : Skin Bank Viability Analysis – University of Michigan Trauma Burn Center

Skin Bank Viability Analysis

University of Michigan Hospital
Trauma Burn Center

By

Arturo O. Araya

A research paper submitted in fulfillment of the requirements for 3.0 (Three) credits
GRADUATE INDEPENDENT RESEARCH PROJECT Fall Term
1999, Professor David Butz, Faculty Supervisor.

Table of Contents

Project Objectives	1
Recommendations	1
Findings	2
Strategic Impact of Recommendations	3
Potential Problems	4
Conclusion and Comments	5
Summary of Cost Study	6
<i>Cost Assumptions and Spreadsheet</i>	7
<i>Graphical Summaries</i>	10
TransCyte Proposal Assumptions	11

Project Objectives:

The objectives of consulting for the University of Michigan Skin Bank (UMHSB) were the following:

- To provide a financial analysis for the UMHSB operation
- To compare UMHSB to industry norms and against burn care trends
- To evaluate the UMHSB value to hospital operations
- To suggest improvements should the UMHSB prove competitive within the industry
- To recommend a profitable and strategically sound alternative should the UMHSB prove non-viable.

Recommendations:

1) Establish a "Center of Excellence" for burn care called "The University of Michigan Burn Resource Center".

Establish a center of excellence to distribute a portfolio of leading edge bio-technical and burn care products as well as Homograft (human cadaver skin). To accomplish this Burn and Trauma Center physicians will need to be trained by suppliers in the use of their products and will then provide consultation to regional healthcare facilities that also treat burn victims. Training will allow physicians to offer burn care expertise on the use of the portfolio of products supplied by The Burn Resource Center. Additionally, the UMHSB should offer professional training for a fee, whether at the University of Michigan Hospital or off sight.

2) Require comprehensive funding from suppliers for new facilities, or changes to the existing facility, that are needed to convert the skin bank into The Burn Resource Center.

Suppliers should provide financial resources to support the training programs. In addition to the costs for facility upgrades, suppliers should cover the initial physician training expenses and the pro-rated share of physicians' salaries (for their time spent training others). Profit should be generated through a combination of sources including supplier subsidy, outside physician training fees and retail profit margins from product sales. Additional profit should be generated by the UMH by charging a fee for suppliers that which to use The Burn Resource Center seal of approval in their marketing efforts.

3) Inaugurate TransCyte as the first Burn Resource Center product with comprehensive training and support.

Complement the product portfolio with Homograft procured externally from a low cost supplier. Use Smith and Nephew as a resource to develop the center. They have experience with Centers of Excellence in other product lines.

- 4) Phase out Homograft processing over a two-year period. Transition all customers to low cost, externally procured Homograft, which is distributed by the UMHSB.**

Take advantage of high volume purchases to gain better pricing. Process in-house only the tissue for Collagenesis with the intent to discontinue production at the end of the second year. Liquidate equipment that was used only to process tissue.

- 5) Develop a formal process for approving products that will be offered and supported by The Burn Resource Center.**

A strict approval process is necessary to avoid favoritism and to build and maintain the credibility of The Burn Resource Center. If the approval process is not rigorous, the portfolio will eventually be filled with products from suppliers that are willing to subsidize The Burn Resource Center the most rather than by products that are truly advancements in burn care.

Findings:

Current skin bank operations encompass three activities:

1. Skin processing, banking and internal/external distribution
2. Microbiological testing to support the Burn and Trauma department
3. Keratinocyte cell generation to fabricate and store tissue cultured from a patient's own skin.

The 1998 revenues and costs for each function are stated below:

	Skin Banking	Microbiological	Keratinocyte
Revenue	\$505,938	\$193,465	\$0
Costs	313,342	34,645	75,000
Percent of Revenues	72.3%	27.7%	0%

Of current Homograft sales, approximately 38% of revenues depend on sales to one customer, Collagenesis. This customer represents 82% of the total volume of external sales. Collagenesis requires a different, thicker type of skin tissue that is not used for surgical procedures. UMHSB is already a second source of supply and has been losing sales at a yearly rate of 8%.

UMHSB is not price competitive with other suppliers of cadaver skin. The tissue banking industry has undergone extensive consolidation. To remain competitive other suppliers have combined the harvesting of higher margin tissue (cartilage, corneas, etc.) with the harvesting of skin tissue to achieve economies of scope. The harvesting teams are composed of surgical technicians, rather than doctors, who harvest tissue in a morgue

rather than an expensive operating room. The scale of operations and advantages of economies of scope cannot be surpassed by UMHSB unless significant investment is made. Even with significant investment it is unlikely that UMHSB can be cost competitive because it carries some of the hospitals significant overhead costs. Organizations such as the American Red Cross have specialized in harvesting tissue and their operations do not have the cost burden of hospital expenditures.

Over the past three years the number of burn victims in the United States has declined. The severity of burns and the percent of body coverage however have increased dramatically. Resultantly, the treatment of burns is becoming more focused on the care of severe injuries for which grafting procedures are not viable because not enough healthy surface area remains for the graft to attach.

Several new synthetic products threaten to replace Homograft, but as of yet are not used by the majority of physicians. Synthetic products are promising for several reasons. Firstly, they are significantly less likely to be rejected by the patient's auto immune system. Adoption of the synthetic graft means that only one application of the product is necessary. Homograft usually requires multiple applications every 8-10 days to prevent infections. Secondly, synthetic products are consistent from batch to batch so the doctor knows what to expect for every procedure. Thirdly, use of synthetic skin rather than Homograft reduces the potential for disease transmission significantly. Fourth, synthetic products have substantially longer shelf lives, exceeding Homograft by two times. Finally, synthetic skin is transported and stored more easily than Homograft. Approval is eminent for TransCyte to be stored at regular freezer temperatures rather than sub-zero environments this approval will significantly reduce the UMH storage costs. Several synthetic tissue products have been clinically tested at the University of Michigan Hospital with varied success, but only a few have been isolated as highly viable ~ one of these is TransCyte.

The Burn and Trauma department of the University of Michigan Hospital enjoys an excellent reputation for setting the standard for burn and trauma care. The Burn and Trauma Center is unusual in the industry in that it earns a profit. Most other trauma departments are resource drains on hospitals and are therefore given little attention. As a result the care and reputation of these institutions suffer. The Burn and Trauma Center is a source of innovation in the care of patients and suppliers to this department view the relationship as highly valuable.

Strategic Impact of Recommendations;

The strategy of turning the skin bank into The Burn Resource Center has several positive repercussions, which include:

Establishing the hospital as a resource center increases the prestige of the physicians and the hospital. Increased departmental prestige and physician prestige will draw

additional top doctors. Top physicians will increase the quality of the education at the UMH. High quality education will draw top pupils and top interns will again increase the prestige of UMH as a teaching hospital. The Burn Resource Center will generate a network of improvements that will vastly improve the quality of care delivered and the quality of the personnel.

Offering consultative training to other facilities for a fee generates a new source of revenue.

The skin bank business is declining and The Burn Resource Center will turn the operations into a thriving and profitable activity.

Establishing a center of excellence for burn care has never been done before. Consequently, the activity will firmly establish the burn care capabilities of the University of Michigan Hospital as the de facto standard.

Training of Physicians by the suppliers of burn care products will ensure that the staff will have the most current capabilities.

Suppliers of innovative products will seek out the University of Michigan Hospital before most other facilities because of the potential for Burn Resource Center approval and the resulting product credibility.

The reputation of the Burn and Trauma center makes The Burn Resource Center approach viable and also difficult to imitate because potential imitators need first to build credibility and then they can attempt to form a center of excellence.

The Burn Resource Center's prestige will lead to higher sales volumes. These higher sales volumes will increase the UMH power to negotiate discounts with suppliers.

Potential problems:

- High sales volumes and multiple product lines will necessitate an accurate costing and billing system.
- As much as possible, the time dedicated to receiving and providing new product training must be evenly distributed among the entire cadre of physicians. Equitable distribution of responsibilities for this will reduce the possibility of certain individuals bearing most of the burden.
- Suppliers need to pay for the training of each UMH physician. They also need to fully subsidize their travel and lodging expenses when they training physicians at

other locations. Also, suppliers need to offer incentives to physicians so they will be motivated to teach others.

- Extended payment terms or consignment needs to be negotiated with the suppliers. The Burn Resource Center will carry significantly increased inventory in both quantity and variety of products. UMH should not be responsible for incurring the new inventory carrying costs.

Conclusion and Comments:

TransCyte, a promising product that has been tested extensively at the University of Michigan Hospital, has impressed physicians. For TransCyte to be broadly accepted in burn care units it needs to build credibility. Being approved for use by The Burn Resource Center will take the product a long way towards broader clinical acceptance. Most new clinical products require this sort of credibility building to become clinically accepted by physicians. Smith and Nephew, the maker of TransCyte, is willing to bring their resources to bear in support of the development of the center of excellence because they realize the value of UMH's approval. Other suppliers also realize that the approval of the highly prestigious University of Michigan Burn and Trauma department has real monetary value. As the prestige of The Burn Resource Center increases so will the value of approval. It is reasonable then for suppliers to pay a fee to advertise that their product has been accepted for use at The Burn Resource Center at the University of Michigan Hospital. The higher the prestige the more value the approval creates.

Creating a center of excellence for burn care, as we have suggested, is an enormous opportunity not only to create new revenues but also to bolster prestige and institutionalize innovation. This endeavor is only possible because the Burn and Trauma department already is already highly reputable. Credibility and reputation are sources of significant competitive advantage and are extremely difficult to imitate.

Suppliers will be of great assistance in the creation of this center. Smith and Nephew, for example, has assisted other institutions to develop centers of excellence that distribute other product lines. Other suppliers have also had similar experiences. Partnering with these suppliers must be viewed as a long-term relationship. Suppliers will need to be trusted to bring their innovations to The Burn Resource Center first; therefore close relationships with them are essential.

Summary of Cost Study

Introduction:

The skin banking operations at the University of Michigan Hospital, Trauma Burn center is becoming increasingly non-viable. In order to maintain the requisite services to patients, a new innovative approach to the skin bank process must be identified. This proposal describes our plan to establish closer relationships with suppliers which enhances patient service, profitability, and augments our relationships with community hospitals.

Project Objectives:

- Analyze current operations.
- Develop a business plan.

Financial Analysis:

Homograft	1999	2000	2001	2002	2003
Total sq. ft. sold internally	80	74	68	62	57
Total sq. ft. sold externally	126	135	19	18	16
Revenues from internal sales	\$102,771	\$94,550	\$86,986	\$80,027	\$73,625
Revenues from external sales	\$87,500	\$80,500	\$13,331	\$12,264	\$11,283
Operating Profit	\$122,745	\$115,226	\$31,218	\$28,941	\$26,533

Transcyte

Total sq. ft. sold internally	155	200	200	200	200
Total sq. ft. sold externally	0	10	65	120	175
Revenues from direct internal sales	\$697,500	\$900,000	\$900,000	\$900,000	\$900,000
Revenues from direct external sales	\$0	\$27,000	\$175,500	\$324,000	\$472,500
Rebate revenues	\$39,250	\$58,500	\$77,750	\$97,000	\$116,250
Total revenues	\$736,750	\$985,500	\$1,153,250	\$1,321,000	\$1,488,750
Operating Profit	\$265,896	\$357,851	\$363,579	\$376,983	\$390,832

Total Net Profit [\$388,642 \$473,078 \$394,798 \$405,924 I \$417364

Current FTE employment levels and technical capabilities are sufficient to staff these new activities through 2003.

Recommendations:

- Convert the skin bank into a Burn Care Resource Center.
- Ultimately carry a portfolio of bioengineered products
- Suppliers pay capacity and distribution fee as well as volume rebate.
- Partner with suppliers to develop an Education Center.

Assumptions

Transcyte:	
Internal Transcyte sales revenues per cassette:	\$2,250
External Transcyte sales revenues per cassette:	\$1,350
Transcyte rebate revenues: 1-100 cassettes	\$75
101-200 cassettes	\$125
201 & more cassettes	\$175
Wholesale cost of Transcyte per cassette:	\$1,350
Manufacturers discount per cassette:	\$75
Homograft:	
Internal Homograft sales revenues per sq. ft.:	\$1,284
External Homograft sales revenues per sq. ft.:	\$700
Wholesale cost of Homograft per sq. ft.	\$550
Wholesale cost of Homograft per sq. ft. (to Collagenesis)	\$290
Personnel & payroll:	
Current full time employees (FTE's):	2.75
Allocation of personnel: Homograft	75%
Internal/external sales	45%
Collagenesis sales	30%
Transcyte	25%
Personnel when outsourcing/personnel when producing inhouse	25%
Payroll expense in 1998	\$83,790
Other expenses & allocation:	
Applicable commodities expense in 1998	\$24,493
Other expenses in 1998 (phone and misc.)	\$30,558
Transcyte shipping/containers per cassette	\$5
Homograft shipping/containers per cassette	\$2.4
Dry ice expense (10lbs per cassette)	\$3.5
Sq. ft of Homograft sold to Collagenesis in 1998	157.5
Space required for Transcyte (sq. ft.)	400
Space required for Homograft (sq.ft.)	400
Facilities cost per sq. ft.	\$25

Current personnel:

	1998
Int./Ext.	1.2375
Collagenesis	0.825
Ttl. Homo	2.0625
Ttl. Transc.	0.6875
Total	2.75

Future personnel:

People required for internal/external Homograft				
1999	2000	2001	2002	2003
0.14	0.13	0.12	0.11	0.10
People required for Collagenesis				
0.54	0.49	0.00	0.00	0.00
People required for Transcyte				
1.07	1.44	1.82	2.20	2.58
Total people required				
1.74	2.06	1.94	2.31	2.68

Current tissue sold:

	Internal 1998	External 1998	Total
Current Homo Sq. Ft. Sold	87	302	389
Current Transc. Cassettes Sold	200	0	200

Analysis of Transcyte Proposal

	Year				
	1999	2000	2001	2002	2003
<i>Homograft Revenues</i>					
Total sq. ft. sold internally	80	74	68	62	57
Total sq. ft. sold externally	23	21	19	18	16
Total sq. ft. sold to Collagenesis	103	94	0	0	0
Revenues from internal sales	\$102,771	\$94,550	\$86,986	\$80,027	\$73,625
Revenues from external sales	\$15,750	\$14,490	\$13,331	\$12,264	\$11,283
Revenues from sales to Collagenesis	\$71,750	\$66,010	\$0	\$0	\$0
<i>Total revenues</i>	\$190,271	\$175,050	\$100,316	\$92,291	\$84,908
Cost of goods sold (internal/external)	\$56,397	\$51,885	\$47,734	\$43,916	\$40,402
Cost of goods sold (to Collagenesis)	\$29,725	\$27,347	\$0	\$0	\$0
<i>Gross profit</i>	\$104,149	\$95,817	\$52,582	\$48,375	\$44,505
<i>Gross profit margin</i>	55%	55%	52%	52%	52%

<i>Homograft Costs</i>					
Facilities overhead	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Payroll (based on allocation of personnel)	\$20,500	\$18,860	\$3,505	\$3,225	\$2,967
Utilities (allocation based on % of total tissue sold)	\$9,751	\$7,591	\$3,446	\$2,717	\$2,185
<i>Total controllable Homograft expenses</i>	\$40,251	\$36,451	\$16,952	\$15,942	\$15,152
Other expenses (Depr., Insur., Disability, Retirement, Fica)	\$12,165	\$9,471	\$4,300	\$3,390	\$2,726
Shipping/containers	\$300	\$276	\$46	\$42	\$39
Dry ice (50 lbs per 5 cassettes @ \$17.50)	\$438	\$403	\$67	\$61	\$56
<i>Operating Profit (before taxes)</i>	\$50,995	\$49,216	\$31,218	\$28,941	\$26,533
<i>Operating Profit Margin</i>	27%	28%	31%	31%	31%

<i>Transcyte Revenues</i>					
Total cassettes sold internally	310	400	400	400	400
Total cassettes sold externally	0	20	130	240	350
Revenues from direct internal sales	\$697,500	\$900,000	\$900,000	\$900,000	\$900,000
Revenues from direct external sales	\$0	\$27,000	\$175,500	\$324,000	\$472,500
Rebate revenues	\$39,250	\$58,500	\$77,750	\$97,000	\$116,250
<i>Total revenues</i>	\$736,750	\$985,500	\$1,153,250	\$1,321,000	\$1,488,750
Cost of goods sold	\$395,250	\$535,500	\$675,750	\$816,000	\$956,250
<i>Gross profit</i>	\$341,500	\$450,000	\$477,500	\$505,000	\$532,500
<i>Gross profit margin</i>	46%	46%	41%	38%	36%

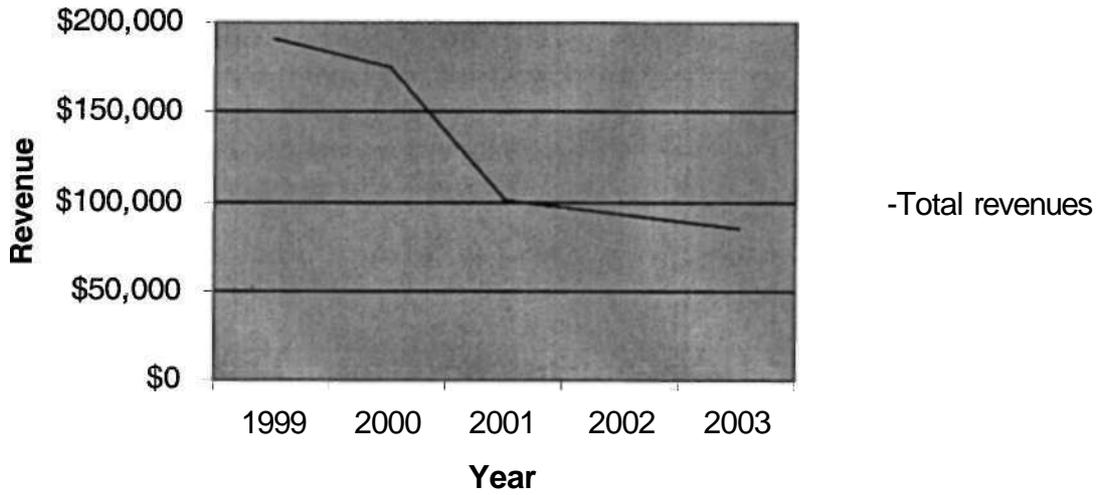
<i>Transcyte Costs</i>					
Facilities overhead	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Payroll (based on allocation of personnel)	\$32,469	\$43,990	\$55,511	\$67,032	\$78,553
Utilities (allocation based on % of total tissue sold)	\$14,742	\$16,902	\$21,047	\$21,776	\$22,308
<i>Total controllable Transcyte expenses</i>	\$57,211	\$70,892	\$86,557	\$98,808	\$110,861
Other expenses (Depr., Insur., Disability, Retirement, Fica)	\$18,393	\$21,087	\$26,258	\$27,168	\$27,832
Shipping/containers	\$0	\$100	\$650	\$1,200	\$1,750
Dry Ice (50 lbs per 5 cassettes @ \$17.50)	\$0	\$70	\$455	\$840	\$1,225
<i>Operating Profit (before taxes)</i>	\$265,896	\$357,851	\$363,579	\$376,983	\$390,832
<i>Operating Profit Margin</i>	36%	36%	32%	29%	26%

Total revenues (all tissues)	\$927,021	\$1,160,550	\$1,253,566	\$1,413,291	\$1,573,658
Total cost of goods sold	\$481,372	\$614,732	\$723,484	\$859,916	\$996,652
Total gross profit	\$445,649	\$545,817	\$530,082	\$553,375	\$577,005

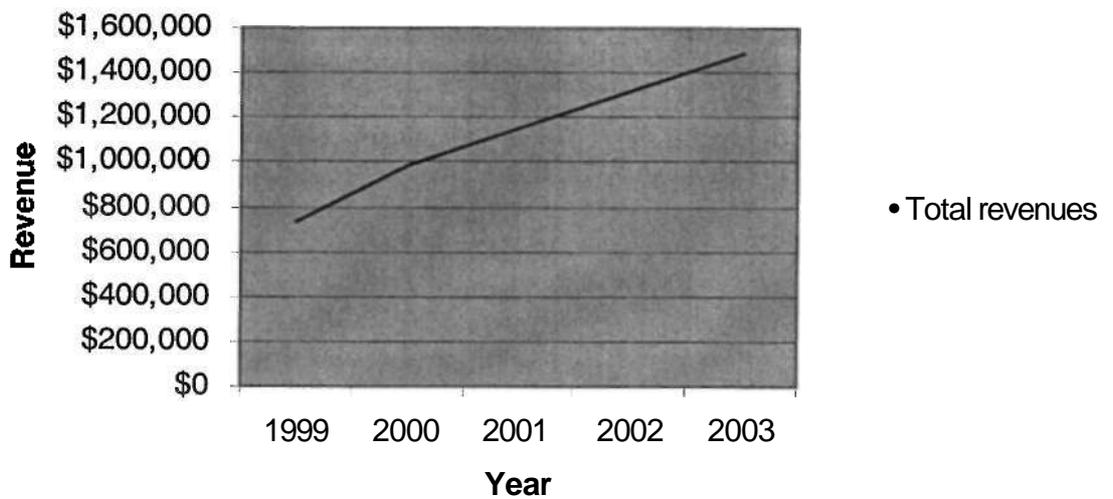
| \$316,92 | \$407,068 | \$394,798 | \$405,924 | \$417,64

Revenue Projections

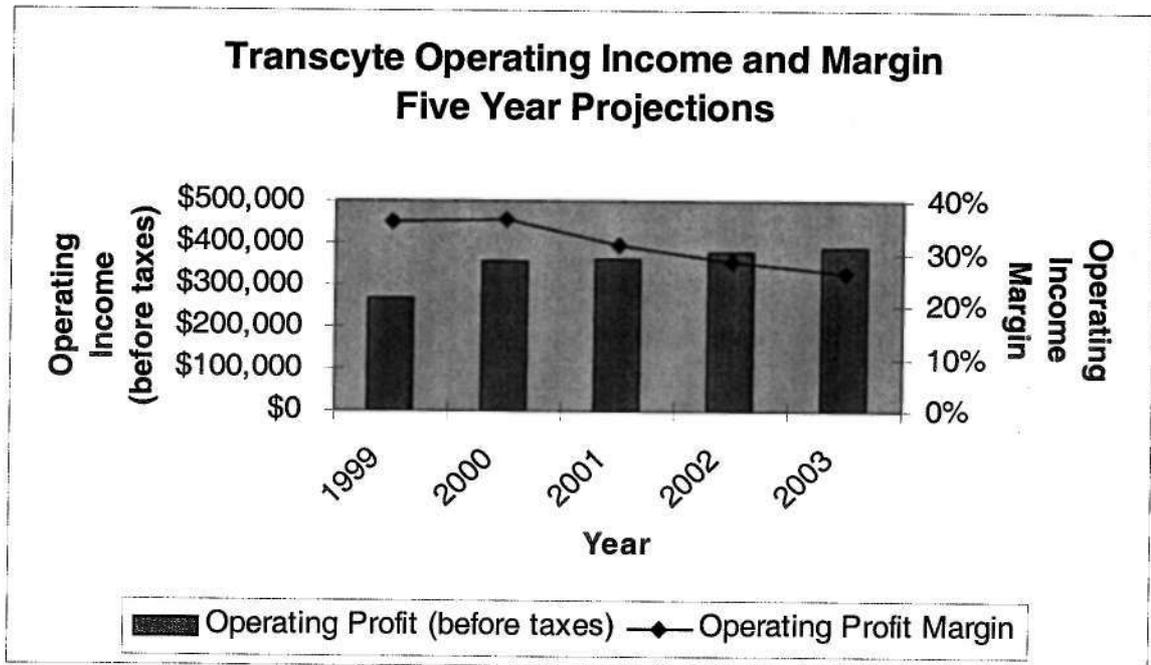
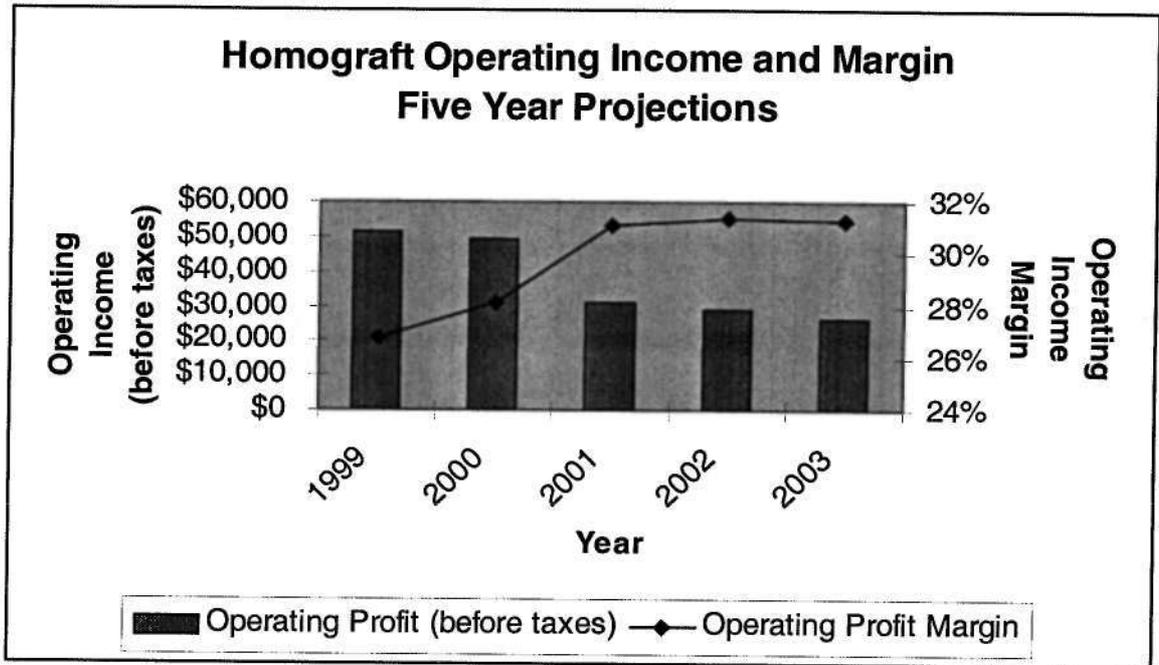
Homograft Five Year Revenue Projections



Transcyte Five Year Revenue Projections



Operating Income and Margins



TransCyte Proposal Assumptions

1. 1999 external Homograft sales projections are based on actual sales volume achieved in the first five months of fiscal year 1999 annualized for 12 months.
2. Actual sales volumes in the first five months of fiscal year 1999 show that sales to Collagenesis comprise 82% of all external Homograft sales. Our projections are based on this percentage.
3. Calculations do not reflect inflation or expense increases over time.
4. Smith & Nephew will sell Transcyte to the University of Michigan Hospital (UMH) on consignment. Therefore, UMH will not have to finance any Transcyte related inventory carrying costs other than utilities and facilities overhead.
5. Inventory finance costs will be incurred for Homograft unless consignment is negotiated with the supplier. Financing cost of capital is not included in our projections.
6. Revenues from distributing Transcyte will come from the discount off list price and cassette rebates only. Smith & Nephew will not pay any fee to UMH for endorsement of Transcyte.
7. UMH doctors' fees for conducting training and assisting in procedures involving Transcyte at other hospitals are not included in our projections. Additionally, related incidental fees such as transportation, accommodation, and meals are also not included.
8. Current man-hours consumed by Homograft related activities are 75% of total man-hours used for both Homograft and Transcyte.
9. Of the time expended on Homograft related activities, 40% is consumed by sales to Collagenesis, and 60% is consumed by internal and other external sales.
10. Current man-hours consumed by Transcyte related activities are 25% of total man-hours used for both Homograft and Transcyte.
11. Time and personnel required when outsourcing Homograft tissue is one-fourth of that required when producing it in-house.
12. The current skin bank facility is approximately 1,200 square feet. Homograft and TransCyte related activities will occupy one-third, or 400 square feet of the facility each.
13. Space required for Homograft, Transcyte and microbiological activities each comprise one-third of the currently available space. This ratio will remain constant even though a product's percentage of total unit sales and volume sold will change.
14. Facilities overhead is \$25 per square foot.
15. Homograft sales will decline 8% per annum due to reduction in burn victims and transfer to Transcyte. This estimate is based on historical trends.
16. External sales of Homograft will initially increase due to a price reduction and broader customer base as a result of a wider product offering. Sales will decrease, however, at a rate of 8% per annum after the first year.
17. Sales to Collagenesis will continue for two more years and will match the total square footage of other external Homograft sales.

TransCyte Proposal Assumptions

18. Combined internal and external Transcyte sales will increase from 200 cassettes in 1998 to 750 cassettes in 2003. Within the five-year projection time frame no sales will be made to the Detroit Hospital.
19. Internal sales of Transcyte will plateau at 400 cassettes by the year 2000.
20. Smith & Nephew will pay for any necessary infrastructure modifications to the existing facility.
21. Transcyte shipping costs, excluding containers, will be paid for by Smith & Nephew.
22. Allocation of costs is based on the percentage of units sold of either product (Homograft or Transcyte) to the total units of tissue (Homograft and Transcyte) sold.
23. Units of Homograft are measured in square feet, whereas units of Transcyte are measured in cassettes.