

Long-term Mental Health, Physical Function and Fatigue Outcomes After Hematopoietic Stem Cell Transplantation (HSCT)

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Background

- As more people survive HSCT there is a need to determine the long-term and late effects of treatment to permit appropriate surveillance guidelines for early detection and treatment of these health problems.
- Findings on long-term physical and mental health outcomes have been inconsistent.
 - Some researchers have documented no mental health differences between survivors and controls.
 - Others have reported both poorer mental health in HSCT survivors relative to controls.
 - All studies note physical health decrements between HSCT survivors and case-matched controls or population norms.
- Of particular interest in survivorship investigations is fatigue because it is consistently the most prevalent long-term health complications reported in survivorship studies across diagnoses. In addition, fatigue has both physical and mental symptoms.

Objectives

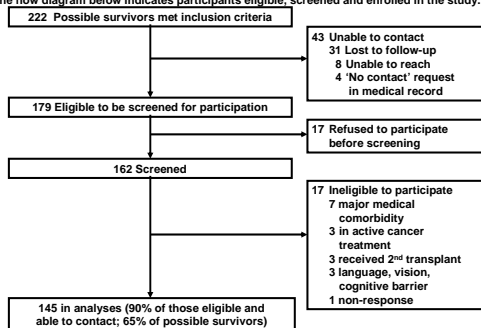
IN A PREVIOUSLY UNEVALUATED COHORT OF SURVIVORS:

- Assess** a cohort of regionally residing survivors of HSCT for their physical function, mental health, and vitality as measured by the SF-36.
 - Hypothesis 1:** Survivors will be below norms on physical function and fatigue, but not mental health.
- Evaluate** the relationship between physical function, mental health and fatigue scores.
 - Hypothesis 2:** Fatigue scores, physical function and mental health will be highly correlated, suggesting overlap between these areas.
- Compare** fatigue interference, as measured by the Fatigue Symptom Inventory (FSI), in the HSCT cohort versus a cohort of breast cancer survivors at different times during and after treatment.
 - Hypothesis 3:** Survivors of HSCT will report fatigue levels similar to breast cancer survivors who received systemic treatment than healthy controls.

Methods

PARTICIPANTS

- Inclusion criteria:**
 - HSCT survivors between 5-20 years post transplant
 - Current age 18 to 49 when first contacted
 - Transplanted for hematologic malignancy or pre-malignancy
 - Residing in the Western Washington region
 - Exclusion criteria:**
 - Unable to self-administer assessments in English
 - Received second transplant
 - In active treatment for cancer
 - Major medical comorbidity that limits physical function
- PROCEDURE**
- Eligible local survivors were recruited for a study on muscle, joints, and bones.
 - The flow diagram below indicates participants eligible, screened and enrolled in the study.



MEASURES

- Short Form Health Survey (SF-36)**
 - Mental health, Physical function, Vitality (T scores)
- Fatigue Symptom Inventory (FSI)**
 - FSI-Total, FSI-Interference, FSI Severity

Results

Table 1. Demographic and medical characteristics

Age, M ± SD		39.6 ± 8.9
Gender, n (%)		77 (53)
Ethnicity, n (%)	Male	
	Hispanic	7 (4)
	Not Hispanic	137 (95)
Race, n (%)		
	Caucasian	131 (90)
	Asian American	4 (3)
	African American	1 (1)
	Other	9 (6)
Educational Attainment, n (%)		
	≤ High school degree	27 (19)
	2 year college or trade	76 (52)
	≥ 4 year college	42 (29)
Income, n (%)		
	<\$20,000	25 (10)
	\$20,000 to \$39,999	31 (21)
	\$40,000 to \$59,999	18 (12)
	\$60,000 to \$79,999	15 (10)
	\$80,000 to \$99,999	17 (12)
	≥\$100,000 to \$120,000	42 (29)
Marital status, married n (%)		84 (58)
Diagnosis and stage, n (%)		
	Lymphoma	43 (30)
	Chronic Myeloid Leukemia	42 (29)
	Acute Non-lymphocytic Leukemia	32 (21)
	Acute Lymphocytic Leukemia	12 (8)
	Myelodysplastic Syndromes	11 (8)
	Multiple Myeloma	3 (2)
Type of transplant, n (%)		
	Myeloablative allogeneic, related	60 (41)
	Myeloablative allogeneic, unrelated	45 (31)
	Myeloablative autologous	40 (28)
		11.2 (4.7)

Years post-transplant, M ± SD

PATIENT REPORTED OUTCOMES

Scores on the SF-36 subscales were comparable to population norms (T score mean = 50, SD = 10) (Figure 1).

SF-36 and FSI scores did not differ by gender, age at transplant, time since transplant, current age, or type of transplant (all *P*s > .05).

Figure 1. SF-36 T scores.

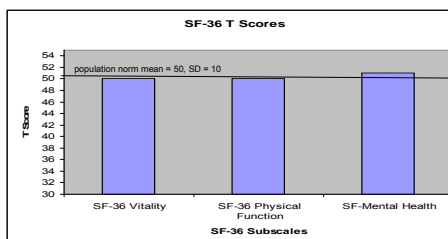


Table 2. Mean (SD) of self-report data

Measure	M (SD)
SF-36 Physical Function	50 (9)
SF-36 Vitality	50 (10)
SF-36 Mental Health	51 (9)
FSI Severity	3 (2)
FSI Frequency	4 (2)
FSI Interference	2 (2)
FSI Total	3 (2)

Scores on the FSI Interference subscale were comparable to a sample of women undergoing active treatment for breast cancer (M = 2, SD = 2, P = .81).

Those with a lower score on any SF-36 subscale reported lower fatigue interference (Table 1).

As expected, fatigue interference and vitality were most strongly negatively correlated. However, both physical function and mental health were also strongly correlated with vitality and fatigue interference.

The SF-36 Physical Function and Mental Health were also correlated with each other, but the correlation was smaller than the correlations between the Fatigue Interference and SF-36 Vitality with Physical Function and Mental Health.

Table 3. Correlations of the SF-36 subscales with fatigue FSI Interference

	SF-36 Vitality	SF-36 Physical Function	SF-36 Mental Health	FSI Total	FSI Severity	FSI Interference
SF-36 Physical Function	.57	1				
SF-36 Mental Health	.67	.34	1			
FSI Total	-.84	-.65	-.65	1		
FSI Severity	-.74	-.52	-.54	.91	1	
FSI Interference	-.79	-.67	-.67	.96	.79	1

Limitations & Strengths

- Findings may be conservative because we only enrolled those not in active treatment for cancer and those who had received only one HSCT. In addition, we excluded survivors with major medical comorbidities that limited their physical function.
- Other limitations include:
 - We enrolled only local survivors transplanted at the Fred Hutchinson Cancer Research Center. Transplant center differences may explain some of the inconsistencies found between studies of these long-term survivors.
 - The study was cross-sectional. Since treatment changes over time and the populations eligible for HSCT also change, a preferred study design would be prospective and longitudinal.
- Strengths include:
 - Very high participation rates.
 - Standardized measures used that had either population norms or were highly specific to survivor symptoms.

Conclusions

- Hypothesis 1 was supported only for the prediction about mental health. None of the SF-36 scores differed from population norms.
- Hypothesis 2 was supported in that fatigue, physical function, and mental health were strongly related. As expected, vitality and fatigue were also correlated.
- Hypothesis 3 was not fully supported. The level of fatigue in our cohort was similar to that of women undergoing treatment for breast cancer rather than controls.
- If the SF-36 subscales were the only measures used in this study, these long-term survivors would look comparable to population norms, and therefore would be considered healthy.
 - However, fatigue remains a significant problem for these HSCT survivors.
 - Results indicate that fatigue in HSCT survivors does not recover when looking at a measure specific to fatigue.
 - Therefore, findings support the value of specific, rather than only generic measures to assess long-term functional deficits in survivors.
 - Long-term and late complications can be missed if only broad measures of function are used.
- Persistent fatigue in these survivors requires further investigation.
 - Factors related to fatigue require further objective testing, including further biomarker, behavior and cognitive investigation.
 - Studies indicate that exercise improves fatigue in cancer survivors. Other behavioral interventions that address the mental components of fatigue are needed.

Funding

Supported by grants from the National Cancer Institute CA112361 and the National Cancer Institute/National Institute on Aging P20 CA103728 awarded to Karen L. Syrjala and National Cancer Institute R25 CA092408-07 awarded to Donald L. Patrick.