

**Thyroid cancer cells in space during the TEXUS-53 sounding rocket mission – The
THYROID Project**

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both contributed equally to this work

Supplementary Information Table 1 and Figure 1

Supplemental Table 1: Flight data of TEXUS-53**QUICKLOOK****TEXUS – 53**

Launching date	January, 23	2016
Launching time	09:30:00	LT
μ -g Time	367	Sec
Payload weight	400.1	Kg
Payload length	5215	Mm

Motor First stage

Peak thrust acceleration	8.3g @ 2.2	Sec
Mean thrust acceleration	5.2	G
Burnout	11.9	Sec
Motor Separation	12.9	Sec

Motor Second stage

Ignition	15.0	Sec
Peak thrust acceleration	12.1g @ 34.9	Sec
Mean thrust acceleration	6.6	G
Burnout 0%	43.4	Sec
Spin at burnout (derived from rate sensor signal)	2.8	Hz
YoYo despin	56.0	Sec
Roll rate after YoYo despin	-18.7 @ 57.6	°/sec
Motor separation	59.0	Sec

RCS Acquisition & Control

RCS enable	59.0	Sec
Acquisition phase	59.0 – 66.0	Sec
Manoeuvres at high thrust:		Sec
Manoeuvres at low thrust:	+Y 399.6 – 403.8	Sec
RCS low thrust enable	60.9	Sec
Lateral Destabilization and Spin-up	458.3	Sec
Achieved spin rate	151°/sec @ 476.3	Sec

Zero-g phase

μ -g achieved signal	66.0	Sec
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Start of zero-g ($< 1 * 10^{exp-4}$ at sensors)	73.0	Sec
Time of apogee (derived from GPS data)	257.8	Sec
Apogee (derived from GPS data)	252.6	Km
End of zero-g ($> 1 * 10^{exp-4}$ at sensors)	440.0	Sec

Reentry & Recovery

Tip ejection	55.3	Sec
Reentry decelerations X= -15.4g Y= +9.7g Z=-0.2g	480.7/479.7/482.0	Sec
Maximum residual reentry deceleration	15.7g @ 481.0	Sec
Heat shield release	4.3g @ 583.9	Sec
Pilot parachute de-reefed	3.8g @ 593.5	Sec
Main parachute release	608.5	Sec
Main parachute de-reefed	2.1g @ 620.1	Sec
Sink rate	7.8	m/s

Housekeeping

Maximal skin temperature descent (POS4)	123.5°C @ 493.4	Sec
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General

Loss of TM-Data & GPS last message at	877.0	Sec
Loss of GPS (4 samples) 0.0 – 3.0		Sec
Last coordinates derived from onboard GPS via TM	68°30.1385'	N
	21°02.6830'	E
Landing coordinates from onboard recorder	68°30.1589'	N
	21°02.6645'	E
Slant Range Distance (Azimuth = 357.9°)	67.9	Km
Landing Altitude	640	M
Impact decelerations (max.) X= -0.2g / Y= -0.3g / Z= 8.5g	887.6/887.9/887.6	Sec
Payload recovery time	5:30	H
Weather conditions	Fog in lower altitude, above clear sky	-23.5 °C
Air pressure (Launcher)	975	Mbar
Number of count-downs	1	

Supplementary Information

Supplemental Figure 1: Illustration of the different acceleration stimulations during launch and microgravity phase. In the hyper-g phase after lift-off the acceleration forces act perpendicularly towards the cells. When entering the microgravity phase the in-flight centrifuge turns on. Due to the special arrangement of the experimental units (brown boxes) on the pivotal platform, the cells are stimulated with 1g parallel to the cell growth surface. The figure was drawn from scratch by MK.

