1. It is valid to dichotomize according to death within 5 years of study enrollment (date of MRI) or death after five years after enrollment because you do not lose any data in doing so. Specifically, all participants who were still alive at the end of the study (n=602) had been enrolled for > 5 years, so they are all in the death after 5 year group; there were 0 study participants who were alive at the end of the study and had been enrolled less than 5 years. Further, there were 12 participants who died during the study after 5 years of survival, and 121 who had died within 5 years.

2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Participant surviving > 5 years post MRI (n=614) | | | | |
|  | LDL | Age (years) | Weight | Years smoking |
| Mean | 127.20 | 74.19 | 160.11 | 17.95 |
| Standard Deviation | 32.93 | 5.22 | 30.35 | 24.69 |
| Min | 39 | 65 | 74 | 0 |
| 25th %tile | 103 | 71 | 138.5 | 0 |
| 50th %tile | 127 | 73 | 158.75 | 4.35 |
| 75th %tile | 148 | 77 | 180 | 31.88 |
| Max | 247 | 99 | 258 | 180 |
|  | Proportion who have had Coronary heart disease | Proportion who have had Coronary Heart Failure | Proportion who have had a stroke | Proportion who are male |
|  | 0.28 | 0.04 | 0.18 | 0.47 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Participants surviving < 5 years post MRI (n=121) | | | | |
|  | LDL | Age | Weight | Years smoking |
| Mean | 118.70 | 76.48 | 159.12 | 28.05 |
| Standard Deviation | 36.16 | 6.17 | 32.79 | 36.04 |
| Min | 11 | 67 | 96 | 0 |
| 25th %tile | 96 | 72 | 139 | 0 |
| 50th %tile | 117 | 75 | 154 | 18.38 |
| 75th %tile | 142 | 81 | 176 | 46 |
| Max | 227 | 91 | 264 | 240 |
|  | Proportion who have had Coronary heart disease | Proportion who have had Coronary Heart Failure | Proportion who have had a stroke | Proportion who are male |
|  | 0.62 | 0.14 | 0.52 | 0.64 |

3.

A two sample two-sided T test assuming unequal variances was performed on the mean serum LDL level for each group (defined by their 5 year vital status) to examine if the mean LDL level was different between the groups. The means were found to be statistically different (p-value=0.0186), with the group surviving greater than five years having an 8.5005 unit higher mean LDL level (127.20 vs. 118.70), and the 95% confidence interval for the difference in means is (1.44, 15.56). This means that these results would be unsurprising if the true difference in means between these groups was between 1.44 and 15.56 mg/dL higher in the group that survived longer than five years.

4.

A two sample two-sided T test was performed on the geometric mean serum LDL level for each group (defined by their 5 year vital status) to examine if the geometric mean LDL level was different between the groups. The geometric means were found to be statistically different (p-value=0.0013), with the group surviving greater than five years having an 10.8 unit higher mean LDL level (122.82 vs. 112.01), and the 95% confidence interval for the difference in means is (4.22, 17.40). This means that these results would be unsurprising if the true difference in means between these groups was between 4.22 and 17.40 mg/dL higher in the group that survived longer than five years.

5.

A Chi squared test was performed to examine the association between high LDL and probability of death within five years post MRI. The test failed to show that there was a statistically different probability of death amongst those with vs. those without high LDL (>=160 mg/dL) (p-value = 0.375) based on the observed data.

The group with high LDL had a .860 probability of death within five years, while the group without high LDL has a .832 probability of death within five years. The difference in probability of death was .028 with a 95% confidence interval of the difference in probabilities being (-.034, .099). This means that these results would be unsurprising if the true difference in probabilities of death between these groups was between -.034 and .099 higher in the high LDL group.

6. A Chi squared test was performed to examine the association between high LDL and probability of death within five years post MRI. The test failed to show that there was a statistically different probability of death amongst those with vs. those without high LDL (>=160 mg/dL) (p-value = 0.375) based on the observed data. The odds ratio of the odds of death of the group with high LDL:the group without high LDL was 1.292, with a 95% confidence interval of this value being (.737, 2.265). While the high LDL group had a greater odds of dying before 5 years, there was not a statistically significant difference. This means that these results would be unsurprising if the true odds ratio was between .737 and 2.265.

7. A logrank test was performed to evaluate the association between LDL and mortality over the observed time period and by examining the observation time of death (days post MRI) and classification of high LDL (>=160 mg/dL). The p value of this test was 0.0435, indicating that high LDL is associated with instantaneous rate of death in the sampled population.

8.

I would have performed a simple two sample, two-sided T-test to examine if the two groups (defined by their vital status at 5 years) had a statistically significant different mean LDL level. I would have doe this because it is a straightforward and easy way to test between our outcome (death within five years) and predictor of interest (LDL level). While we are examining by the outcome, this is a useful test because we defined it such to not have any censored data.