natural science

increase meat quality and quantity,

METHODS

Data Collection

The microsatellite genetic data for the Medano-Zapata Ranch herd had previously been collected and archived at Texas A&M University. Previously established protocols (Halbert et al. 2005) were used to assess levels of cattle gene introgression at 14 diagnostic and polymorphic (containing more than one allele) microsatellite markers. The markers analyzed were, AGLA17, AGLA293, BM1314, BM4307, BM4513, BM7145, BMS2270, BMS4040, CSSM36, CSSM42, RM185, RM500, SPS113, and TGLA227. The markers spanned 10 chromosomes (of 30 total chromosomes in bison) and were used to either diagnose or confirm whether cattle gene introgression had occurred (Halbert et al. 2005).

Data Analysis

To analyze the structure of the population, I used STRUCTURE v. 2.3.4 (Pritchard et al. 2000) with the 14 microsatellite loci for all 1,700 individuals. I used the admixture model and ran seven repetitions for each K value (1-4), with K being the number of assumed genetic clusters and calculated the mean of logarithmic probability (Cao et al. 2017). I used an burn-in period of 500,000 steps and Monte Carlo Markov Chain (MCMC) rep length of 500,000 steps and chose the K genetic cluster values based on methods published in the literature (Pinzone and Dyer 2013).

The two indices of genetic diversity that I used were (1) expected heterozygosity (H_E) and (2) number of alleles and their associated frequencies. Expected heterozygosity is an indicator of genetic variation and provides information on the fre-

es the results from the analysis, and
2Ü××ÔÌÔÌÕÛÈÙà‰ÐÎÜÙÌ2Σ×ÓÖÛÚÛÏÌ*
40 values and shows the most probable
likelihood value.ÐDC /C2_mean /Lang 1en-USsults from the analysis, and 1frequenciTf likelihood value.ÐDC
valu6quenc1000MC 0f e6.413MCID 6.413M236.5149 598.485.093 TEults from the analysis, and mfor(likelihood g
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ed my hypothesis that there would be multiple clusters. This indicates that the individuals are part of one interbreeding, or admixing, population and that genes are randomly distributed among individuals. Admixture occurs when individuals from [illegible] ed populations interbreed and gene [illegible] [illegible] [illegible] the genetic variation within the loci. [illegible] natural log probabilities between K = [illegible] the other clusters, hinting that perhaps two clusters are forming in the population. Future studies could po- [illegible] more genetic loci.

[…]

[illegible]

The mean expected heterozygosity was relatively low for the markers used in this study and [illegible] markers was also low. Heterozygosity is commonly used as a measure of genetic variation and the values are expressed as the frequency of hetero- [illegible] [illegible] [illegible] population is a consequence of the [illegible] [illegible] levels are expected to decline due to a random loss of alleles (Allendorf [illegible] population reduction can also result in inbreeding, or the mating between closely related individuals. Inbreeding increases the proportion of homozygotes (thereby reducing [illegible]
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ALK-EML$_4$-Positive Cancers and Combination Therapy

Probing the Apoptotic Threshold

Teagan H. Glass

The following is an excerpt from a longer piece. For full text, please visit www.honorsjournal.com.

[…]

ĸĶɣ¥Yĸķ¥

çĦ▯ĸ🄀🄀▯¥Ħĸ diseases currently being researched, lung cancer is one of

initial slope of the curve and a larger ÌřÌÊÛÈÛÛÎÏÌÚÈÔÌÊÖÕÊÌÕÛÙÈÛÐÖÕÚÈÚ crizotinib, indicating higher biologÐÊÈÓÈÊÛÐÝÐÛà ÈÕË ÔÈßÐÔÈÓ ÌŚÊÈÊà Paragazole exhibited the least potency, by far, with an EC_{f_2}ÖÍ ţf µM (%Ð*Î*Σ#Å. Perhaps the most striking characteristics of paragazole treatment compared to that of treatment with either ALK inhibitor was the relatively miniscule slope and maximal ÌŚÊÈÊà ÖÍ ÎÏÌ ËÖÚÌıÙÌÚ×ÖÕÚÌ 6 ÏÐÓÌ higher concentrations of paragazole would be necessary to achieve a complete sigmoidal dose-response, the data collected represents the relative ÐÕÌřÌÊÛÐÝÌÔÌÙÚÖÍ ' # "ÐÖÕÐÛÚÖÞÕ Based on the data produced from single-drug treatments, it is evident ÛÏÈÛÉÖÛÏÊÙÐáÖÛÐÕÐÉÈÕË /ļţΣΣΤÖÕ their own achieve powerful maximal ÌŚÊÈÊÐÌÚÈÚÞÌÓÈÚ×ÖÛÌÔÊÐÌÚÈÙÙÌÈsonable concentrations, in terms of short-term *in vitro* treatment. Paragazole, on the other hand, exhibits ÔÐÕÐÔÈÓ ×ÖÛÌÔÊà ÈÕË ÔÈßÐÔÈÓ ÌŚcacy, even at concentrations much larger than that of either ALK inhibitor. Clearly, it is the kinase activity ÖÍÛÎÏÌ +*ı$, +TÍÜÚÐÖÕ×ÙÖÛÌÐÕÛÎÈÛ predominantly confers survival. Due ÛÖÛÎÏÌ ËÐÚ×ÈÙÐÛà ÉÌÛÞÌÌÕÛÎÌ ÌřÌÊÛÚ of individual HDAC and ALK inhibition, it is not obvious that much stronger activity would be achieved in response to treatment with paragazole in combination of each of the two ALK inhibitors.

Combination ƘYĸǂK Treatments

The focus of ƘYĸǂK analysis is being able to quantify synergistic activity between two drugs in combination by creating a response surface model. Drug relationships are represented and evaluated by the Ƒ ÝÈÓÜÌÙÞÏÌÙÌ ƑØɣÙ ƑåɣÙ ÈÕË ƑøɣÙ ÈÙÌ indicative of antagonism, additivity, and synergism, respectively.

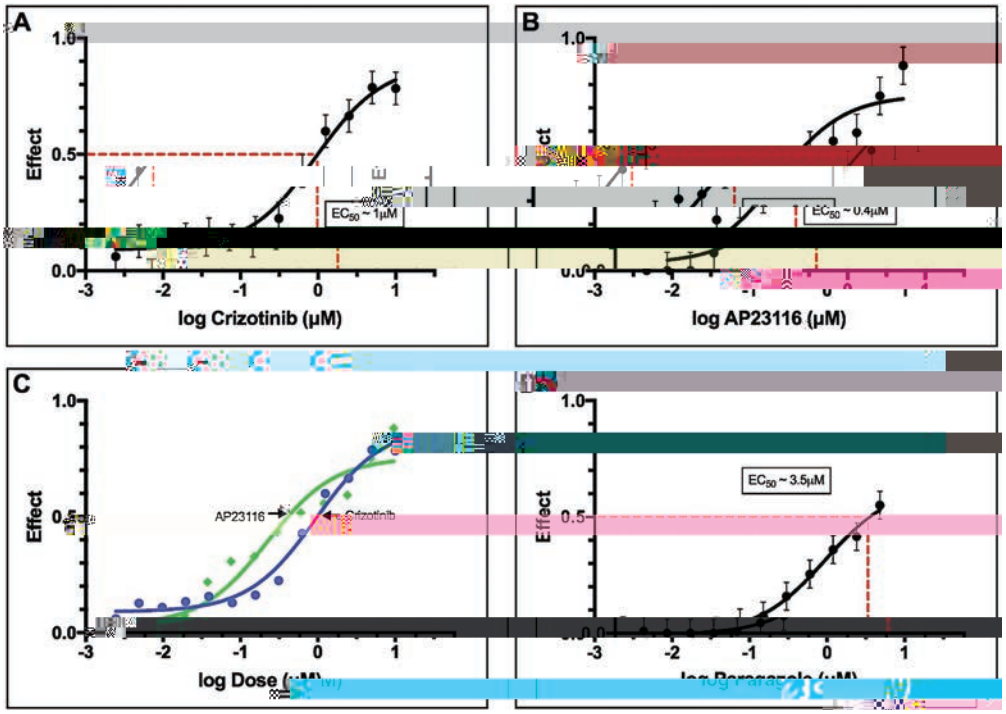

Figure 1. 2ÐÕÎÓÌıËÙÜÎÛËÖÚÌıÙÌÚ×ÖÕÚÌÚÕ Å#ÖÚÌıÙÌÚ×ÖÕÚÌÛÖÍ ' ţΣļļÛÜÛÊÙÐáÖÙÐÕÐÉÕ! Å#ÖÚÌıÙÌÚ×ÖÕÚÌÛÖÍ ' ţΣļļÛÜÛ /ļΣΣţΤÕ "Å . ÝÌÙÓÈàÖÍËÖÚÌıÙÌÚ×ÖÕÚÌÛÖÍ ' ţΣļļÛÜÛÊÙÐáÖÙÐÕÐÉÛÉÓÜÌÅ& /ļţΣΣΤÎÙÌÌÕÁÙÈÙÙÖÞÚÛÐÕËÐÊÈÙÌÛÓÖÊÈÙÐÖÕÛÖÍ$ " f_2Õ#Å#ÖÚÌıÙÌÚ×ÖÕÚÌÛÖÍ ' ţΣļļÛÙÜ×ÈÙÈÎÈáÖÓÌÕ

A crucial element of the experiment is establishing the baseline activity of each individual drug. This ÞÈÚ Ë ÖÕÌ É à ÛÙÌÈÛÐÕÎ ' ţΣ ļ ÞÐÛÏ ÊÙÐáÖÛÐÕÐÉÓ /ļţΣΣΤÙ ÈÕË ×ÈÙÈÎÈáÖÓÌ "in combination" with themselves in order to achieve purely additive responses. These self-self combinations àÐÌÓËÌË ƑÝÈÓÜÌÚÝÌÙà ÊÓÖÚÌ ÛÖ áÌÙÖ (%ÐÎõ ļÃõ3ÏÌ ÚÓÐÎÏÛËÌÝÐÈÛÐÖÕ ÖÍ ÛÏÌÚÌ ÝÈÓÜÌÚ ÍÙÖÔ ƑåƨÐÚ ÕÖÛÐÕËÐÊÈÛÐÝÌ ÖÍ antagonism, in the case of ALK self-self trial, or synergism, in the case of the HDAC self-self trial, but rather demonstrates that the set-up for the experiment was less than perfect; the numerous intensive and tedious steps of the drug addition process for ƘYĸĦƘ analysis yield many opportunities for small errors to be made. The presented data were produced from two biological replicated of each combination.

Establishing an additive baseline with the self-self trials is necessary to accurately determine the relationship between ALK and ' # "ÐÕÏÐÉÐÛÖÙÚ Þ Ï ÌÕ ' ţΣ ļ Ú Þ ÌÙÌ treated with the two combinations: ÊÙÐáÖÛÐÕÐÉƴ×ÈÙÈÎÈáÖÓÌ ÈÕË /ļţΣΣΤƴ paragazole. In order to verify the combination response, each drug pair is tested on two microplates, with the two drugs added in two ËÐř ÌÙÌÕÛÖÙÐÌÕÛÈÛÐÖÕÚõ%ÖÙ ÌÈÊÏ ÊÖÔ-bination, crizotinib/paragazole and /ļţΣΣΤƴ×ÈÙÈÎÈáÖÓÌÔƑÝÈÓÜÌÚÖÍ Þ ÌÓ over zero were produced, indicating strong synergistic activity for each ALKi/HDACi pair (%ÐÎõ ţÃõ - ÖÛÖÕÓà ËÖÛÎ Ì ƑÝÈÓÜÌÚÊÖÕÍÌÙ ÚàÕÌÙÎ àÛ ÉÜÛ so do the response surfaces produced by the ƘYĸĦƘ analysis (%ÐÎõ *TÃ*. The key feature of a synergistic surface response is the rounding of the response as the concentrations of each drug increase. This is clearly seen in both the crizotinib/paragazole (*Fig. T* È ÕË /ļţΣΣΤƴ×ÈÙÈÎÈáÖÓÌ ¶*Fig. T!Ã* response surfaces. This rounding indicates that as the concentration of one drug increases, less and less of the other drug is required to proËÜÊÌ ÛÏ Ì ÚÈÔ Ì Ì ř ÌÊÛÛ ÌßÌ Ô×ÓÐÍàÐÕÎ a synergistic relationship between each ALK inhibitor and paragazole. All results yielded positive k values, yet with varying magnitudes due All results yielded p9s the conce13 k SMC /Span a

2ÛÈÎÎÌÙÌÈ"ÖÔÉÐÕÈÛÐÖÕ3ÙÌÈÛÔÌÕÛÚ

Since synergistic activity was observed with each ALKi/HDACi combination, staggered combination experiments were conducted in order to determine whether the observed synergistic activities were dependent on ALKi or HDACi. These experiments were done by initially treating cells with the first drug followed by the addition of the other drug. Staggered combinations yielded stronger responses when ALKi was the initial treatment. As expected, due to the two ALK inhibitors, the initial addition of crizotinib had greater potency and biological activity (*Fig.* *Ţ!Ä* compared to when crizotinib was the initial treatment (%ÐÎõ Ţ Ä. Also, as expected, a higher potency was observed with the second drug as a secondary treatment compared to crizotinib. Due to the fact that survival of ALK+ cancers is highly dependent on constitutive ALK activation, it is not surprising that ALK inhibition appears to be the dominating factor. However, the discrepancy between responses of ALKi as initial vs. secondary treatment could be due to the fact that ALK inhibition is required for both ALK inhibitors and paragazole.)ÜËÎÐÕÎÉàÛÏÌÙÌÓÈÛÝÌÓàÓÖÞÌŚÊÈÊà of paragazole single-drug treatment, it would not be expected that HDAC inhibition would lend itself to greater +*Ð ÌřÌÊÛÝÌÕÌÚÚ àÌÛ ÚÐÔÜÓÚÈneous combination treatment yields dramatic results. In order to truly determine whether or not the observed synergistic activity is HDAC- or ALK-dependent, comprehensive mechanistic studies would be have to be conducted.

ƘʜɣkɣɣɣʜçÇ

Combination therapy is becoming a widely used strategy to ÔÖÙÌŚÊÈÊÐÖÜÚÓàÚÙÌÈÛ×ÈÚÐÌÕÚÚÈËÐÈÎnosed with cancers harboring genetic ÈÉÌÙÙÈÛÐÖÕÚ Ú×ÌÊÐŗÊÈÓÓà ÛÏÖÚÌ Þ ÏÐÊÏ confer drug resistance. Approximate- óà Ưƨôƨƨ×ÌÖ×ÓÌÈÙÌËÐÈÎÕÖÚÌËÞÐÛÏ +*ɪ$, +Tɪ×ÖÚÐÛÐÝÌ ÕÖÕɪÚÔÈÓÓ ÊÌÓÓ lung cancer each year (Sasaki et al. ɭƨΣƨÅ3ÏÌ×ÙÌÝÈÓÌÕÊÌÖÍÛÏÌÚÌËÐÈÎnoses necessitates the formulation of ÌřÌÊÛÐÝÌÚ×ÌÊÐÈÓÐáÌËÛÙÌÈÛÔÌÕÛÚÛÏÈÛ can overcome the resistance mech-

product, acquired drug resistance to ALK inhibition therapy is nearly inevitable. Therapeutic combinations are a promising method to overcome resistance mechanisms such as ALK Î ÌÕÌ ÈÔ×ÓÐ ÊÈÛÐÖÕ ÈÕËÍ ×ÖÐÕÛ ÔÜÚÈ

φ9ÏÈÕÎÌÛÈÓ5ls2ΣTA5' # "ÐÏÈÚÈÓÚÖ been shown to induce intrinsic apopÛÖÛÐÊ×ÈÙÏ ÞÈàÚÝÐÈ×ƒţÈÊÛÐÝÈÛÐÖÕ5!à inactivating nuclear histone deaceteÓÈÚÌÚ×ƒţÉÌÊÖÔÌÚÏà×ÌÙÈÊÌÛàÓÈÛÌËÓ preventing its inactivation via ubiqÜÐÛÐÕÈÛÐÖÕÉà, #, lφ9ÏÜÈÕÎls2ΣţA5 ×ƒţ ÈÊÛÐÝÈÛÐÖÕ ÐÕËÜÊÌÚ ÌßׯÙÌÚÚÐÖÕ of many downstream pro-apoptotic ÍÈÊÛÖÙÚ ÖÍ ÛÏÌ !ÊÓılÍÈÊÛÖÙÚÐÚÈÓÚÖÔÌÈËÐÈÛÌËÉà ÏàׯÙÈÊÌÛàÓÈÛÐÖÕ ÖÍ ÛÏÌ 'ţÈÕË 'T histone subunits, a result of class-I HDAC inhibition. Bao et al. also obÚÌÙÝÌË ÛÏÐÚ ÏàׯÙÈÊÌÛàÓÈÛÐÖÕ ÖÍ 'ţ ÈÕË 'T ÈÚ È ÙÌÚÜÓÛ ÖÍ ØÜÐÚÐÕÖÚÛÈÙ treatment. Finally, HDAC inhibition ÏÈÚÉÌÌÕ ÚÏÖÞÕ ÛÖ ÈÉÙÖÎÈÛÌ 23 3ţ activity, an essential transcriptional regulator of factors that promote cell survival, growth, proliferation, and ËÐřÌÙÌÕÛÐÈÛÐÖÕφ3ÈÒÌáÈÞÈ ÌÛÈÓ5ls2ΣΣA5 'àׯÙÈÊÌÛàÓÈÛÐÖÕ ÖÍ 23 3ţ ËÜÌ ÛÖ HDACi has been shown to inhibit its phosphorylation and catalyze its translocation from the nucleus to the cytoplasm, therefore diminishing its capability to induce transcription of its downstream factors (Gupta et al. ls2s0Ù9ÏÜÈÕÎls2ΣţA5

The fact that both ALKi and HDACi produce overlapping and ÕÖÕıÖÝÌÙÓÈ××ÐÕÎ ÌřÌÊÛÚ ÐÕ ÛÌÙÔÚ ÖÍ stimulating pro-apoptotic pathways could very well explain the synergistic relationship between the two inhibitors when administered to ALK$,+TÊÈÕÊÌÙÚ5 6 ÏÌÕÊÖÔÉÐÕÌËÞÐÛÏ ËÌ×ÓÌÛÐÖÕ ÖÍ +*ÈÕËÈ23 3ţÈÊÛÐÝÐty via ALKi, concurrent activation of the TNF pathway, along with the Ü×ıÙÌÎÜÓÈÛÐÖÕ ÖÍ ×ÙÖıÈ×Ö×ÛÖÛÐÊ!ÊÓılׯÙÖÛÌÐÕÚ ÝÐÈ×ƒţÐÕËÜÊÛÐÖÕ ÈÕËÏÐÚtone hyperacetylation, HDACi may overcome pro-survival mechanisms ÜÛÐÓáÌËÉà +*ı$,+T-2"+"Ú5"ÌÙtainly a threshold is reached whereÐÕÛÏÌ×ÙÖıÈ×Ö×ÛÖÛÐÊÌřÌÊÛÚ ÖÍ +* and HDAC inhibition overcome all pro-survival pathways and induce cell death. While much mechanistic-focused work must be done to validate this hypothesis, recent research, as well as the data presented ÐÕÛÏÐÚ×È×ÌÙÛÊÖÕ¸ÙÔÚÛÏÌÛÓÌÎÐÛÐÔÈcy of combining ALKi with HDACi ÈÚÈ ÔÌÈÕÚ ÖÍ ÛÙÌÈÛÐÕÎ +*ı$,+T cancers. In addition to establishing the precise mechanisms that confer synergy between these two drugs, employing this combination thera×àÖÕ +*ı$,+TÊÌÓÚÛÏÈÛ ÌßÏÐÉÐÛ ALKi-resistance would further the validity and value of this particular approach. Only by formulating a specialized treatment that is capable of overcoming acquired drug resistance to ALKi therapy can we improve the quality and longevity of life of those ËÐÈÎÕÖÚÌËÞÛÏ +*ı$,+Tı×ÖÚÛÐÝÌ cancers.

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Bayliss, Richard, Jene Choi, Dean A. Fennell, Andrew M. Fry, and Mark W. Richards. “Molecular

apy, schizophrenia patients showed

%ÈÕÎ ÌÛ ÈÓõ φ⌊ƨΣƒÅ ÈÓÚÖ ÊÖÙ-
related music to language and found that both music and speech involve perception, action, learning, memory, and emotion. They led a data-driven analysis in which participants underwent a natural stimulus ÍÜÕÊÛÐÖÕÈÓ , 1(φ - ıÍ , 1(Å Þ ÏÐÓÌ ÔÜ-
sic and speech were used as stimuli. It was found that music and speech produced almost the same results, with distribution of activity as shown ÐÕ3ÈÉÓÌΣφ%ÈÕÎ ÌÛÈÓõÛ⌊ƨΣƒÅõ

[…]

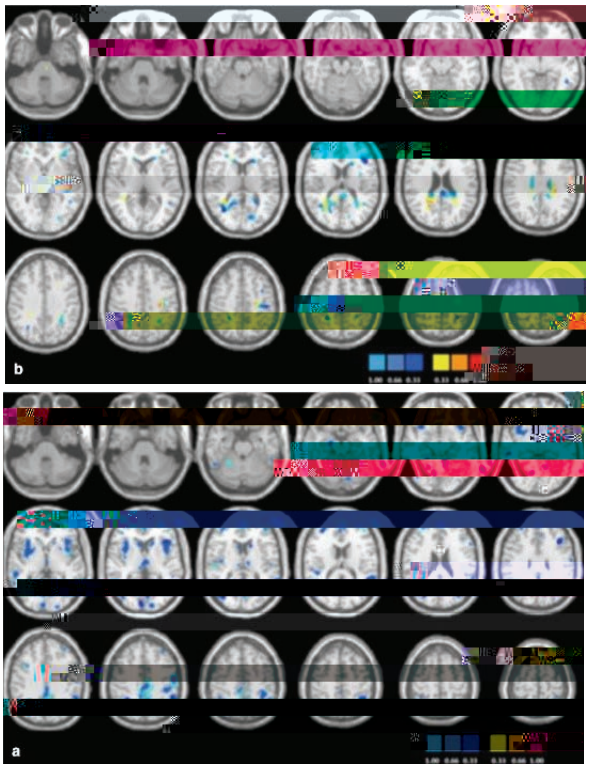
While fMRI proves to be a consistent and reliable tool for studying the brain, electroencephalogram φ$$&Å ÐÚ ÈÕÖÛÏ ÌÙ ÞÈà ÛÖ ËÌÛÌÙÔÐÕÌ the exact locations of the brain that processes music (Nizamie and Tik-
ÒÈÓ⌊ƨΣTÅõ(Û ÞÈÚ ËÐÚÊÖÝÌÙÌË Û ÏÈÛ Û Ï Ì
acoustic circuit involves the auditory nerve, brainstem, medial geniculate, body of the thalamus, and auditory ÊÖÙÙÌß φ - ÐáÈÔÐÌ ÈÕË 3ÐÒÒÈÛ ⌊ƨΣTÅõ Not only do these areas of the brain strongly correlate to the limbic system, but after undergoing music ther-

there is a fair amount of documented functional imaging of disorders and ÛÏÌ ÈÙÌÈÚ ÖÍ ÛÏÌ ÉÙÈÐÕ ÛÏÌà ÌřÌÊÛõ (Õ order to ensure that music would affect the brain during an fMRI, StewÈÙÛ ÌÚ ÈÓõ ɻƨƨƬÆ ÍÖÜÕËÆÛÏÈÛ ÊÌÙÛÈÐÕ ÔÜsical listening disorders did in fact ÚÏÖÞ ÚÐÎÕÐ ÊÈÕÛ ËÐřÌÙÌÕÊÌÚ ÐÕ ÈÊÛÐvation with music stimuli. Stewart et ÈÓõ ɻƨƬÆ ÈÓÚÖ ÍÖÜÕËÛÏÈÙ ÓáÏÌÐÔÌÙÚ produced increased perfusion in the left temporal lobe and angular gyrus, and that musical hallucinations often occurred in patients with depression, schizophrenia, obsessive-compulsive disorder, and alcoholism. This review will not focus on Alzheimer's or alcoholism, but the research done by Stewart is worth mentioning as it is one of the only studies connecting music and psychiatric disorders during functional imaging.

Personality disorders are a common issue in today's society but is frequently misdiagnosed, with only È××ÙÖßÐÔÈÚÌÓà ƯΣõƯŭ ÖÍ ËÐagnoses remaining constant upon a second evaluation by a psychiatrist (Merten et al., ɻƨΣƯÅõ 3ÏÌÙÌ ÈÙÌ ÔÈÕà Ûà×ÌÚ of personality disorders, but the most common are bipolar disorder, antisocial personality disorder, and narcissistic personality disorder. Bipolar disorder (ǨǨÆ ÏÈ××ÌÕÚ ÛÖ be the most common of the three, and upon using manual tracing methods with fMRI, ǨǨ ÚÏÖÞ ÚÈřÌÊÛÐÝÌ ÈÕË behavioral dysregulation, impairments of prosody and interpersonal connections, and disturbed relatedness, as well ÈÚ ÚÔÈÓÓÌÙ ÎÙÌà ÔÈỤÌÙ ÝÖÓÜÔÌ ÐÕ ÛÏÌ amygdala and hippocampus (Schulá Ì ÈÕË 1ÖÌ×ÒÌÚ ɻƨΣTÕ %ÙÈÕÎÖÜ ÌÛ ÈÓõ

ɻƨΣTÅõ 3ÏÌÚÌ ŗÕËÐÕÎÚ ÈÙÌ ÚÐÎÕÐŗÊÈÕÛ in relation to this review because the amygdala and hippocampus are both involved in processing music, and the impairments in prosody shown could relate to how a person with ǨǨ would react to music. Antisocial personality disorder (ǩĘǨÆ ÈÕËÕÈÙcissistic personality disorder (ÇĘǨÆ both showed lower activation of the amygdala with orbitofrontal and ventromedial implications (Shulze ÈÕË 1ÖÌ×ÒÌÚ ɻƨΣTÅõ 3ÏÌ ÚÜÉÛÌ ËÐÍferences between ǨǨ and ÇĘǨ is key in looking for potential diagnostic abilities, as ǨǨ focuses on a smaller ÎÙÌà ÔÈỤÌÙ ÖÍ ÛÏÌ ÈÔà ÎËÈÓÈÚ ÞÏÐÓÌ ÇĘǨ focuses on lower activation, as ÚÏÖÞÕ É à %ÐÎÜÙÌ ɻõ

[…]



%ÐÎÜÙÌ ɻõ # ÐÚÊÙÐÔÐÕÈÛÐÖÕ ÔÈ×ÚÍÖÙ ÎÙÌà ÔÈỤÌÙ ÈÆÈÕÈËÞ ÏÐÛÌ ÔÈỤÌÙ ÉÆÈÓÈÚÐŗÊÈÛÐÖÕÉÌÛÞÌÌÕ patients with bipolar disorder and healthy inËÐÝÐËÜÈÓÚ%ÙÈÕÎÖÜ ÌÛ ÈÓõ ɻƨΣTÆ

ķçÇķ₢¥ɣɨçÇ

In summary, all psychiatric disorders discussed present with ËÐřÌÙÌÕÊÌÚ₪ÐÕ₪Û˙Ì₪ÈÔàÎËÈÓÈÓ₪ÐÕÚÜÓÈÓ₪ orbitofrontal regions, lingual gyrus, or cingulate gyrus, which are all regions connected to the processing of music in healthy individuals as ÞÌÓÓß₪ 3˙ÌÙÌ₪ ÈÙÌ₪ ÜÕÐØÜÌ₪ ËÐřÌÙÌÕÊÌÚ₪ for each disorder which lends to the hypothesis that music may be a reliable stimulus that produces unique results when studying functional imaging of the brain. While there is È₪ÚÐÎÕÐ˛ÊÈÕÛ₪ÈÔÖÜÕÛ₪ÖÍ₪ÙÌÚÌÈÙÊÏ₪ÛÏÈÛ₪ has been done studying music and the brain in healthy individuals and functional imaging of some psychiÈÛÙÐÊ₪ËÐÚÖÙËÌÙÚÛ₪ÙÌÚÌÈÙÊÏ₪ÐÕ₪Û˙Ì₪˛ÌÓË₪ of music psychophysiology is hardly complete. There is enough information to build a foundation for future research, but more research is needÌË₪ ÛÖ₪ ÊÙÌÈÛÌ₪ ÊÖÕÚÐÚÛÌÕÛ₪ ˛ÕËÐÕÎÚ₪ ÐÕ₪ the functional imaging of some disorders, such as in schizophrenia, depression, and others not mentioned in this review.

[…]

Based on the information given by the current research, it can be concluded that psychiatric disorders ÞÖÜÓË₪ÚÏÖÞ₪ËÐřÌÙÌÕÊÌÚ₪ÐÕ₪Û˙Ì₪ÉÙÈÐÕ₪ when stimulated with music and it may be hypothesized that one could use music in conjunction with fMRI to diagnose the aforementioned psychiatric disorders. If researchers are ÈÉÓÌ₪ ÛÖ₪ ˛ÕË₪ È₪ ÊÖÙÙÌÓÈÛÐÖÕ₪ ÉÌÛÞÌÌÕ₪ ÝÐÛÈÓÚ₪ ÔÜÚÐÊÔ₪ÈÕË₪Ú×ÌÊÐ˛Ê₪ËÐÚÖÙËÌÙÚ₪ while listening to music that is both unique to the disorder and reliable, È řÖÙËÈÉÓÌ₪Ï˙ÌÈÓÛÏÊÈÙÌÓ₪ËÐÈÎÕÖÚÐÚÓ₪ÈÕË₪ treatment of psychiatric disorders may be brought to the community and change the means, accuracy, and costs of mental health issue diagnosis and treatment.

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