



## BACKGROUND

With online shopping through Amazon marketplace getting popular, consumers are making their purchase decisions more often based on product's user rating and written reviews. Researchers have also looked into the Amazon user reviews to obtain consumer perception information regarding products like wearable devices [1] and penile clamps [2]. Hundreds of topical retinol products are marketed on the Amazon website to consumers for antiaging or anti-wrinkle purposes. Thousands of consumers provided user ratings and/or writing reviews for these products. With so many retinol products, it is hard for consumers to choose a right topical retinol product for them. This study examines the Amazon user reviews from a representative number of topical retinol products to extrapolate some relationships among the consumer self-reported skin irritation, skin burn, efficacy, anti-wrinkle effect, and retinol content in these products, and thus provides some guidance in choosing the topical retinol products.

## METHODS

Twelve topical retinol products (>2000 user rating and >200 written reviews) of different retinol contents were purchased from Amazon. The retinol content in these products was determined through an HPLC method, and the amount of retinol penetration into human cadaver skin was also determined. The Amazon user reviews from each product were searched with four different keywords: "burn", "irritation", "effect", "wrinkle" separately. The reviews from each product containing the keyword were examined to determine whether the review was positive (yes) or negative (no) in response to the keyword, and the percentage of the number of yes to the total number of reviews containing the keyword was determined. A plot of the relationship between the percentage of yes to skin burn / skin irritation / product effectiveness / reduce wrinkle and the retinol content of these products was constructed. A correlation curve was generated using Prism with nonlinear regression with the One Phase Association Model:  $y = y_0 + (Plateau - y_0)(1 - e^{-kx})$ . Also, a plot between the percentage of yes to skin burn / irritation / product effectiveness / reduce wrinkle and the amount of retinol penetrated into the skin from these products was plotted, and a similar correlation curve with the one phase association model was generated for the plot.

## RESULTS

Table 1. Summary of Amazon consumer written review results for each topical retinol product.

MP#	Measured Retinol Content	Penetrated Retinol Amount (ug)	Total # written reviews	Irritate Skin		Burn Skin		Product Effectiveness		Reduce Wrinkle	
				Yes	No	Yes	No	Yes	No	Yes	No
1	0.1355%	0.6412	1,108	7/24	17/24	24/34	10/34	29/38	9/38	73/111	38/111
				29%	71%	71%	29%	76%	24%	66%	34%
2	0.0998%	0.0966	587	4/9	5/9	6/8	2/8	22/38	16/38	20/24	4/24
				44%	56%	75%	25%	58%	42%	83%	17%
3	1.339%	4.425	301	6/12	6/12	15/16	1/16	12/13	1/13	11/11	0/11
				50%	50%	94%	6%	92%	8%	100%	0%
4	0.1391%	NA	2,451	36/76	33/76	127/162	28/162	30/46	16/46	281/413	132/413
				47%	53%	78%	22%	65%	35%	68%	32%
5	0.0299%	NA	11,074	56/493	437/493	58/181	123/181	238/306	68/306	484/585	101/585
				11%	89%	32%	68%	78%	22%	83%	17%
7	0.028%	NA	2654	7/31	24/31	14/28	14/28	7/19	12/19	26/46	20/46
				23%	77%	50%	50%	37%	63%	57%	43%
8	0.0001%	NA	248	1/13	12/13	2/4	2/4	5/7	2/7	7/8	1/8
				8%	92%	50%	50%	71%	29%	88%	12%
9	0.0181%	NA	5283	29/154	125/154	45/76	31/76	89/123	34/123	161/201	40/201
				19%	81%	59%	41%	72%	28%	80%	20%
10	0.0017%	NA	681	5/12	7/12	13/15	2/15	8/10	2/10	11/14	3/14
				42%	58%	87%	13%	80%	20%	79%	21%
11	1.009%	5.630	571	11/14	3/14	45/46	1/46	33/40	7/40	27/31	4/31
				79%	21%	98%	2%	83%	17%	87%	13%
12	0.4355%	2.433	578	10/25	15/25	26/27	1/27	12/15	3/15	70/102	32/102
				40%	60%	97%	3%	80%	20%	69%	31%
13	0.2267%	1.127	525	16/32	16/32	86/100	14/100	19/20	1/20	48/63	15/63
				50%	50%	86%	86%	95%	5%	76%	24%

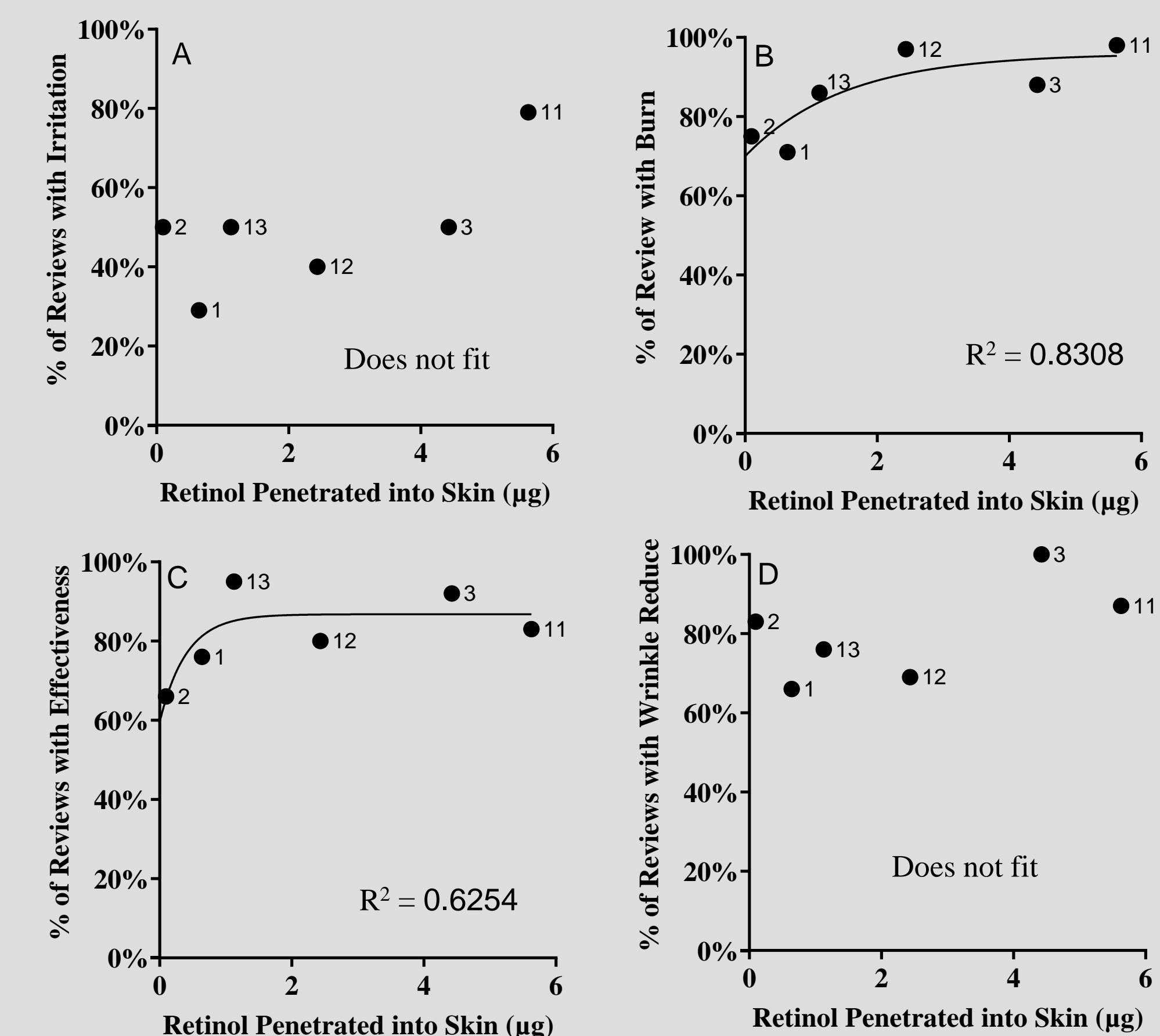


Fig 2. A, B, C, D: plots of relationships of between the percentage of yes to skin irritation / skin burn / product effectiveness / reduce wrinkle and the amount of retinol penetrated into the skin from the retinol products.

## CONCLUSION

The user reported skin burn (%) is directly correlated to the retinol content in the products, and it showed even stronger correlation to the amount of retinol penetrated into the skin.

The user reported product effectiveness (%) is correlated to the retinol content in the products, and it also correlated to the amount of retinol penetrated into the skin.

The user reported skin irritation (%) also showed some correlation to the retinol content in the products, but it showed no correlation to the amount of retinol penetration into the skin.

The user reported wrinkle reduce (%) showed no correlation to the retinol content in the products, and it also showed no correlation to the amount of retinol penetration into the skin.

## REFERENCES

1. K Chong et al., Consumer perceptions of wearable technology devices: retrospective review and analysis. JMIR Mhealth Uhealth 2020; 8(4) e17544.
2. A Lee et al., Qualitative analysis of Amazon customer reviews of penile clamps for male urinary incontinence. Neurourology and Urodynamics. 2021; 40: 384-390.

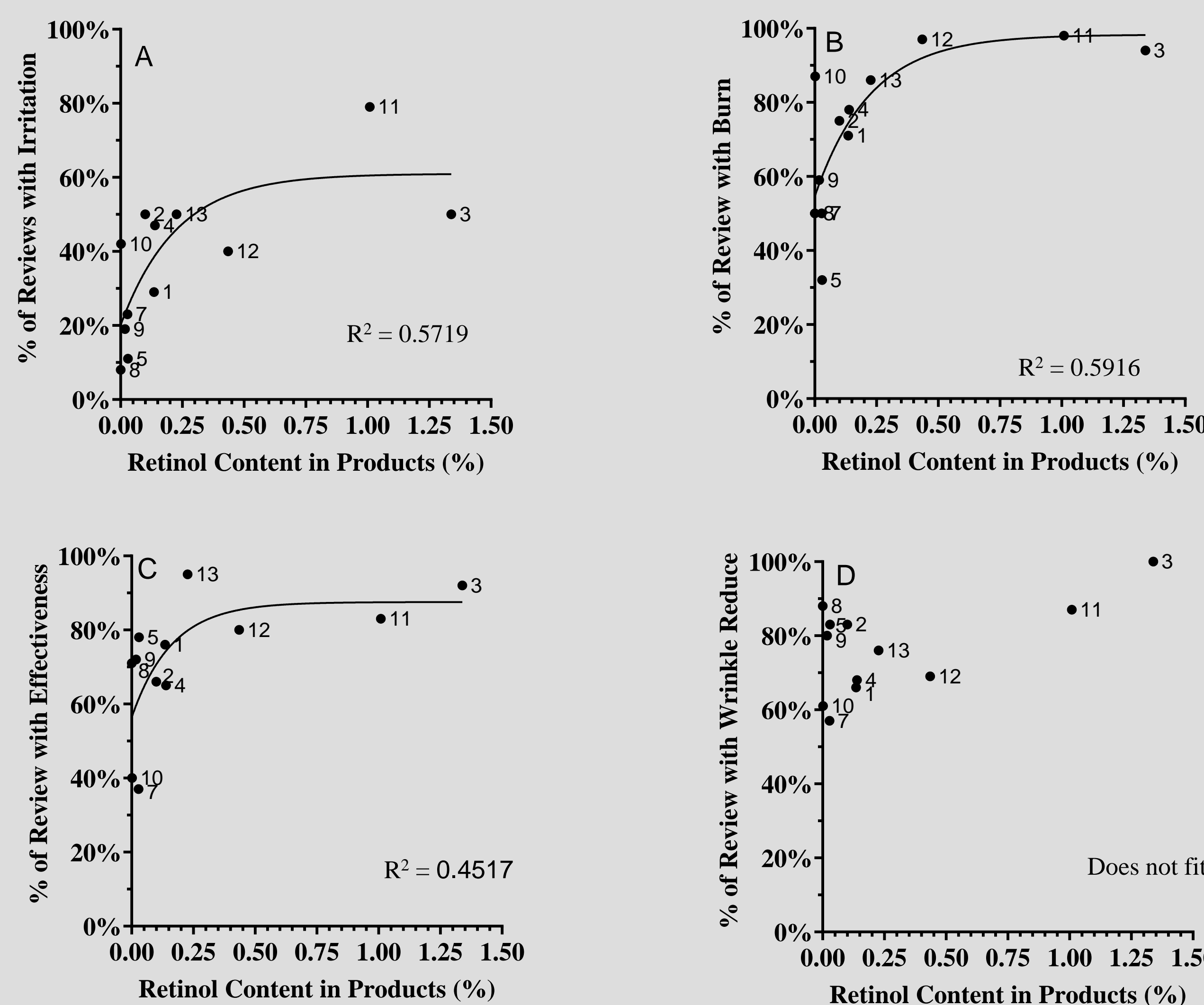


Fig1. A, B, C, D: plots of relationships between the percentage of yes to skin irritation / skin burn / product effectiveness / reduce wrinkle and the retinol content of the retinol products.